

CAR 2019

EXPERIENCE THE
FUTURE OF RADIOLOGY

VIVEZ L'AVENIR DE
LA RADIOLOGIE

APRIL 11-14 AVRIL 2019
MONTREAL, QC



Canadian Association of Radiologists
L'Association canadienne des radiologistes

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WELCOME LETTERS MOTS DE BIENVENUE





Dear colleagues,

It is with great pleasure that I welcome you to the CAR 2019 Annual Scientific Meeting, Canada's premier educational event dedicated to medical imaging and radiologists. I am excited to be back in the dynamic city of Montreal again this year for our 82nd Annual Conference.

This year's conference theme is Radiology, Yours to Discover. We are expanding on artificial intelligence (AI) themes from last year's ASM, addressing various subjects that are central to our profession, such as emerging technologies, their application into our current workflows, and how we, as leaders of our profession, can harness the power of AI to improve patient outcomes, while ensuring the ethical administration of these technologies. Renowned speakers will discuss the concepts of value, physician performance and productivity as they apply to your practices.

I would like to recognize and give kudos to Dr. Michael Patlas, CAR 2019 ASM Chair, as well as the other also fantastic members of the conference planning committee, for their tremendous work in preparing this robust educational program. I would also like to acknowledge our many speakers, both from Canada and abroad, for committing their time to impart on us their knowledge and contribute to the success of this meeting through their expertise. Finally, I would like to thank the CAR staff and event management company, Face 2 Face, for their hard work in organizing what is sure to be a successful event. Of course, I would like to thank our industry partners and event sponsors. Without their support this event would not be possible. Throughout the event, I would encourage all of you to take the time to visit the exhibit hall and to speak with them about their products and services. Finally, I would like to thank you, our members & conference participants who are the inspiration for our drive to provide our members opportunities to learn and lead healthcare in Canada.

I wish you all a successful meeting and look forward to connecting with you throughout the event!

Chers collègues,

J'ai le plaisir de vous accueillir à l'édition 2019 du Congrès scientifique annuel de la CAR, l'événement éducatif le plus important au Canada dédié à l'imagerie médicale et aux radiologistes. Je suis heureux d'être de retour cette année dans la ville dynamique de Montréal pour la 82^e conférence annuelle.

Cette année, le thème de la conférence sera : « Radiologie : votre découverte ». Depuis le congrès de l'année dernière, nous approfondissons le thème de l'intelligence artificielle (AI), développant ainsi différentes thématiques principales de notre profession, telles que les technologies émergentes, leur application au sein de notre profession et la manière dont nous pouvons, en tant qu'experts, exploiter le potentiel de l'IA afin d'améliorer les résultats des patients tout en assurant une utilisation éthique de cette technologie. Des intervenants renommés débattront des concepts de valeur, de performance médicale et de productivité appliqués à notre activité.

Je voudrais féliciter le Dr Michael Patlas, le président du CSA 2019 de la CAR, ainsi que les autres membres incroyables du comité de planification du congrès, pour le travail phénoménal qu'ils ont accompli afin de préparer un programme éducatif d'une telle envergure. Je voudrais également remercier nos nombreux conférenciers venant du Canada et de l'étranger pour le temps qu'ils consacrent à nous transmettre leur savoir et contribuer au succès de cet événement grâce à leur expertise. Enfin, je voudrais remercier le personnel de la CAR et la société de gestion événementielle, Face 2 Face, pour le remarquable travail qu'ils ont fourni afin d'organiser un événement que l'on peut qualifier de réussi. Je voudrais bien évidemment remercier nos partenaires du secteur ainsi que nos commanditaires. Cet événement n'aurait pas eu lieu sans leur soutien. Tout au long de l'événement, je vous encourage tous à prendre le temps de vous rendre dans le salon d'exposition et de discuter avec eux à propos de leurs produits et leurs services. Enfin, je voudrais vous remercier, nos membres et participants au congrès, qui représentez une source de motivation pour offrir à nos membres la possibilité d'apprendre et d'être les pionniers en matière de soins de santé au Canada.

Je vous souhaite à tous un congrès réussi et je me réjouis de réseauter avec vous tout au long de l'événement!

Dr. Emil Lee

President / Président

Canadian Association of Radiologists / L'Association canadienne des radiologistes



Canadian Association of Radiologists
L'Association canadienne des radiologistes



Message from CAR 2019 ASM Chair

Welcome to the 82nd CAR Annual Scientific Meeting and to the eclectic city of Montreal. Being part of the planning process for this educational event has been a great pleasure and I am very proud of the work the planning committee has done in putting together such a high caliber program. This year's theme, the Future of Radiology – Yours to Discover is especially relevant due to strong focus on emerging technologies such as artificial intelligence and multi-energy CT. Over the course of the weekend you will hear from many talented speakers and hopefully add to your already extensive repertoire and expertise.

I would like to highlight the work of the Program Planning Committee as well as offer kudos to the CAR staff. The team has outdone themselves in pulling together a stellar event, one which I am very much looking forward to partaking in. As your chair and master of ceremonies, I invite you to consult the CAR 2019 ASM app. You can access the full program schedule as well as be alerted to social activities and have the ability to network with your peers.

I hope you enjoy the conference but also take some time to relish in the magnificent attractions that this beautiful city has to offer.

Message de la part du président du CSA 2019 de la CAR

Bienvenue à la 82^e édition du Congrès scientifique annuel de la CAR et dans la ville éclectique de Montréal. C'est avec grand plaisir que j'ai participé à l'organisation de cet événement éducatif, et je suis très fier du travail que le comité d'organisation a fourni pour élaborer un programme d'une telle envergure. Le thème de cette année – « Le futur de la radiologie : votre découverte » – est particulièrement pertinent, notamment grâce à l'attention qu'il porte aux technologies émergentes telles que l'intelligence artificielle et la tomographie multi-énergie. Au cours de cette fin de semaine, vous entendrez de nombreux conférenciers talentueux s'exprimer, et avec un peu de chance, vous pourrez compléter votre répertoire et votre expertise déjà vastes.

Je voudrais mettre en lumière le travail effectué par le comité de planification du programme et féliciter le personnel de la CAR. L'équipe s'est surpassée en donnant naissance à un événement exceptionnel auquel je suis impatient de participer. En ma qualité de président et maître de la cérémonie, je vous invite à consulter l'application CSA 2019 de la CAR. Vous pouvez accéder à la programmation complète et recevoir des notifications sur les activités sociales, ainsi que réseauter entre pairs.

J'espère que vous apprécierez la conférence et que vous prendrez également le temps de profiter des incroyables attraits que la ville a à offrir.

Michael N. Patlas, MD, FRCPC, FSAR
Professor of Radiology, McMaster University / Professeur de radiologie, Université McMaster



Canadian Association of Radiologists
L'Association canadienne des radiologistes



**MESSAGE FROM THE MINISTER OF HEALTH
CANADIAN ASSOCIATION OF RADIOLOGISTS' 82nd ANNUAL SCIENTIFIC MEETING
MONTREAL, QUEBEC APRIL 11 – 14, 2019**

**MESSAGE DE LA MINISTRE DE LA SANTÉ
82^e CONGRÈS SCIENTIFIQUE ANNUEL DE L'ASSOCIATION CANADIENNE DES RADIOLOGISTES
MONTRÉAL (QUÉBEC) DU 11 AU 14 AVRIL 2019**

I am delighted to welcome you to the 82nd Annual Scientific Meeting of the Canadian Association of Radiologists. This year's theme, "Future of Radiology" will, I am sure, lead to fruitful discussions on innovation and improving patient care. As specialists in the detection and treatment of diseases, your contribution to Canada's health care system is invaluable. Over the next few days, you will have the opportunity to discuss the latest medical advances in your field. These discussions are crucial, as they will help shape the future of your profession and, in turn, contribute to better health outcomes.

The Government of Canada strongly believes that innovation leads to better patient care. In that regard, we are committed to working with provinces, territories and stakeholders to ensure the health care system continually improves and meets the needs of Canadians.

Your ongoing commitment to the highest standards of patient care, research and lifelong learning helps us achieve this goal. On behalf of the Government of Canada, I thank you for investing in your professional development, and I know that Canadians everywhere will be healthier because of it.

Wishing you all a very productive meeting.

C'est avec grand plaisir que je vous souhaite la bienvenue au 82^e Congrès scientifique annuel de l'Association canadienne des radiologistes, qui a pour thème cette année l'avenir de la radiologie. Je suis persuadé que ce thème donnera lieu à des discussions fructueuses sur l'innovation et sur l'amélioration des soins aux patients. En tant que spécialistes de la détection et du traitement des maladies, votre contribution au système de santé canadien est inestimable. Au cours des prochains jours, vous aurez l'occasion de parler des plus récentes avancées dans votre domaine de spécialité. Ces discussions sont d'une importance capitale étant donné qu'elles aideront à dessiner l'avenir de votre profession et, par conséquent, permettront d'améliorer l'état de santé de tous.

Le gouvernement du Canada est fermement convaincu que l'innovation ouvre la voie à de meilleurs soins aux patients. À cet égard, il est déterminé à collaborer avec les provinces, les territoires et les parties prenantes pour veiller à ce que le système de santé ne cesse de s'améliorer et de répondre aux besoins des Canadiens.

Votre engagement sans relâche à l'égard des normes les plus élevées en matière de soins aux patients, de recherche et d'apprentissage nous aide à atteindre notre objectif. Au nom du gouvernement du Canada, je vous remercie d'investir dans votre perfectionnement professionnel, ce qui aura pour effet, j'en suis sûre, d'améliorer la santé de toute la population canadienne.

Je vous souhaite à tous et à toutes un congrès des plus productifs.

The Honourable Ginette Petitpas Taylor, P.C., M.P. / L'honorable Ginette Petitpas Taylor, C.P., députée
Minister of Health / Ministre de la Santé



MESSAGE DE LA MINISTRE DE LA SANTÉ ET DES SERVICES SOCIAUX

Avec des phénomènes tels que le vieillissement démographique et l'augmentation du nombre de cas de cancers, notre réseau de la santé et des services sociaux se voit confronté actuellement à des enjeux de taille. Parmi ceux-ci, notons la nécessité d'offrir à ses usagers le meilleur accès possible aux services diagnostiques, et ce, en temps opportun. En effet, une détection précoce de certaines maladies est souvent cruciale, permettant dans bien des cas de mieux traiter les patients, voire de leur sauver la vie.

À cet égard, nous pouvons compter sur la précieuse expertise et la collaboration essentielle des radiologistes, de même que sur des technologies de pointe en imagerie médicale qui contribuent de manière indispensable à l'efficacité de nos interventions auprès des patients. Voilà pourquoi je suis très fière de m'adresser à vous dans le cadre de cette 82^e édition de cette rencontre scientifique annuelle de l'Association canadienne des radiologistes.

Lors de cet événement, vous pourrez échanger sur les plus récentes percées dans votre domaine, où de nombreuses perspectives d'avenir nous laissent d'ailleurs espérer de grands progrès, notamment du côté de l'intelligence artificielle. Je suis d'ailleurs persuadée que les découvertes que vous ferez ici en compagnie de vos collègues seront mises à profit au sein de notre réseau au cours des prochaines années, au bénéfice de l'ensemble de notre collectivité.

Alors je vous souhaite une excellente réunion scientifique annuelle!

Danielle McCann
Ministre de la Santé et des Services sociaux / Minister of Health and Social Services
Gouvernement du Québec / Government of Québec

Québec 

GENERAL INFORMATION RENSEIGNEMENTS GÉNÉRAUX



GENERAL INFORMATION

CAR 2019 Venue and Host Hotel

Le Centre Sheraton
1201 René-Lévesque Blvd W, Montreal, QC H3B 2L7
www.sheratoncentremontreal.com

Registration and Information Desk

LOCATION

Level 4

HOURS*

Thursday, April 11 16:00 – 20:30
Friday, April 12 06:30 – 18:30
Saturday, April 13 06:30 – 19:30
Sunday, April 14 06:30 – 12:45

**Hours are subject to change*

Badges

CAR 2019 name badges must be worn and visible at all times by all delegates. They are required to access all scientific sessions and official CAR social functions.

Name badges are not transferable. Please do not alter, deface and avoid covering name badges with business cards, pins or stickers.

Speaker-Ready Room

The speaker-ready room is in Salon 8 on Level 4. All presentations must be reviewed, edited and saved as the final version at least two (2) hours prior to the start of the speaker's scheduled session.

The speaker-ready room will be open during the following dates and times:

Thursday, April 11 16:00 – 20:30
Friday, April 12 06:30 – 18:30
Saturday, April 13 06:30 – 19:30
Sunday, April 14 06:30 – 12:45

Mobile Application

CAR is going green for 2019! The conference app is at your fingertips for iOS and Android device users. See the registration desk if you require assistance with the app.

RENSEIGNEMENTS GÉNÉRAUX

Installations et hôtel hôte du Congrès CAR 2019

Le Centre Sheraton
1201, boul. René-Lévesque Ouest, Montréal (Québec) H3B 2L7
www.sheratoncentremontreal.com

Bureau d'inscription et d'information

LIEU

4^e étage

HORAIRE*

Judi 11 avril 16 h à 20 h 30
Vendredi 12 avril 6 h 30 à 18 h 30
Samedi 13 avril 6 h 30 à 19 h 30
Dimanche 14 avril 6 h 30 à 12 h 45

**Les horaires sont sujets à changements*

Porte-nom

Les délégués sont priés de porter le porte-nom du Congrès de la CAR 2019 de manière visible, en tout temps. Les porte-nom sont exigés pour participer aux séances scientifiques et aux activités sociales officielles de la CAR.

Les porte-nom ne sont pas transférables. Il est interdit de les modifier ainsi que de les recouvrir ou d'y apposer des cartes professionnelles, des épinglettes, des autocollants ou autre.

Salle de préparation des conférenciers

La salle de préparation des conférenciers est située dans Salon 8, au 4^e étage. Les conférenciers devront avoir passé en revue, modifié et enregistré leurs documents en version définitive au moins deux heures avant le début de leur présentation.

Heures d'ouverture de la salle de préparation des conférenciers :

Judi 11 avril 16 h à 20 h 30
Vendredi 12 avril 6 h 30 à 18 h 30
Samedi 13 avril 6 h 30 à 19 h 30
Dimanche 14 avril 6 h 30 à 12 h 45

Application mobile

La CAR prend le virage vert en 2019! Téléchargez l'application du Congrès sur votre appareil iOS ou Android. Pour obtenir de l'aide au sujet de l'application, rendez-vous au bureau d'inscription.

WHOVA - OFFICIAL EVENT APP

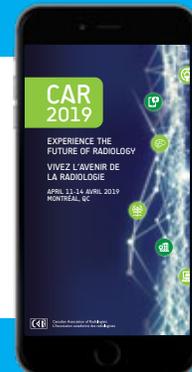
- Explore the professional profiles of event speakers and attendees
- Send in-app messages and exchange contact info
- Network and find attendees with common affiliations, educations, shared networks, and social profiles
- Receive update notifications from organizers
- Access the event agenda, GPS guidance, maps, and parking directions at your fingertips

DOWNLOAD WHOVA AND TAKE YOUR EVENT MOBILE.

Get Whova from the App Store or Google Play. Please sign up for the app with your social media account or email.

The event invitation code is: **CAR2019**

You will be asked for an event invitation code after installing Whova



Learning Objectives

After attending this conference, attendees should be able to:

- Define the role and utilization of advanced and emergent technologies in clinical imaging. (CanMEDS Roles: Communicator, Leader, Medical Expert)
- Identify and implement practical strategies to improve the management of academic and community radiology departments (CanMEDS roles: Collaborator, Communicator, Leader, Professional)
- Discuss the practical, legal, and ethical changes that have occurred in radiology practice and research as a result of the implementation of artificial intelligence, deep learning, and machine learning. (CanMEDS roles: Health Advocate, Leader, Professional)
- Discuss how imaging can help inform therapeutic decision making. (CanMEDS Roles: Health Advocate, Leader)
- Identify strategies to engage in academic activities and contribute to the academic life of a radiology department. (CanMEDS role: Professional, Leader, Scholar)

Abstracts (ePoster Sessions)

The CAR will be showcasing posters using digital screens. The ePoster sessions will take place on the 4th Floor annex. The Royal College has determined that viewing ePosters meets the criteria for a Self-Learning Scanning Activity and is eligible for Section 2 credits under the MOC program. ePosters are available for viewing on a self-serve basis throughout the day and during health breaks.

Accreditation

Participants should only claim the credits commensurate with the extent of their participation in the activity.

CAR 2019 is an Accredited Group Learning Activity (Section 1) and an Accredited Simulation Activity (Section 3) as defined by the Maintenance of Certification Program of the Royal College of Physicians and Surgeons of Canada (RCPSC) and approved by the Canadian Association of Radiologists. The CAR 2019 scientific programme is approved for a maximum of 18.25 credits (Section 1).

Participants in the **CT Colonography Practical Workshop** are eligible to claim a maximum of 5.75 hours (credits are automatically calculated) under Section 3 (Simulation Based Activity) of the Royal College MOC program.

Participants in the **Prostate MRI and PIRADSv2 Practical Workshop** are eligible to claim a maximum of 3.75 hours (credits are automatically calculated) under Section 3 (Simulation Based Activity) of the Royal College MOC program.

Objectifs d'apprentissage

À l'issue du Congrès, les participants devraient être en mesure de :

- Définir le rôle et l'utilisation des technologies avancées et émergentes en imagerie clinique. (Rôles CanMEDS: communicateur, leader, expert médical)
- Identifier et mettre en œuvre des stratégies pratiques pour améliorer la gestion des départements de radiologie universitaire et communautaire (rôles CanMEDS: collaborateur, communicateur, leader, professionnel)
- Discutez des changements pratiques, juridiques et éthiques survenus dans la pratique et la recherche en radiologie à la suite de la mise en œuvre de l'intelligence artificielle, de l'apprentissage en profondeur et de l'apprentissage automatique. (Rôles CanMEDS: promoteur de la santé, leader, professionnel)
- Discuter de la façon dont l'imagerie peut aider à éclairer la prise de décision thérapeutique. (Rôles CanMEDS: promoteur de la santé, leader)
- Identifier des stratégies pour s'engager dans des activités académiques et contribuer à la vie académique d'un département de radiologie. (Rôle CanMEDS: professionnel, leader, érudit)

Communications (séances sur les affiches numériques)

La CAR présentera, sur des écrans numériques, des affiches électroniques. Les séances de visionnement des affiches numériques auront lieu à l'annexe du 4^e étage. Le Collège royal a déterminé que le visionnement d'affiches électroniques constitue une activité d'auto-apprentissage en dépistage admissible aux crédits de la section 2 du programme de Maintien du certificat (MDC). Les affiches électroniques pourront être consultées en libre-service tout au long de la journée et pendant les pauses.

Agrément

Les participants doivent réclamer leurs unités de formation (crédits) proportionnellement à leur participation à l'activité.

Le Congrès scientifique annuel de la CAR constitue une activité d'apprentissage collectif agréée (section 1) ainsi qu'une activité de simulation agréée (section 3) conformément à la définition précisée dans le programme de Maintien du certificat du Collège royal des médecins et chirurgiens du Canada (CRMCC). Le programme scientifique du CAR 2019 est approuvé par l'Association canadienne des radiologistes pour un maximum de 18,25 crédits (section 1).

Les participants à l'**Atelier de simulation en matière de colonoscopie virtuelle** peuvent obtenir, au maximum, 5,75 heures (les crédits sont calculés automatiquement) sous la section 3 (activité de simulation agréée) du programme de MDC du Collège royal.

Les participants à l'**Atelier de simulation d'IRM de la prostate et de PI-RADS v2** peuvent obtenir, au maximum, 3,75 heures (les crédits sont calculés automatiquement) sous la section 3 (activité de simulation agréée) du programme de MDC du Collège royal.

AMA Accreditation Statement

Through an agreement between the Royal College of Physicians and Surgeons of Canada and the American Medical Association, physicians may convert Royal College MOC credits to AMA PRA Category 1 Credits™.

UEMS Accreditation Statement

Live educational activities, occurring in Canada, recognized by the Royal College of Physicians and Surgeons of Canada as Accredited Group Learning Activities (Section 1) are deemed by the European Union of Medical Specialists (UEMS) eligible for ECMEC®.

Certificate of Attendance

After the event, a certificate of attendance will be available for all participating delegates attending the conference. An email will be sent to you following the conference.

Participants can document their learning in the RCPSC MAINPORT at <https://login.royalcollege.ca/oamlogin/login.jsp>

Session Evaluation

The CAR values your feedback! By completing evaluations for the individual sessions, you will have a direct impact on the quality of programming at CAR and ensure the CAR will continue to meet your educational needs. Session evaluations can be accessed in the event app.

Disclosure of Conflict of Interest

The CAR has a formal policy regarding the need for authors and presenters to inform CAR attendees of any Conflict of Interest (COI). A COI includes, but is not limited to, employment, ownership of stock, membership on a standing advisory council or committee, or being on the board of directors or publicly associated with a company or its products. Other potential areas of real or perceived conflict of interest could include receiving honoraria, consulting fees, or grants.

Disclaimer

No responsibility is assumed by the CAR for any injury and/or damage to persons or property as a matter of product liability, negligence or otherwise, or from any use or operations of any methods, products, instructions or ideas contained in materials distributed or described during presentations throughout CAR 2019. Because of rapid advances in the medical sciences, in particular, independent verification of diagnoses and drug dosages should be made.

Although all advertising material on location and in print is expected to conform to ethical (medical) standards, inclusion in this event does not constitute a guarantee or endorsement of the quality or value of such product or of the claims made of it by its manufacturer and representatives.

Énoncé d'agrément de l'AMA

En vertu d'une entente entre le Collège royal des médecins et chirurgiens du Canada et l'American Medical Association, les médecins peuvent convertir les crédits du programme de MDC en crédits de catégorie 1 de l'AMA PRA^{MC}.

Énoncé d'agrément de l'UEMS

La participation en direct à des activités éducatives reconnues par le Collège royal des médecins et chirurgiens du Canada rend les participants admissibles à des crédits européens de formation continue (ECMEC[®]) attribués par l'Union européenne des médecins spécialistes (UEMS).

Certificat de participation

Un certificat de participation sera remis aux délégués assistant à la conférence. Un courriel vous sera envoyé après la conférence.

Les participants peuvent documenter leur apprentissage sur le portail MAINPORT du Collège royal des médecins et chirurgiens du Canada (CRMCC) au <https://login.royalcollege.ca/oamlogin/login.jsp>.

Évaluation des séances

La CAR accorde une grande importance à vos commentaires! En remplissant une évaluation après chacune des séances auxquelles vous participez, vous nous aidez à améliorer la qualité du programme de la CAR afin que nous puissions continuer de répondre à vos besoins de perfectionnement professionnel.

Déclaration de conflit d'intérêts

En vertu de la politique de la CAR, les auteurs et les conférenciers doivent aviser les participants du Congrès de tout conflit d'intérêts. Les conflits d'intérêts incluent, sans s'y limiter, l'emploi, la propriété d'actions, l'appartenance à un conseil ou à un comité consultatif permanent, ou la participation au conseil d'administration d'une entreprise, ou toute affiliation publique à celle-ci ou à ses produits. Il peut également y avoir conflit d'intérêts réel ou perçu si le conférencier reçoit des honoraires, des frais d'expert-conseil ou des subventions.

Avis de non-responsabilité

La responsabilité de la CAR ne saurait en aucune façon être engagée pour tout préjudice ou dommage aux personnes ou aux biens découlant du fait des produits, de la négligence ou autre, ou encore de l'utilisation ou de l'application de produits, de méthodes, d'instructions ou d'idées contenus lors du Congrès scientifique annuel de la CAR. En raison notamment des progrès rapides du domaine des sciences médicales, un contrôle indépendant des diagnostics et de la posologie devrait être effectué.

Bien que tout matériel publicitaire imprimé et sur les lieux soit tenu de respecter les normes d'éthique (du domaine médical), la présence lors de cet événement de tel matériel ne constitue en rien une garantie, ni ne vient appuyer la qualité ou la valeur des produits ou les promesses du fabricant ou de ses délégués à leur égard.

The CAR wishes to extend its sincere thanks to the volunteer members of the CAR 2019 Scientific Planning Committee and Abstract Review Committee. It is their dedication, expertise and pursuit of excellence that has shaped this year's outstanding educational programme.

La CAR souhaite transmettre ses remerciements les plus sincères aux membres bénévoles du Comité du programme scientifique et du Comité de révision des résumés du Congrès scientifique annuel CAR 2019. Leur dévouement, leur expertise et leur volonté d'exceller ont façonné l'excellent programme de formation de cette année.

SCIENTIFIC PROGRAMME COMMITTEE COMITÉ DU PROGRAMME SCIENTIFIQUE

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Vivek Virmani
Charlotte Yong-Hing

HIGHLIGHTS OF | GRANDS MOMENTS DU CONGRÈS

CAR 2019

Opening Reception

Cocktail d'ouverture

Thursday, 5:00 pm | jeudi 17 h
Le Windsor, 1170 rue Peel

Cocktail with Vendors

Cocktail avec les vendeurs

Friday, 5:45 pm | vendredi 17 h 45

Reception for Radiologists-in-Training

Réception pour les radiologistes en formation

Friday, 6:30 pm | vendredi 18 h 30

FEATURED SESSIONS SÉANCES EN VEDETTE

Les séances se déroulent en anglais seulement.

A Contrarian's Radiologist's Perspective on Value: Will You Know It When You See It?

Friday, 8:00 am | vendredi 8 h
Speaker: Richard Duszak

Ethical and Legal Issues in AI for Radiologists

Friday, 4:45 pm | vendredi 16 h 45
Panelists: Heather Chalmers, Jaron Chong, Mary Jane Dykeman

CAR Awards Reception and Ceremony

Remise des prix de la CAR

Saturday, 5:30 – 7:30 pm | samedi 17 h 30 – 19 h 30

The CAR invites all participants to join us in celebrating this year's distinguished award winners and successful abstract winners. We will also be honouring our many volunteers.

La CAR convie tous les délégués à la soirée organisée en l'honneur des lauréats des prix de la CAR et des gagnants des communications. Nous soulignerons également la contribution de nos bénévoles.

Evaluation of the Solitary Pulmonary Nodule

Saturday, 8:00 am | samedi 8 h
Speaker: Jeffrey Klein

Film Panel

Saturday, 4:30 pm | samedi 16 h 30
Speaker: Bruce Forster

Dilemmas in Musculoskeletal Tumor Diagnosis

Sunday, 8:00 am | dimanche 8 h
Speaker: Mark Murphey



5K FUN RUN
COURSE AMICALE DE 5 KM
Friday, 6:45 am
Vendredi 6 h 45

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AWARDS OF EXCELLENCE PRIX D'EXCELLENCE





2019 CAR DISTINGUISHED CAREER AWARD RECIPIENT RÉCIPIENDAIRE DU PRIX D'EXCELLENCE DE LA CAR POUR UNE ÉMINENTE CARRIÈRE 2019 **DR. GILES STEVENSON**

Dr. Giles Stevenson first began his career in Canada in 1976 as Associate Professor of Diagnostic Radiology at McMaster University, Hamilton. He was promoted to professor in 1982 and was professor and chairman of the same department from 1997-2007, as well as being Chief of Radiology at Chedoke-McMaster Hospitals over that duration. Since that time, Dr. Stevenson was appointed Professor Emeritus at McMaster and has done a considerable number of locums tenens, particularly in rural BC, providing much-needed imaging services in remote locations. He was appointed Honorary Professor, UBC Department of Diagnostic Radiology in 2005, a position which he currently still holds and continues to be active in teaching medical students to this day.

Throughout his 42-year career in Canadian radiology, Dr. Stevenson has generously served on countless committees at the University (Program Director, Faculty Executive, Dean's Advisory Group), hospital (Endoscopy Committee, Computers in Medicine, GI Program Executive) and community (RCPSC Nucleus Group and Chair, RCPSC Examining Committee, Chair of Canadian Heads of Academic Radiology, Board Member and President Society of GI Radiologists, Area Counsellor for RSNA) levels.

For the CAR, he has served on the Committee for Training and Qualifications, including as its Chair, the Committee for Interventional Radiology, and as Board member/President for the Canadian Radiologic Foundation for six years.

As a GI Radiologist, Dr. Stevenson has achieved international renown, receiving its highest honour, the Cannon Medal, in 2006. Most of his 117 papers in the peer-reviewed literature are related to GI clinical and research topics and have been published in such high impact factor journals as Gut, AJR, Radiology, and The Lancet. Dr. Stevenson's contributions with regard to barium examination of the GI tract and CT colonography are seminal, and he remains one of the few radiologists practicing at that time (or any other) who was skilled in endoscopy, providing an indelible clinical link to other specialties. As his outstanding work became known, Dr. Stevenson found himself invited regularly as a visiting professor (26 times internationally) and in great demand as a speaker (137 invited presentations). Throughout his career, he has been revered as an educator, garnering teaching awards at McMaster, giving refresher courses at top international meetings, and authoring a truly incredible 42 book chapters and editing two prominent books in the specialty.

Dr. Stevenson has served the Canadian radiology community with dignity, professionalism, energy, innovation and good humour. He epitomizes collegiality, humility and selflessness in his dedication to the specialty form the most hallowed academic halls to the most rural locales.

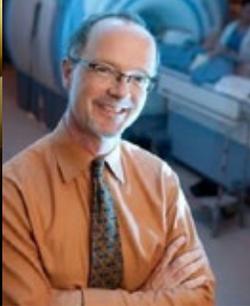
Le docteur Giles Stevenson a commencé sa carrière au Canada en 1976 en tant que professeur agrégé en radiologie diagnostique à l'Université McMaster, à Hamilton. En 1982, il a été promu professeur et entre 1997 et 2007, il était à la fois professeur et chef du service de radiologie des hôpitaux Chedoke-McMaster. Depuis lors, le docteur Stevenson est titulaire du poste de professeur émérite à l'Université McMaster et a effectué un nombre considérable de remplacements, en particulier dans les zones rurales en Colombie-Britannique, répondant ainsi au besoin important en imagerie dans des lieux isolés. En 2005, il a été promu professeur honoraire au département de radiologie diagnostique de l'Université de la Colombie-Britannique. Toujours détenteur de son titre à ce jour, il continue d'enseigner aux étudiants en médecine.

Au cours de ses 42 années de carrière en radiologie au Canada, le docteur Stevenson a été membre d'innombrables comités en milieu universitaire (directeur de programme, directeur de la faculté, membre du comité consultatif auprès du doyen), hospitalier (comité d'endoscopie, informatique en médecine, directeur du programme de gastroentérologie) et communautaire (président et membre du groupe principal du CRMCC, membre du comité d'examen du CRMCC, président de la *Canadian Heads of Academic Radiology*, membre du conseil d'administration et président de la *Society of GI Radiologists*, conseiller de secteur pour la RSNA).

À la CAR, il a siégé au comité de radiologie interventionnelle et au comité de formation et qualifications, notamment comme président. Il a également été membre du conseil d'administration et président de la Fondation radiologique canadienne pendant six ans.

En tant que radiologiste en gastroentérologie, le docteur Stevenson a acquis une renommée internationale en recevant la distinction la plus prestigieuse, la médaille Cannon, en 2006. Parmi ses 117 articles parus dans des publications examinées par des pairs, la plupart sont liés à des sujets cliniques et de recherche sur la gastroentérologie, et ont été publiés dans des revues influentes telles que Gut, AJR, Radiology et The Lancet. Les contributions du Dr Stevenson concernant les examens barytés de l'appareil digestif et la coloscopie virtuelle sont fondamentales. De plus, il figure parmi les rares radiologistes formés en endoscopie qui pratiquaient à l'époque (ou toute autre), faisant ainsi le lien avec les autres spécialités d'un point de vue clinique. Alors que son travail gagnait en reconnaissance, le Dr Stevenson était souvent invité en tant que conférencier (137 présentations) et en tant que professeur invité (26 fois dans des pays étrangers). Tout au long de sa carrière, il a été reconnu pour ses qualités de pédagogue grâce aux cours de perfectionnement qu'il donnait lors de réunions internationales de haut niveau, à la rédaction de 42 chapitres de livres et à la publication de deux ouvrages majeurs dans la spécialité, ce qui lui a valu l'obtention de prix d'enseignement à l'Université McMaster.

Le docteur Stevenson a servi la communauté de radiologie canadienne avec dignité, professionnalisme, énergie, innovation et bonne humeur. De par son dévouement à la spécialité, il est une figure de collégialité, d'humilité et d'altruisme, tant dans des universités prestigieuses que dans les milieux ruraux les plus isolés.



2019 CAR GOLD MEDAL AWARD RECIPIENT RÉCIPIENDAIRE DE LA MÉDAILLE D'OR DE LA CAR 2019 **DR. BRUCE FORSTER**

Dr. Bruce Forster is Professor and Head at the University of British Columbia, Department of Radiology, and Director of the UBC, Office of Academic Innovation. He was recently the Regional Department Head and Medical Director, Diagnostic Imaging, Vancouver Coastal Health and Providence Health Care and Director of Diagnostic Imaging for the Vancouver 2010 Winter Olympics/Paralympics Games.

As an Associate Member of the Allan McGavin Sports Medicine Centre, he has been involved in the clinical, education, and research aspects of sports imaging for 25 years. Dr. Forster has delivered over 350 invited lectures, many internationally, and has served as a Visiting Professor in Canada, the United States, Indonesia, Singapore, Japan, South America, Russia, and the Middle East. He is the author of over 135 peer-reviewed scientific publications, and 120 educational exhibits, and has served as President of the Pacific Northwest Radiology Society, and on the Board of Directors of the Canadian Association of Radiologists and is currently on the Board of Directors and is President of the Canadian Radiologic Foundation.

Dr. Forster was Lead Physician for 'Choosing Wisely Medical Imaging' one of the most comprehensive appropriateness initiatives in the Province, and organized and taught at the CAR/CRF/UBC Radiology Leadership and Business Course, in collaboration with the UBC Sauder School of Business.

Le docteur Bruce Forster est professeur et chef du département de radiologie ainsi que directeur de l'*Office of Academic Innovation* (Bureau pour l'innovation universitaire) à l'Université de la Colombie-Britannique (UCB). Dernièrement, il a été chef de service régional et directeur médical en imagerie diagnostique de la *Vancouver Coastal Health* et du *Providence Health Care*. En 2010, il a été directeur d'imagerie diagnostique pour les Jeux olympiques et paralympiques d'hiver de Vancouver.

En tant que membre associé du centre de médecine du sport *Allan McGavin*, il est impliqué dans l'imagerie du sport aux niveaux clinique, pédagogique et de recherche depuis 25 ans. Le docteur Bruce Forster a été l'invité de plus de 350 conférences, souvent internationales, et a enseigné au Canada, aux États-Unis, en Indonésie, à Singapour, au Japon, en Amérique du Sud, en Russie et au Moyen-Orient en tant que professeur invité. Il est l'auteur de plus de 135 publications scientifiques évaluées par des pairs, ainsi que de 120 expositions éducatives. Il a été le président de la *Pacific Northwest Radiology Society* et a siégé au conseil d'administration de l'Association canadienne des radiologistes. Enfin, il est le président de la Fondation radiologique canadienne (FCR) et siège actuellement au conseil d'administration.

Le docteur Bruce Forster était le médecin-chef de « Choisir avec soin – Imagerie médicale », une des initiatives les plus complètes sur l'adéquation du choix d'imagerie médicale dans la province, et a organisé et donné le cours de leadership en radiologie de la CAR, la FCR et l'UCB, en collaboration avec la *Sauder School of Business* de l'UCB.



2019 CAR YOUNG INVESTIGATOR AWARD RECIPIENT RÉCIPIENDAIRE DU PRIX DU JEUNE CHERCHEUR DE LA CAR 2019 **DR. FAISAL KHOSA**

Dr. Faisal Khosa is an Associate Professor in radiology at the University of British Columbia. He received his medical degree in Pakistan followed by board certifications in radiology from Ireland, the USA and Canada. He subsequently completed an MBA at Goizueta Business School. He has delivered more than 200 invited lectures, published 135 peer-reviewed manuscripts, published over two dozen book chapters and has received over six million dollars in collaborative grants in North America. He is an award-winning radiologist, author, educator and scholar, but it is his work as a mentor, researcher and advocate for equity, diversity and inclusion that has created a legacy, not only for his own profession but also for the larger health care and academic community.

His interests include the study of leadership and disparities in academia and he has mentored more than 500 students from academically underrepresented groups. In the last 15 years, he has pioneered, championed and supported many philanthropic initiatives, including schools and free healthcare clinics in support of minorities and indigent populations in the developing world. His mentoring website includes links, lectures and career counselling advice.

He has received awards for philanthropy and excellence in research, mentorship and advocacy in Pakistan, the UAE, the USA and Canada including the Vancouver Coastal Health – Healthcare Hero Award (2018); Canadian Radiological Foundation Leadership Scholarship (2017); People First Leadership Award – Vancouver Coastal Health (2017); College of Physicians and Surgeons Examiners Award (2017); Outstanding Support Award by VGH Trauma Program (2016); American Roentgen Ray Society Scholar (2013 – 2016); Outstanding Young Investigator Award in USA (2015); One in One Hundred Mentor Award in USA (2014); “Medal of Excellence” (Tamgha-i-Imtiaz) by the Government of Pakistan (2013); Outstanding Service to Medicine Award by College of Physicians and Surgeons in Pakistan (2012); Education and Mentoring award in UAE (2012).

Le docteur Faisal Khosa est professeur agrégé en radiologie à l'Université de la Colombie-Britannique. Il a obtenu son diplôme en médecine au Pakistan, puis des certifications en radiologie approuvées par un comité de médecins spécialistes en Irlande, aux États-Unis et au Canada. Il a ensuite obtenu une maîtrise en administration des affaires à la *Goizueta Business School*. Il a participé à plus de 200 conférences en tant qu'invité, a publié 135 manuscrits examinés par des pairs ainsi que plus de deux douzaines de chapitres d'ouvrages, et a reçu plus de six millions de dollars sous forme de bourses collaboratives en Amérique du Nord. Il est un radiologiste, auteur, pédagogue et universitaire récompensé, mais c'est surtout son travail en tant que mentor, chercheur et défenseur de l'équité, de la diversité et de l'intégration qu'il laissera en héritage, non seulement pour sa propre profession, mais également pour la communauté élargie des soins et du monde universitaire.

Il s'intéresse notamment à l'étude du leadership et des disparités dans le milieu universitaire, et a été le tuteur de plus de 500 étudiants issus de groupes sous-représentés à l'université. Au cours des 15 dernières années, il a lancé et soutenu de nombreuses initiatives philanthropiques, y compris des écoles et des cliniques de santé gratuites, afin d'aider les minorités et les populations défavorisées dans les pays en développement. Son site Web de mentorat donne accès à des liens, des cours ainsi que des conseils sur l'orientation professionnelle.

Il a reçu plusieurs prix de philanthropie et d'excellence en recherche, mentorat et défense des intérêts au Pakistan, aux Émirats arabes unis, aux États-Unis et au Canada, y compris le *Healthcare Hero Award* de la *Vancouver Coastal Health* (2018); la bourse de leadership de la Fondation radiologique canadienne (2017); le *People First Leadership Award* de la *Vancouver Coastal Health* (2017); l'*Examiners Award* du Collège royal des médecins et chirurgiens (2017); le *Outstanding Support Award* du *VGH Trauma Program* (2016); la bourse *American Roentgen Ray Society Scholar* (2013-2016); l'*Outstanding Young Investigator Award* aux États-Unis (2015); le *One in One Hundred Mentor Award* aux États-Unis (2014); la « Médaille d'excellence » (Tamgha-i-Imtiaz) du gouvernement du Pakistan (2013); l'*Outstanding Service to Medicine Award* (Prix de la contribution exceptionnelle à la médecine) du Collège des médecins et chirurgiens du Pakistan (2012); l'*Education and Mentoring Award* (Prix pour l'éducation et le mentorat) aux Émirats arabes unis (2012).



ANNUAL GENERAL MEETINGS

Members are invited to attend the Canadian Association of Radiologists and Canadian Radiological Foundation Annual General Meetings. Breakfast will be served.

Saturday April 13, 2019 | 7:00 – 8:00 am
Salle de bal Est, Level 4

ASSEMBLÉES GÉNÉRALES ANNUELLES

Tous les membres sont invités à assister aux assemblées générales annuelles de l'Association canadienne des radiologistes et de la Fondation radiologique canadienne. Le petit déjeuner sera servi.

Samedi 13 avril | de 7 h à 8 h
Salle de bal est, Niveau 4

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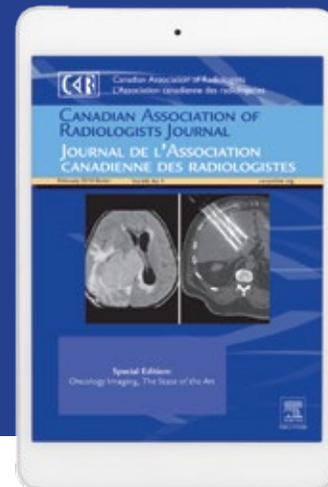
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Recent Highlights

- Gadolinium Deposition in the Brain: A Systematic Review of Existing Guidelines and Policy Statement Issued by the CAR
- Retrospective Analysis of Emergency Computed Tomography Imaging Utilization at an Academic Centre: An Analysis of Clinical Indications and Outcomes
- Acute Aortic Syndrome: Yield of Computed Tomography Angiography in Patients With Acute Chest Pain



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LE PROGRAMME DES PARTENAIRES DE LA CAR

The Canadian Association of Radiologists places tremendous value on the industry partnerships it has cultivated. These partnerships are essential for the CAR in achieving its goal of advancing the profession through leadership in healthcare and excellence in patient care. We would like to extend our sincere gratitude to the following CAR partners and supporter for their leadership and continued support.

L'Association canadienne des radiologistes accorde une extrême importance aux partenariats qu'elle forge dans l'industrie. Aux yeux de la CAR, en stimulant le leadership et en encourageant l'excellence en soins de santé, ces ententes sont essentielles à l'avancement de notre profession. C'est pourquoi nous souhaitons exprimer notre sincère reconnaissance envers les partenaires et le sympathisant de la CAR en considération de leurs qualités de leader et de leur appui constant.

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AGENDA SOMMAIRE DU PROGRAMME





PRELIMINARY AGENDA | SOMMAIRE DU PROGRAMME PROVISOIRE

- Plenaries | Séances plénières
- Educational Sessions | Séances éducatives
- Research Presentations | Présentations de recherche
- Resident Sessions | Séances réservées aux résidents
- Workshop | Atelier
- Nutritional Breaks | Pauses santé
- CAR and CRF AGMs | Assemblées générales de la CAR et de la FRC
- Social Events | Événements sociaux

THURSDAY, APRIL 11, 2019

08:00 – 16:00	Interactive CT Colonography Workshop – Tanya Chawla	Bonaventure Hotel
17:00 – 19:00	Welcome Reception Welcoming Remarks – <i>Emil Lee (CAR President)</i> Future of International Collaboration in Radiology – <i>Boris Brkljacic (ESR President)</i>	Le Windsor

FRIDAY, APRIL 12, 2019

06:45 – 07:30	5k Fun Run	Hotel Lobby
08:00 – 17:00	Scientific and Educational Posters	Fourth Level Annex
07:30 – 08:00	Breakfast	Fourth Level Annex
07:55 – 08:00	Opening Remarks – Emil Lee (CAR President)	
08:00 – 09:00	Opening Plenary: A Contrarian's Radiologist's Perspective on Value: Will You Know It When You See It? – Richard Duszak	Salle de bal ouest
	Neuroradiology <i>Moderator: Carlos Torres</i> Salle de bal ouest	
	Practice Management <i>Moderator: Robert Sevick</i> Salle de bal est	
	Scientific Research Project Oral Presentations Kafka-Lamartine	
09:00 – 09:30	Imaging of Brain Metastases <i>Carlos Torres</i>	Judges: <i>Emily Pang, Francesca Proulx, Vivek Virmani</i>
09:30 – 10:00	Perineural Spread in Head and Neck Imaging: What You Need to Know! <i>Eugene Yu</i>	
10:00 – 10:30	Critical Imaging Findings for Clinical Management of Adults with Spinal Metastases <i>Wende Gibbs</i>	
10:30 – 10:45	Break	Fourth Level Annex

FRIDAY, APRIL 12, 2019 (CONTINUED)

	Chest Radiology <i>Moderator: Daria Manos</i> Salle de bal ouest	Contrast-Enhanced Ultrasound <i>Moderator: Stephanie Wilson</i> Salle de bal est	Radiologists-in-Training Research Project Oral Presentations Kafka-Lamartine
10:45 – 11:15	Airspace Disease <i>Elsie Nguyen</i>	Microbubble Contrast Agents for US <i>Peter Burns</i>	Judges: <i>Marco Essig, Faisal Khosa, Mark Levental</i>
11:15 – 11:45	Reticulation and Fibrotic Lung Disease <i>Hamid Bayanati</i>	Focal Liver Masses on CEUS: The Fundamentals of Interpretation <i>Stephanie Wilson</i>	
11:45 – 12:15	Nodular and Cystic Lung Diseases <i>Daria Manos</i>	CEUS of HCC <i>TK Kim</i>	
12:15 – 13:00	Lunch and Scientific and Educational Posters		Fourth Level Annex
12:15 – 13:00	Physician Wellness Lunchtime Symposium		Salle de bal est
	Multi Energy CT <i>Moderator: Savvas Nicolaou</i> Salle de bal ouest	Building Resilience in Ourselves and Our Organizations <i>Moderator: Carolyn Thomson</i> Jarry-Joyce	Value of Radiology Research Project Oral Presentations Kafka-Lamartine
13:00 – 13:25	MSK Multi Energy CT Practical Applications Making a Difference <i>Michael O'Keeffe</i>		Judges: <i>Andreu Costa, Daria Manos, Charlotte Yong-Hing</i>
13:25 – 13:50	MECT Oncologic Applications Impacting Management <i>Mohammed Mohammed</i>		
13:50 – 14:15	MECT in the Acute Setting <i>Savvas Nicolaou</i>		
14:15 – 14:30	MECT Panel Questions and Discussion: The Future of MECT <i>All Presenters</i>		
14:30 – 14:45	Break		Fourth Level Annex
	Cartilage Imaging <i>Moderator: Adnan Sheikh</i> Salle de bal ouest	CAIR at CAR: IR for the DR <i>Moderator: Amol Mujoomdar</i> Salle de bal est	Departmental Clinical Audit Project Oral Presentations Kafka-Lamartine
14:45 – 15:10	Cartilage Imaging <i>Bruce Forster</i>	14:45 – 15:15 Imaging of Bleeding: Protocols, Imaging, and When to Call IR <i>Derek Cool</i>	Judges: <i>Andreu Costa, Suki Dhillon, Ania Kielar, Matthew McInnes</i>
15:10 – 15:35	Newer MR Imaging Techniques in MSK <i>Marcos Sampaio</i>	15:15 – 15:45 Biopsy and Drainage Tips and Tricks for the Management of Anticoagulation/Coagulopathy <i>Amol Mujoomdar</i>	
15:35 – 16:00	Shoulder Labrum – 1.5T or 3.0T <i>Ali Naraghi</i>	15:45 – 16:15 Update on LI-RADS and Imaging Post-Localregional Therapy of HCC <i>Jonathan Chung</i>	
16:00 – 16:25	3D Printing in Orthopedics <i>Adnan Sheikh</i>		

FRIDAY, APRIL 12, 2019 (CONTINUED)

16:25 – 16:45	Break	Fourth Level Annex
16:45 – 17:45	CAR Hot Topics: Artificial Intelligence in Radiology: Data Transparency, Privacy and Bias <i>Moderator: Andra Morrison</i> <i>Panelists: Heather Chalmers, Jaron Chong, Mary Jane Dykeman</i>	Salle de bal ouest
17:45 – 18:30	Cocktail with Vendors	Salle de bal centre
18:30 – 20:00	Reception for Radiologists-in-Training	Sheraton Club – Level 37

SATURDAY, APRIL 13, 2019

08:00 – 17:00	Scientific and Educational Posters	Fourth Level Annex	
07:00 – 08:00	CAR Annual General Meeting and Breakfast	Salle de bal est	
08:00 – 09:00	Plenary: Evaluation of the Solitary Pulmonary Nodule – Jeffrey Klein	Salle de bal ouest	
08:00 – 12:00	Hands-On Workshop: Prostate MRI – Silvia Chang	Drummond	
	Cardiac <i>Moderator: Carole Dennie</i> Salle de bal ouest	Academic Radiology <i>Moderator: Iain Kirkpatrick</i> Salle de bal est	Clinical Audit Workshop <i>Moderator: Suki Dhillon</i> Jarry-Joyce
09:00 – 09:30	Beyond Stenosis: FFRCT and Plaque Analysis on Cardiac CT <i>Narinder Paul</i>	Instituting a Peer Review Program: Lessons Learned <i>William Anderson</i>	
09:30 – 10:00	Imaging of the Aorta: From Innovations in TAVR to the Prediction of Acute Aortic Syndromes <i>Alban Redheuil (SFR Rising Star)</i>	Novel Methods of Delivering Educational Content in Radiology Journals, with a Focus on RadioGraphics <i>Jeffrey Klein</i>	
10:00 – 10:30	Late Gadolinium Enhancement and Beyond: The Value of Cardiac MR in the Diagnosis of Non-Ischemic Cardiomyopathy <i>Carole Dennie</i>	Software Applications to Improve Your Academic Productivity <i>Iain Kirkpatrick</i>	
10:30 – 10:45	Break	Fourth Level Annex	
	Community Radiology <i>Moderator: Michael Patlas</i> Salle de bal ouest	Artificial Intelligence <i>Moderator: Alexandre Cadrin-Chênevert</i> Salle de bal est	So You Made a Mistake: Dealing with Imperfection in Radiology <i>Moderator: Cameron Hague</i> Jarry-Joyce
10:45 – 11:15	Pediatric Neurological Emergencies for the Community Radiologist <i>Elka Miller</i>	AI in Radiology: Ethics and Legal Considerations <i>Jacob Jaremko and Rebecca Bromwich</i>	<i>Panelists: Lisa Smyth, Richard Mimeault, Taryn Hodgdon</i>
11:15 – 11:45	BMD Facility Accreditation: Controversies in the Reporting Standard <i>David Lyons</i>	What We Have Learned from AI in Radiology: the McGill Experience <i>Jaron Chong</i>	
11:45 – 12:15	Chest Imaging Traps to Avoid: Practical Tips for Busy Radiologists <i>Daria Manos</i>	Development of AI Applications for Enhanced Diagnostic Experience <i>Leonid Chepelev</i>	
12:15 – 13:00	Lunch and Scientific and Educational Posters	Fourth Level Annex	

SATURDAY, APRIL 13, 2019 [CONTINUED]

Community Radiology <i>Moderators: Michael Patlas</i> Salle de bal ouest		Controversies in Contrast <i>Moderators: Nicola Schieda</i> Salle de bal est	Case Review for Residents <i>Moderator: Cameron Hague</i> Kafka-Lamartine
13:00 – 13:30	Imaging of Acute RUQ Pain <i>Anthony Hanbidge</i>	Nephrogenic Systemic Fibrosis <i>Nicola Schieda</i>	MRI Physics: The Basics <i>Iain Kirkpatrick</i>
13:30 – 14:00	Appendicitis in 2019 <i>Michael Patlas</i>	Gadolinium Retention/Deposition <i>Jeffrey Weinreb</i>	Brain Imaging <i>Mario Kontolemos</i>
14:00 – 14:30	Hand and Wrist Trauma <i>Adnan Sheikh</i>	Contrast-Induced Nephropathy <i>Matthew Davenport</i>	Spine Imaging <i>Jason Shewchuk</i>
		14:45 – 15:15 Group Discussion w/ Q&A <i>Nicola Schieda, Jeffrey Weinreb, Matthew Davenport</i>	
14:30 – 14:45	Break	Fourth Level Annex	
Acute Abdomen <i>Moderator: Michael Patlas</i> Salle de bal ouest		Scientific and Educational Posters Fourth Level Annex	Junior and Senior Plain Film Hot Seat Sessions <i>Moderator: Cameron Hague</i>
14:45 – 15:15	Twists and Unexpected Turns: Imaging Complications After Bariatric Surgery <i>Ania Kielar</i>		Junior Hot Seats <i>Mario Kontolemos, Jason Shewchuk</i> Salon 4
15:15 – 15:45	Trauma in the Pregnant Patient <i>Vincent Mellnick</i>		Senior Hot Seats <i>Nader Zakhari, Stephanie Lam</i> Salon 5
15:45 – 16:15	Big Trouble in the Small Bowel – CT of Small Intestinal Emergencies? <i>Vincent Mellnick</i>		
16:30 – 17:30	Film Panel Hosted by Bruce Forster <i>Panelists: Carolyn Flegg, Cameron Hague, Alison Harris, Marie-Constance Lacasse, Emil Lee, Matt McInnes, Willie Miller, Elsie Nguyen</i>		Salle de bal ouest
17:30 – 18:00	CAR Awards Reception	Fourth Level Annex	
18:00 – 19:30	CAR Awards Ceremony	Salle de bal ouest	

SUNDAY, APRIL 14, 2019

07:00 – 08:00	Breakfast	Fourth Level Annex
08:00 – 09:00	Plenary: Dilemmas in Musculoskeletal Tumor Diagnosis <i>Mark Murphey</i>	Salle de bal ouest
	Mistakes We All Make <i>Moderator: Mark Levental</i> Salle de bal ouest	
09:00 – 09:20	Neuro <i>Benjamin Kwan</i>	
09:20 – 09:40	ENT <i>Mark Levental</i>	
09:40 – 10:00	Pediatrics <i>Christine Saint-Martin</i>	
10:00 – 10:20	Pitfalls in Imaging of Musculoskeletal Tumors <i>Mark Murphey</i>	
10:20 – 10:35	Break	Fourth Level Annex
10:35 – 10:55	Chest <i>Karl Sayegh</i>	
10:55 – 11:15	MSK <i>Rehana Jaffer</i>	
11:15 – 11:35	Imaging of the Twists and Turns of the Gastrointestinal Tract <i>Francesca Proulx</i>	
11:35 – 11:50	Closing Remarks	



CAR
2019

CT COLONOGRAPHY WORKSHOP



THURSDAY, APRIL 11, 2019

08:00 – 16:00

Hôtel Bonaventure Montréal

900 Rue de la Gauchetière Ouest
Montréal, QC

This one-day workshop with dedicated hands-on training and small group didactic lectures will give attendees a basic competency in accurately interpreting and effectively performing CT Colonography, an advanced medical imaging diagnostic tool.

SPEAKERS

Tanya Chawla
Jennifer Sammon

TARGET AUDIENCE

This workshop is designed for practicing radiologists interested in conducting colorectal cancer screening with high-quality virtual colonography (VC).

LEARNING OBJECTIVES

At the end of this simulation workshop, the participants should be able to:

- Implement the various components of a complete VC examination to acquire high quality examinations
- Effectively detect polyps
- Identify common pitfalls and problems associated with VC interpretation
- Identify the role of CT colonography in colorectal screening

AGENDA

08:00 – 08:55 BREAKFAST

08:55 – 09:00 Welcome and Introduction

09:00 – 09:30 Introduction and Rationale for CTC and Role of Imaging in Colorectal Screening Paradigm

09:30 – 10:00 How to Perform CT Colonography: Tips and Techniques

10:00 – 11:30 Buttonology: Introduction to Software and Hands-On Review of Cases

11:30 – 12:15 Image Interpretation: How I Read a CTC

12:15 – 13:00 LUNCH

13:00 – 13:30 Bowel Preparation: What You and Your Patient Need to Know

13:30 – 14:30 Review of Hands-On Cases and Discussion

14:30 – 14:45 BREAK

15:00 – 16:00 Hands-On Cases and Discussion

PROSTATE MRI AND PIRADSV2 PRACTICAL WORKSHOP

SATURDAY, APRIL 13, 2019

08:00 – 12:00

Le Centre Sheraton Montreal Hotel
1201 Boulevard Rene-Levesque Ouest
Montréal, QC



This half-day workshop features short high-impact didactic sessions followed by hands-on review of complete prostate MRI image files. Participants will be able to simulate real case-reporting with the benefit of individualized feedback from instructors. The workshop will cover the latest PIRADSV2.1 technique with examples of good and poor-quality images, PIRADSV2.1 interpretation of cases with an official template, and the opportunity to review cases.

TARGET AUDIENCE

This workshop is designed for practicing radiologists and will focus on practical problem-solving for the general radiologist. The workshop is geared for beginners or those who have less experience in prostate MRI.

LEARNING OBJECTIVES

At the end of this simulation workshop, the participants should be able to:

- Perform and interpret prostate MRI in accordance to PIRADSV2
- Create a standardized template report
- Recognize pitfalls and mimics in interpreting multi-parametric prostate MRI

SPEAKERS



Silvia Chang



Dan Margolis



Emily Pang

AGENDA

- 07:30 – 08:00** CAR Annual General Meeting + BREAKFAST
- 08:00 – 08:05** Welcome and Introduction
- 08:05 – 08:15** PIRADSV2.1 technique: The Good, the Bad and the Ugly
- 08:15 – 08:30** Official template: PIRADSV2.1 Interpretation
- 08:30 – 10:00** Interactive Case Review
- 10:00 – 10:15** BREAK
- 10:15 – 11:45** Interactive Case Review
- 11:45 – 12:00** Q & A and Wrap up

Making Your Health a Priority

Physician Wellness Symposium

Friday, April 12 from 12:15 – 1:00 PM
Derek Puddester, MD Med FRCPC PCC



PRESENTATION SUMMARY

Join us for this feature event and listen to Dr. Derek Puddester, a global expert in physician health and resiliency, as he discusses physician wellness and how to recognize and effectively manage burnout. This lunchtime lecture will feature insights on achieving better work-life balance as well as techniques to manage stress.

LEARNING OBJECTIVES

At the end of the session, participants should be able to:

1. Recognize the signs and symptoms of physician burnout
2. Identify techniques to minimize stress and implement treatment strategies based on identified problem areas

This event is an Accredited Group Learning Activity (Section 1) as defined by the Maintenance of Certification program of the Royal College of Physicians and Surgeons of Canada (RCPSC) and approved by the Canadian Association of Radiologists for a maximum of 0.75 hours.

Co-presented by:



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PRESENTATIONS PRÉSENTATIONS



FRIDAY, APRIL 12, 2019

OPENING PLENARY

Richard Duszak
Emory University School of Medicine
08:00 – 09:00
Salle de bal ouest

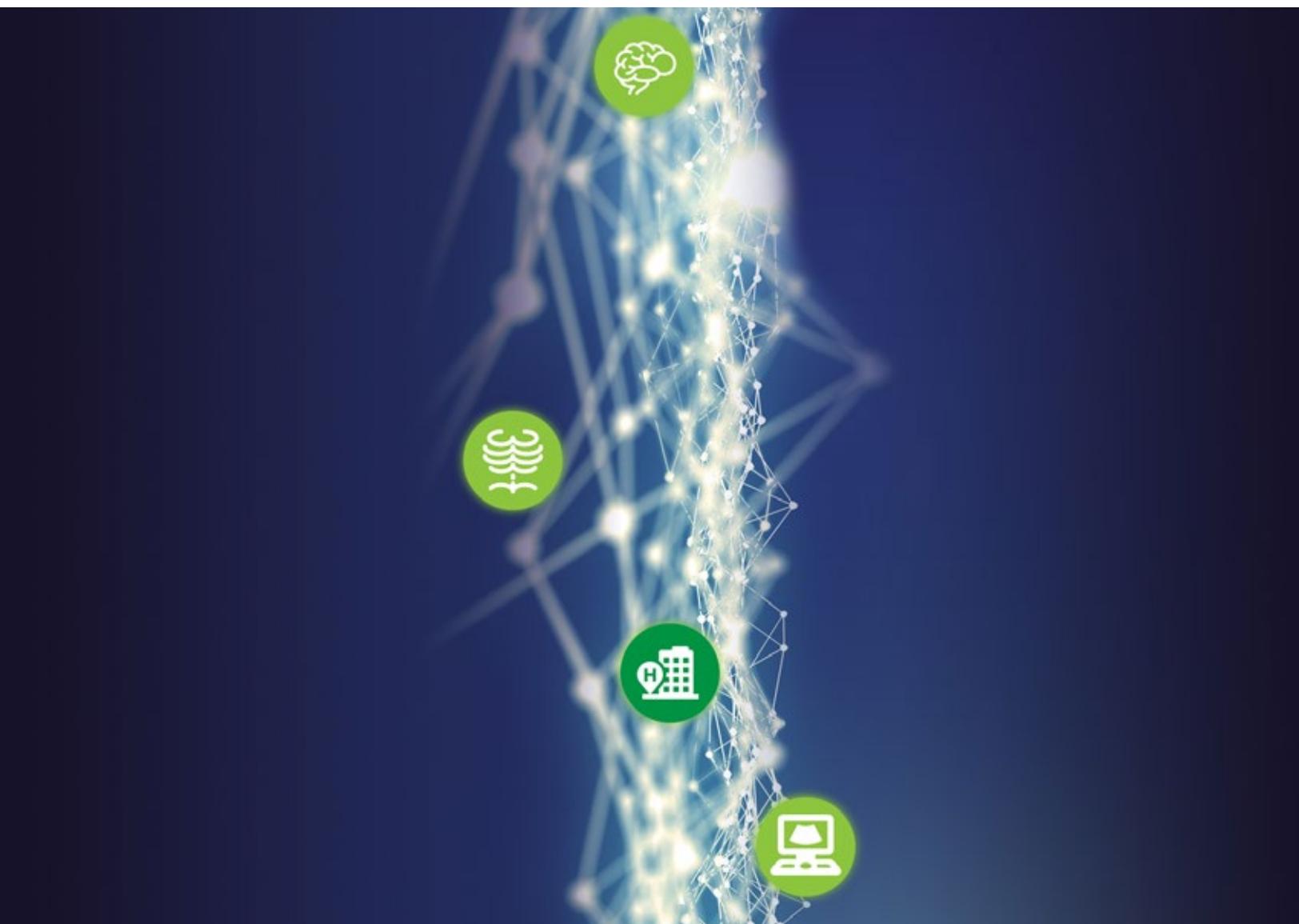


A Contrarian Radiologist's Perspective on Value: Will You Know It When You See It?

Value is elusive holy grail of healthcare. Much attention has been focused on “value-based purchasing” but rigorous definitions of value using clinically valid and reproducible metrics are still lacking. Intended to be both provocative and informative, the talk will provide perspectives on how value has been defined in healthcare (and specifically imaging) in the past, and how physicians (and specifically radiologists) can take a leadership role in both their practices and national policy development.

LEARNING OBJECTIVES:

1. Describe the benefits and unintended consequences of the current physician fee-for-service payment methodology
2. View imaging services through the eyes of patients and other stakeholders, and anticipate future payment models accordingly
3. Identify opportunities to maximize the value of radiology services



FRIDAY, APRIL 12, 2019

NEURORADIOLOGY SESSION

Moderator: Carlos H. Torres
09:00 – 10:30



Imaging of Brain Metastases

Carlos H. Torres, University of Ottawa 09:00 – 09:30

Metastatic disease to the brain affects 15% to 25% of cancer patients. The overall incidence of metastatic disease to the brain is increasing, in part due to longer survival rates as a result of better imaging detection and improved treatment. Unfortunately it implies poor prognosis and it is a leading cause of morbidity and mortality. In this lecture, we will review the general aspects of brain metastases, including location and key features on conventional and advanced imaging. We will review the most important differential diagnoses as well as key concepts related to medical and surgical treatment, treatment response and disease progression and/or recurrence.

1. Discuss the general aspects of brain metastases
2. Review initial evaluation and differential diagnoses of brain mets
3. Associate key imaging concepts in the monitoring of treatment

Perineural Disease in Head and Neck Cancer

Eugene Yu, University of Toronto 09:30 – 10:00

Perineural tumor spread (PTS) refers to the macroscopic tracking of tumor along nerves as the neoplastic cells extend away from the primary tumor mass. PTS is associated with poorer prognosis and a higher risk for locoregional recurrence. Tumors that affect certain locations in the extracranial head and neck have an increased predilection for PTS. This lecture will systematically review the imaging appearance of the most common forms of PTS in head and neck cancer.

LEARNING OBJECTIVES:

1. Identify the pathophysiology of perineural disease in head and neck cancer
2. Review the common nerves affected by perineural tumor spread in the head and neck
3. Recognize the best imaging modalities to assess perineural disease
4. Examine the imaging features of perineural tumor spread in the head and neck

Critical Imaging Findings for Clinical Management of Adults with Spinal Metastases

Wende Gibbs, University of Southern California 10:00-10:30

The incidence of cancer and metastatic disease is increasing. Recent advances in surgery and radiation oncology have improved survival for patients with osseous spinal metastases. Spinal metastases are treated by a multidisciplinary team of surgeons, radiation and medical oncologists, and radiologists. New evidence-based management algorithms rely heavily upon data provided in radiology reports. Patient care is optimized when there is clear communication between members of the treatment team. This requires the radiologist to have a thorough knowledge of the most current treatment options and management algorithms. Providing our vital data with standardized reporting highlights our value to the team and improves the care of our patients.

LEARNING OBJECTIVES:

1. Describe advances in spine oncology and the new algorithms that guide management
2. Consider the vital role of the radiologist in multidisciplinary decision-making and treatment
3. Explain methods of increasing our value through optimized reporting, and the role this will play in enhanced patient care, quality improvement, and research.

FRIDAY, APRIL 12, 2019

PRACTICE MANAGEMENT
SESSION

Moderator: Robert Sevick
09:00 – 10:30



Physician Performance and Productivity: Looking Beyond the RVUs

Richard Duszak, Emory University School of Medicine 09:30 – 10:00

As physician reimbursement rates decline, many radiologists are forced to work faster and harder than ever. Their practices often use measures of clinical productivity (and frequently in the USA, the RVU) to measure the quantity of that work. But, little attention focuses on quality and service. This session will examine those traditional metrics and propose new perspectives and metrics to more adequately assess physician performance.

LEARNING OBJECTIVES:

1. Define traditional metrics used to assess radiology productivity.
2. Describe unintended consequences of such historic metrics.
3. Identify new ways to measure radiology performance and incentivize value-added imaging.

Coming from All Sides: Radiology in the Crosshairs

Bill Anderson, Medical Imaging Consultants 09:00 – 09:30

Radiology is under increasing pressure from a wide variety of sources. In Canada we have been sheltered from many of the pressures other jurisdictions are going through due to a strong regulatory environment, collegial medical associations and small group practices that have casual contracts with individual hospitals. The landscape is changing and changing quickly. This discussion will highlight these challenges from a radiologist's perspective and help facilitate the panel discussion with the attendees.

LEARNING OBJECTIVES:

1. Describe the increasingly competitive environment in which radiology exists.
2. Summarize why these forces exist and what we can do to help mitigate them.

Building a Stronger Partnership with Radiology

Mike Nader, University Health Network 10:00 – 10:30

This presentation will explore health system leadership and its partnership with radiology.

LEARNING OBJECTIVES:

1. Describe what health systems want to achieve.
2. Identify what brings value to health systems, and the challenges inherent in defining value.
3. Discuss radiology engagement in health system change.



Diffuse Airspace Disease on HRCT Chest: Practical Tips

Elsie Nguyen, Toronto General Hospital, University of Toronto 10:45 – 11:15

This presentation will outline an approach to interpretation of diffuse airspace disease as seen on high resolution chest CT. The focus is on practical tips to help integrate clinical information in order to narrow the differential diagnosis and make accurate final diagnoses.

LEARNING OBJECTIVES:

1. Describe an approach to diffuse airspace disease as detected on high resolution CT chest.
2. List three common causes of acute diffuse airspace disease.
3. List three common causes of chronic diffuse airspace disease.

Reticulation and Fibrotic Lung Disease

Hamid Bayanati, The Ottawa Hospital, University of Ottawa 11:15 – 11:45

This presentation will describe the HRCT definitions and principles of imaging interpretation of interstitial lung diseases. The pathological findings of reticulation and fibrosis will be discussed to facilitate the understanding of their HRCT manifestations. The clinical and prognostic significance of these findings will be discussed. Finally, using a case-based format, attendees will be presented with a systematic approach for the diagnosis of various interstitial lung diseases, including non-fibrotic causes of reticulation and chronic fibrosing lung diseases.

LEARNING OBJECTIVES:

1. Identify reticular pattern on high resolution CT (HRCT) of the lung and describe their radiological-pathological correlation and main differential diagnoses.
2. Recognize features of pulmonary fibrosis on HCRT and their prognostic significance.
3. Recognize the principles of HRCT interpretation for the diagnosis of non-fibrotic reticulation and fibrotic interstitial lung diseases.
4. Develop a systematic approach to the diagnosis of various interstitial lung diseases.

Nodular and Cystic Lung Diseases

Daria Manos, Dalhousie University 11:45 – 12:15

The case-rich presentation will review a practical approach to multinodular patterns and common cystic lung diseases. This session is presented in conjunction with the Canadian Society of Thoracic Radiology.

LEARNING OBJECTIVES:

1. Diagnose multinodular lung disease by supplementing the traditional anatomic approach with additional CT clinical clues.
2. Distinguish diffuse cystic lung disease from common mimics to improve diagnoses.



Microbubble Contrast Agents for US

Peter Burns, University of Toronto 10:45 – 11:15

Microbubbles offer ultrasound a contrast agent with some fascinating properties. By resonant amplification a single bubble the size of a red blood cell is detected deep in tissue. Bubbles are uniquely intravascular, even in angiogenic tumour vessels. After deliberate disruption by the imaging beam, their replenishment measures local perfusion rate. Their interaction with tissue can guide, and even enhance, therapeutic intervention. Finally, new ultrafast nonlinear imaging can track individual bubbles to depict microvascular vascular anatomy.

LEARNING OBJECTIVES:

1. Describe the physical principles of diagnostic contrast imaging with ultrasound and microbubbles;
2. Explain the role of microbubbles in diagnosis and therapeutic intervention.

The Fundamentals of Interpretation of CEUS of Focal Liver Masses

Stephanie Wilson, University of Calgary 11:15 – 11:45

Characterization of focal liver masses is the worldwide approval indication for microbubble contrast agents and is the most widely accepted indication for the use of CEUS in medical imaging. Knowledge of a few basic principles allows for very respectable determination of malignancy of liver masses and provides frequent noninvasive diagnosis. Malignancy is well predicted by identification of washout following arterial phase enhancement of any degree. Washout is described according to its timing, early at 1 minute following contrast agent injection. Washout is also described according to its intensity with marked washout suggesting a black or punched out hole in the liver. Weak washout shows a nodule with less enhancement relative to the liver but showing evidence of microbubbles within the nodule so that it is not completely black. These differences in washout typify differences between hepatocellular carcinoma, showing late and weak washout, as compared with nonhepatocellular malignancy, characterized by early rapid washout, often showing a marked or punched out appearance. Metastases and cholangiocarcinoma are both characterized by early marked washout. Benign tumors include hemangiomas, FNH and rare adenomas. They have a unique benefit from dynamic real-time CEUS in that all have a highly specific and suggestive enhancement pattern in the arterial phase. Hemangiomas show peripheral discontinuous globular enhancement with centripetal progression. This progression may occur rapidly in only seconds, in so called flash filling hemangiomas, and may alternately fill slowly and incompletely. FNH are hypervascular tumors, generally with stellate vessel morphology and centrifugal filling. They show sustained enhancement with a nonenhancing scar. Adenomas may show hyperenhancement with nonspecific morphology or may also show a centripetal pattern. All benign tumors have a strong tendency to sustained enhancement in the portal and late phase. Classic hepatocellular carcinoma, in any patient, shows APHE and slow weak washout. It is covered in more detail in the third lecture in this course.

LEARNING OBJECTIVES:

1. Identify that washout is the fundamental feature allowing for diagnosis of a malignant mass on liver CEUS.
2. Recognize that dynamic real-time imaging with ultrasound allows for superior identification of rapidly changing enhancement patterns that typify benign liver lesions on CEUS.
3. Consider that intravascular microbubble contrast agents for ultrasound will show discordance of enhancement patterns for malignant tumors with CT and MR scan where images are created with contrast agents with a recognized interstitial phase.

CEUS of HCC

Tae Kyung Kim, Medical Imaging, Toronto General Hospital 11:45 – 12:15

Noninvasive diagnosis of HCC relies heavily on sequential changes in the intranodular blood supply during hepatocarcinogenesis. CEUS is excellent to evaluate nodule perfusion utilizing real-time evaluation of enhancement and purely intravascular contrast. CEUS LI-RADS provides a diagnostic algorithm which categorizes liver nodules from LR-1 (definitely benign) through LR-5 (definitely HCC). LR-5 nodules can be treated as HCC without biopsy. LR-M nodules usually require biopsy because they may represent non-HCC malignancies such as cholangiocarcinoma or HCC.

LEARNING OBJECTIVES:

1. Recognize the role of CEUS in the diagnostic algorithms of liver nodules in patients at risk for HCC2.
2. Review CEUS LI-RADS particularly on the differences between LR-5 and LR-M.

FRIDAY, APRIL 12, 2019

MULTI ENERGY CT SESSION

Moderator: Savvas Nicolaou
13:00 – 14:30



MSK Multi Energy CT Practical Applications Making a Difference

Michael O’Keeffe 13:00 – 13:30

Details to come.

Practical Applications of Multienergy CT in Oncology Imaging

**Mohammed F. Mohammed, King Saud bin Abdulaziz University for Health Sciences, King Abdullah International Medical Research Center, Ministry of the National Guard, Health Affairs, Medical Imaging Department, Abdominal Imaging Section
13:30 – 14:00**

Details to come.

LEARNING OBJECTIVES:

1. Describe the basics of multi-energy CT.
2. Explain applications of multi-energy CT in oncology imaging for diagnosis and follow-up.
3. Employ strategies for applications in routine practice.

MECT in the Acute Setting

Savvas Nicolaou, University of British Columbia 14:00 – 14:30

This session outlines novel techniques that multi-energy CT provides for applications in the acute setting, with analysis of several clinical examples.

LEARNING OBJECTIVES:

1. Describe and apply novel techniques utilizing multi-energy CT:
 - (1) Liver VNC – 3 material decomposition for abdominal and neuroradiology applications;
 - (2) Bone marrow edema and tendon/ligament analysis for musculoskeletal radiology applications;
 - (3) Material separation and highlighting for stones analysis; and
 - (4) Image improvement and metal artifact reduction in monoenergetic imaging.
2. Apply these novel techniques in the acute setting.

FRIDAY, APRIL 12, 2019

BUILDING RESILIENCE IN OURSELVES AND OUR ORGANIZATIONS

Carolyn Thomson
Dalhousie University
13:00 – 14:30



Studies have consistently shown that greater than 50% of physicians and learners report symptoms of burnout. Reducing burnout and rekindling the “joy in medicine” must be addressed at both individual and organizational levels. In this interactive workshop, the concept of physician burnout will be explored and participants will have the opportunity to learn tools to enhance their own personal resilience. Working in groups, participants will then develop strategies to create a culture of wellness within their departments and organizations.

LEARNING OBJECTIVES:

1. Review the issue of physician and learner burnout and why it matters.
2. Develop tools to enhance personal resilience and wellness.
3. Discuss strategies to promote a “culture of wellness” in our departments and organizations.



FRIDAY, APRIL 12, 2019

CARTILAGE IMAGING SESSION

Moderator: Adnan Sheik
14:45 – 16:25



Cartilage Imaging for 'the Rest of Us'

Bruce Forster, University of British Columbia 14:45 – 15:10

Conventional Morphologic Techniques:

- Conventional SE/Fast SE -Lipid suppression
- MRA New Morphologic Techniques
- DESS-3T Physiologic Imaging of Cartilage Loss of proteoglycan content
- dGEMRIC Collagen degradation and increased hydraulic permeability of matrix T2 Mapping

LEARNING OBJECTIVES:

1. Discuss the socioeconomic impact of osteoarthritis and the role of imaging in assessment of cartilage.
2. Describe the current MRI techniques in assessing cartilage morphology and biochemistry, describing their advantages and disadvantages.
3. Propose the potential role of cartilage mapping in research and clinical practice.

Newer Imaging Techniques in MSK

Marcos Loreto Sampaio, University of Ottawa / The Ottawa Hospital 15:10 – 15:35

In this presentation you will be presented with ultrasound, MRI, CT and radiographic techniques that may potentially facilitate your MSK practice. We will discuss applications and limitations, including the impact on the workflow.

LEARNING OBJECTIVES:

1. Describe new technologies in MSK imaging, their potential applications and limitations.
2. Distinguish between and integrate the new technologies the ones that may contribute to your clinical practice.

Shoulder Labrum: 1.5T or 3T

Ali Naraghi, Toronto Joint Department of Medical Imaging, University of Toronto 15:35 – 16:10

Labral pathology may result in shoulder instability or shoulder pain and is a common indication for MR imaging of the shoulder particularly in younger individuals. 3T imaging with its better SNR affords theoretical advantages in assessment of internal derangement of joints. This presentation will discuss image optimization at 1.5T and 3T. The literature will also be reviewed to determine whether there is improved diagnostic performance of 3T over 1.5T in assessment of shoulder labral pathology.

LEARNING OBJECTIVES:

1. Discuss optimization of imaging parameters at 1.5T and 3T in assessment of the shoulder.
2. Describe potential advantages of 3T MRI over 1.5T MRI in evaluation of the shoulder labrum.
3. Determine the accuracy of 1.5T and 3T MRI in detection of shoulder labral pathology.

3D Printing in Orthopaedics

Adnan Sheikh, The Ottawa Hospital

3D printing, also known as additive manufacturing, takes a computer-generated design and turns it into a three-dimensional object via a 3D printer that deposits successive layers of a material, such as plastic or metal, on top of each other to create a 3D printed model. At present 3D printing models are used for teaching, surgical planning and research.

LEARNING OBJECTIVES:

1. Recognize the basic principles of 3D printing.
2. Describe the different techniques and applications of 3D printing.

FRIDAY, APRIL 12, 2019

CAIR AT CAR: IR FOR THE DR

Moderator: Amol Mujoomdar
14:45 – 16:25



Imaging of Bleeding: Protocols, Imaging, and When to Call IR

Derek Cool, Western University 14:45 – 15:15

This presentation will discuss how to image a patient with various types suspected traumatic or non-traumatic bleeding, imaging interpretation pearls and interventional radiology treatment options.

LEARNING OBJECTIVES:

1. Identify the appropriate imaging modality and protocol to evaluate a patient with suspected active bleeding.
2. Differentiate common imaging features and sites/sources of active bleeding that require emergent intervention.
3. Discuss common interventional radiology management options for various types of bleeding.

Biopsy and Drainage Tips and Tricks for the Diagnostic Radiologist and Management of Anticoagulation/Coagulopathy

Amol Mujoomdar, London Health Sciences Centre/Western University 15:15 – 15:45

This session will demonstrate different approaches to challenging general interventional radiology cases, including biopsies and drainages. In addition, the issues of anticoagulation and management of coagulopathy will be addressed.

LEARNING OBJECTIVES:

1. Approach and perform a challenging biopsy.
2. Explain the management of anticoagulation and coagulopathy, as they pertain to IR procedures.

Update on Li-RADS and Imaging Post-Locoregional Therapy of HCC

Jonathan Chung, Western University 15:45 – 16:15

The first half of the lecture will present a practical approach to integrating Li-RADS into practice. The second half of the lecture will briefly discuss the various loco-regional therapies used in the treatment of HCC and the expected (and unexpected) findings post treatment.

LEARNING OBJECTIVES:

1. Apply the use of Li-RADS in reporting hepatocellular carcinoma.
2. Consider the range of appearances of the liver following loco-regional therapy.

CAR HOT TOPICS: ARTIFICIAL INTELLIGENCE IN RADIOLOGY: DATA TRANSPARENCY, PRIVACY AND BIAS

Moderator: Andra Morrison
Panelists:
Heather Chalmers, Jaron Chong, Mary Jane Dykeman
16:45 – 17:45

The session will focus on the interplay between data collection, patient privacy and consent in R&D for artificial intelligence tools used in medical imaging. Consenting protocols exist for the primary use of health data, but the continued progress of AI research depends on access to the data oceans that exist in institutions all over Canada, often making secondary or tertiary use of patient data. Research Ethics Boards are not necessarily prepared to bridge the gap between AI research pursued for scientific or clinical purposes and the subsequent use of the resulting algorithms to develop market-ready tools and products. The presentations that frame the panel discussion will explore topics related to the ethical and legal issues surrounding AI R&D, the risk of implicit bias in data collection and data sets, research design, patient engagement and the role of industry.

SATURDAY, APRIL 13, 2019

**PLENARY: EVALUATION OF
THE SOLITARY PULMONARY
NODULE**

Jeffrey Klein
University of Vermont Medical Center
08:00 – 09:00



This session will use a case-based method to review issues related to the characterization of solitary pulmonary nodules, with a focus on the use of thin-section CT for analysis. Proper lesion measurement, density and margin characterization, and proper technical/display parameters will be reviewed. The Fleischner guidelines for the assessment and management of incidental lung nodules will be highlighted.

LEARNING OBJECTIVES:

1. Describe the proper method of measuring lung nodules on CT.
2. Apply the Fleischner guidelines for the recommended management of small incidental lung nodules.

**HANDS-ON WORKSHOP:
PROSTATE MRI**

Facilitators: Silvia Chang, Dan Margolis,
Emily Pang
08:00 – 12:00

This hands-on interactive prostate MRI workshop will focus on providing the participant with simulated interpretation and reporting of cases. Didactic sessions on PIRADSV2 imaging technique and interpretation with an official template will also be included. Participants will be presented a few examples of how to perform, assess, interpret, and report multiparametric prostate MRI using the Prostate Imaging Reporting and Data Systems version 2.1. The session will conclude with an audience response system for additional case-based learning.

LEARNING OBJECTIVES:

1. Perform and interpret prostate MRI in accordance to PIRADSV2.
2. Create a standardized template report.
3. Recognize pitfalls and mimics in interpreting multi-parametric prostate MRI.
4. Learn the differences between PI-RADS v2 and v2.
5. Communicate important findings on prostate MRI for patient management.

SATURDAY, APRIL 13, 2019

CARDIAC

Moderator: Carole Dennie
09:00 – 10:30



Beyond Stenosis: FFRct and Plaque Analysis on Cardiac CT

Narinder Paul, Western University, Schulich School of Medicine and Dentistry 09:00 – 09:30

Details to come.

LEARNING OBJECTIVES:

1. Identify the fundamentals of FFRCT.
2. Consider the current literature on the role of FFRCT .
3. Compare technical considerations in cardiac CT plaque analysis .
4. Evaluate the rationale for different approaches to performing cardiac CT for assessment of coronary artery disease.

Imaging of the Aorta: From Innovations in TAVR to the Prediction of Acute Aortic Syndromes

Alban Redheuil, Sorbonne Université Médecine 9:30 – 10:00

Details to come.

Late Gadolinium Enhancement and Beyond: The Value of Cardiac MR in the Diagnosis of Non-ischemic Cardiomyopathy

Carole Dennie, The Ottawa Hospital/University of Ottawa 10:00 – 10:30

This presentation will focus on the use of traditional cardiac MR (CMR) sequences, especially late gadolinium enhancement (LGE) to diagnose non-ischemic cardiomyopathies. Newer CMR techniques such as parametric mapping and strain imaging will also be introduced as an example of current and future techniques that promise to improve early detection, diagnostic accuracy and possibly patient outcomes.

LEARNING OBJECTIVES:

1. Describe three patterns of non-ischemic late gadolinium enhancement.
2. List three types of non-ischemic cardiomyopathy in which T1 and T2 mapping can be particularly useful.
3. Describe the emerging role of strain imaging in non-ischemic cardiomyopathy.

SATURDAY, APRIL 13, 2019

ACADEMIC RADIOLOGY

Moderator: Iain Kirkpatrick
09:00 – 10:30



Peer Learning: What Has It Taught Us?

Bill Anderson, Medical Imaging Consultants 09:00 – 09:30

Alberta Health Services (AHS) is Canada's largest province wide, fully-integrated health system, responsible for delivering health services to the over four million people living in Alberta. AHS has implemented a province-wide Quality Assurance Program within Diagnostic Imaging including over 130 sites, 300+ radiologists and 1400+ technologists. Radiologists and technologists perform peer learning on randomly selected, de-identified exams from across the province. The goal of the program is to reduce errors and increase quality and patient outcomes through education. This presentation will share our key components of success, lessons learned and the future possibilities of where the program can take improving patient outcomes.

LEARNING OBJECTIVES:

1. Define key components of our Quality Assurance Program.
2. Consider the challenges and lessons learned.
3. Recognize the possibilities with a successful Quality Assurance Program.

Novel Methods of Delivering Educational Content in Radiology Journals, with a Focus on RadioGraphics

Jeffrey Klein, University of Vermont Medical Center 09:30 – 10:00

This presentation will review the various formats of journal educational content that can currently be published online, with a focus on those used in RadioGraphics, the RSNA journal for continuing medical education in radiology. The use of video, audio, animation, and slide presentation formats will be featured, and the use of American Board of Radiology and American Association of Physicists in Medicine indices for organizing educational content will be discussed.

LEARNING OBJECTIVES:

1. Detail novel methods of creating and delivering education content via online journal publication.
2. Assess the multiple sources of educational content provided by RadioGraphics online.

Software Applications to Improve Your Academic Productivity

Iain Kirkpatrick, University of Manitoba 10:00 – 10:30

This session will explore a number of useful software applications for both desktop and mobile operating systems that academic radiologists can download to increase their productivity and make more efficient use of their time at work. This will include a discussion around the use of cloud storage, note taking, the paperless office, task management, and reference article organization. Several applications will be demonstrated.

LEARNING OBJECTIVES:

1. Recognize how the use of software applications can save radiologists valuable time at work.
2. Describe the value of keeping reference material in the cloud (and define "the cloud").
3. Consider the utility of software applications for note taking, academic task management, reference article organization.
4. Operationalize measures towards initiating a paperless office.

SATURDAY, APRIL 13, 2019

CLINICAL AUDIT WORKSHOP

Sukhvinder Dhillon
University of Alberta
09:00 – 10:30



This workshop will be comprised of short presentations and interactive exercises. Participants are encouraged to bring along audit proposals which we can discuss as part of the workshop.

In this workshop we will:

- Review what clinical audit is and is not
- Discuss what constitutes a good clinical audit project
- Show examples of clinical audit projects. Review guidelines for the CAR clinical audit competition
- Discuss the relevance of the CanMEDs framework to clinical audit

LEARNING OBJECTIVES:

1. Describe the clinical audit template.
2. Discuss the components of a good clinical audit project.
3. Relate the CanMEDS framework to a clinical audit project.



SATURDAY, APRIL 13, 2019

COMMUNITY RADIOLOGY

Moderator: Michael Patlas
10:45 – 12:15



Pediatric Neurological Emergencies for Community Radiologist

Elka Miller, Children's Hospital of Eastern Ontario 10:45 – 11:15

This is a case-based presentation of pediatric neuroradiological emergencies with an emphasis on the differential diagnosis and obtaining a sense of which imaging modality is most appropriate for different pediatric ages.

LEARNING OBJECTIVES:

1. Recognize a spectrum of non-traumatic pediatric head and neck pathologies seen in the emergency room.
2. Review critical findings that radiologists must convey to clinicians which can directly influence patient treatment and outcomes.

BMD Facility Accreditation: Controversies in the Reporting Standard

David Lyons, Deep and River District Hospital 11:15 – 11:45

The mission statement of the CBMD BMD Facility Accreditation Program outlines the importance of promoting a “reporting standard” that will optimize the appropriate use of BMD services in our publicly funded health care system and contribute to overcome the “care gap” between disease recognition and treatment provided. Promoting a reporting standard is not without controversy, and this presentation will attempt to clarify some important issues which have important implications for imaging physicians.

LEARNING OBJECTIVES:

1. Describe some of the controversies encountered in the promotion of a reporting standard for BMD.
2. Recognize the critical importance of the CAR guidelines in supporting imaging physicians in achieving a high standard in the reporting of BMD exams.

Chest Imaging Traps to Avoid: Practical Tips for Busy Radiologists

Daria Manos, Dalhousie University 11:45 – 12:15

You know your blind spots but what other errors could be lurking in the shadows? Focusing on CT and the most challenging of imaging modalities, the chest X-ray, this presentation will review tips for identifying, characterizing and diagnosing tricky thoracic disease.

LEARNING OBJECTIVES:

1. Recognize clues that suggest less common causes of consolidation, reticulation and mediastinal enlargement.
2. Associate thoracic diseases that may result in normal or near normal imaging.

SATURDAY, APRIL 13, 2019

ARTIFICIAL INTELLIGENCE

Moderator: Alexandre Cadrin-Chênevert
10:45 – 12:15



AI in Radiology: Ethics and Legal Considerations

Jacob Jaremko, University of Alberta/Rebecca Bromwich, Carleton University 10:45 – 11:15

Radiology is at the forefront of adoption of artificial intelligence in Canadian health care. We will provide an overview of the conflicting ethical principles relevant to application of AI to medical imaging, particularly as related to data privacy. We will also describe the basic principles of relevant Canadian law.

LEARNING OBJECTIVES:

1. Recognize the main ethical principles relevant to use of AI in medical imaging.
2. Summarize the basic principles behind Canadian law applicable to AI in medical imaging.

What We Have Learned from AI in Radiology: the McGill Experience

Jaron Chong, McGill University 11:15 – 11:45

This presentation will discuss the prerequisites for bootstrapping a radiology department for AI development and utilization. We will discuss the barriers, mitigation strategies, and organization strategies for AI development and consumption. The participant will understand various options and techniques for encouraging the development of AI within their own communities, and review an approach to evaluating experimental design viability balancing clinical application with technical feasibility.

LEARNING OBJECTIVES:

1. Identify resources and skillsets necessary for AI development at a department and organization level.
2. Describe the different strategies organizations can take to develop AI within their departments.
3. Review an approach to evaluating and critiquing clinical applications for AI algorithm viability.

Development of AI Applications for Enhanced Diagnostic Experience

Leonid Chepelev, University of Ottawa 11:45 – 12:15

AI-based solutions for clinical and diagnostic medical applications are undergoing an exponential growth, promising to redefine the practice of medicine and physicians' added value. To fully benefit from this promise, a productive dialogue must occur between computer scientists and frontline physicians, whereby the former understand the scope of possible medical use cases and the latter appreciate the benefits and limitations of AI-based technologies. This session aims to support this dialogue from a physician-scientist perspective.

LEARNING OBJECTIVES:

1. Describe the major existing applications and use cases for AI applications in enhancing clinical and research radiological workflow.
2. Identify the broad categories of algorithms in development to support use cases in image quality improvement, triaging, hypothesis evaluation, and diagnostic support.

SATURDAY, APRIL 13, 2019

PANEL DISCUSSION: SO YOU MADE A MISTAKE: DEALING WITH IMPERFECTION IN RADIOLOGY

Moderator: Cameron Hague
Panelists: Lisa Smyth,
Richard Mimeault, Taryn Hodgdon
10:45 – 12:15



Panel discussion will include brief (5 min) presentations from panelists. With 1 hour reserved for questions for the audience.

LEARNING OBJECTIVES:

1. Consider the psychology of making mistakes and dealing with them in the medical profession.
2. Discuss tools to help develop a healthy relationship with errors made in radiology, how to learn from them and get past them.

COMMUNITY RADIOLOGY

Moderator: Michael Patlas
13:00 – 14:30

Imaging Acute RUQ Pain

Anthony Hanbidge, Toronto Joint Department of Medical Imaging, University of Toronto 13:00 – 13:30

Ultrasound is the primary imaging modality for assessing acute RUQ pain; it is both sensitive and specific in demonstrating gallstones, biliary dilatation, and features suggesting acute inflammation. Occasionally, additional imaging is indicated. CT is valuable for confirming the nature and extent of complications of acute cholecystitis. MRCP is helpful in complicated ductal disease when more detailed diagnostic information is required for treatment planning, whereas ERCP is used when biliary intervention is required.

GOAL: Demonstrate a practical approach to imaging the patient with acute right upper quadrant pain

LEARNING OBJECTIVES:

1. Discuss the value of ultrasound in the assessment of acute pain in the right upper quadrant.
2. Identify the imaging features of acute cholecystitis and its complications.
3. Describe additional pathologic conditions that can cause acute pain in the right upper quadrant when the gallbladder is normal.

Appendicitis in 2019

Michael Patlas, McMaster University 13:30 – 14:00

Appendicitis is a common entity. There is a decreasing emphasis on clinical and laboratory presentation. The accurate preoperative diagnosis is heavily relies on imaging. The advantages and disadvantages of different cross-sectional modalities (US, MDCT, MRI) for the detection of acute appendicitis will be discussed.

LEARNING OBJECTIVES:

1. Discuss the use of different cross-sectional modalities for the diagnosis of acute appendicitis.
2. Examine common mistakes in interpretation3. To review potential mimics of acute appendicitis.

Hand and Wrist Trauma

Adnan Sheikh, The Ottawa Hospital 14:00 – 14:30

Hand and wrist injuries are common. These can be divided into two categories: traumatic injuries and overuse injuries. We will review the most common hand and wrist traumatic injuries. Acute wrist injuries are predominantly bone fractures, such as those of the scaphoid, hamate hook, and ulnar styloid. Ligament lesions are more challenging for radiologists and may lead to carpal instability if undiagnosed.

LEARNING OBJECTIVES:

1. Describe the mechanisms and the radiologic aspects of wrist and hand injuries.
2. Identify the imaging findings of the most common wrist and hand injuries.

SATURDAY, APRIL 13, 2019

CONTROVERSIES IN CONTRAST

Moderator: Nicola Schieda
13:00 – 14:30



This interactive session reviews current controversial topics in contrast utilization in diagnostic medical imaging including: Nephrogenic Systemic Fibrosis (NSF), Contrast Induced Nephropathy (CIN) and Gadolinium Retention. The speakers include national and international experts on contrast media and Chairs of the CAR and ACR Guidelines on NSF and Contrast Media.

LEARNING OBJECTIVES:

1. Recognize the substantially decreased risk of NSF using Group 2 Gadolinium based contrast agents (GBCA) and Gadoxetic acid and the implications on patient care.
2. Summarize updated information about CIN and how this pertains to utilization of iodinated contrast media in patients undergoing CT with impaired renal function.
3. Consider the evolving topic of Gadolinium retention in the body and implications, if any, for patient care.

Nephrogenic Systemic Fibrosis

Nicola Schieda, The Ottawa Hospital 13:00 – 13:30

This lecture reviews our current scientific understanding of NSF in the era of Group 2 GBCA and Gadoxetic Acid and describes the evidence which has led to modifications of guidelines pertaining to the use of GBCA in patients with acute kidney injury, severe chronic kidney disease or on dialysis. The recent CAR and ACR guidelines are described, with reference to Health Canada and the FDA recommendations. A discussion of the need for outpatient screening of renal function in the era of markedly reduced or non-existent cases of NSF is presented.

LEARNING OBJECTIVES:

1. Describe the markedly reduced incidence of NSF in the era of Group 2 GBCA and gadoxetic acid and appreciate the available evidence confirming few if any cases of NSF with these agents when used in patients with renal dysfunction or on dialysis.
2. Develop a policy on use of GBCA in patients with renal dysfunction or on dialysis.
3. Develop a policy on outpatient screening of renal function in patients undergoing GBCA enhanced MRI.

Gadolinium Retention/Deposition

Jeffrey Weinreb, Yale School of Medicine 13:30 – 14:00

Following intravenous administration of gadolinium-based contrast agents (GBCAs), minute quantities of gadolinium remain in certain parts of the brain and in other tissues throughout the body. The amount of Gd retention is related to GBCA stability, and macrocyclic agents are associated with lower levels of Gd retention than linear ones. The potential toxicities of the small pool of retained GBCAs, their metabolites, as well as the soluble and insoluble complexes derived from this pool, are largely unknown. To date, no convincing evidence of chronic toxicity arising from retained gadolinium in neural tissues introduced via intravenous administration has been reported. At this time, the clinical importance of gadolinium retention in different human populations is unknown.

LEARNING OBJECTIVES:

1. Describe current data about deposition and retention of gadolinium following intravenous administration of gadolinium-based contrast agents.
2. Review updated data about clinical manifestations of gadolinium retention and recommendations about use of GBCAs.

Contrast-Induced Nephropathy

Matthew Davenport, Michigan Medicine 14:00 – 14:30

Discussion of the risk of contrast-induced nephropathy (CIN) following IV media and potential prophylactic strategies.

LEARNING OBJECTIVES:

1. Identify the thresholds used to signify risk of CIN.
2. Recognize the efficacy of prophylactic measures vs. CIN.



MRI Physics: The Basics

Iain Kirkpatrick, University of Manitoba 13:00 – 13:30

An easy-to-understand and streamlined approach to MRI physics targeted at radiology residents will review basic principles required to understand contrast weighting (T1, T2), pulse sequence design, and sequence selection.

LEARNING OBJECTIVES:

1. Describe concepts of T1, T2, and associated contrast weighting.
2. Consider how and why we manipulate radiofrequency pulses to create different pulse sequences, and what clinical applications various sequences are used for.

Brain Imaging

Mario Kontolemos, University of Ottawa 13:30 – 14:00

A case-based tour of various pathologies manifesting as intracranial masses, with an emphasis on pertinent differentials and imaging pearls helpful to diagnosis.

LEARNING OBJECTIVES:

Following this presentation, participants will be able to:

1. identify major imaging features relevant to an appropriate differential of an intracranial mass and
2. make appropriate recommendations regarding management of these lesions.

Spine Imaging

Jason Shewchuk, University of British Columbia 14:00 – 14:30

Review of spinal imaging cases to emphasize learning points.

LEARNING OBJECTIVES:

1. Review spine M&M cases to identify important pearls and pitfalls.
2. Recognize and mitigate these mistakes in practice.



Twists and Unexpected Turns: Imaging Complications After Bariatric Surgery

Ania Kielar, University of Toronto 14:45 – 15:15

In this didactic presentation, an overview of different types of weight reduction interventions will be shown. Specific examples of normal post-operative appearances as well as complications post-interventions will be highlighted. There will be a heavy focus on identifying imaging appearances associated with internal hernias post Roux-en-Y gastric bypass.

LEARNING OBJECTIVES:

1. Diagnose internal hernias post RYGB even when there is no associated bowel obstruction.
2. Identify and manage acute gastric distension of the excluded stomach post-operatively, and the need for immediate communication of this finding to the surgeon.

Trauma in the Pregnant Patient

Vincent Mellnic, Mallinckrodt Institute of Radiology 15:15 – 15:45

The goals of this talk are to:

- Review epidemiology of trauma in pregnancy
- Discuss the imaging evaluation of the pregnant trauma patient, including rationale in choosing modalities
- Understand concerns about radiation dose in pregnant patients and put them in appropriate context
- Provide examples of non-pregnancy specific injuries in trauma
- Demonstrate pregnancy-specific injuries in trauma

Big Trouble in the Small Bowel – Uncommon Small Intestinal Emergencies

Vincent Mellnick, Mallinckrodt Institute of Radiology 15:45 – 16:15

This lecture will focus on imaging features of uncommon small intestinal emergencies with an emphasis on CT findings. Differential diagnoses for small bowel obstruction, ischemia, inflammation, and hemorrhage will be reviewed.

LEARNING OBJECTIVES:

1. Utilize plain film, CT and MRI to identify and characterize acute conditions of the small bowel.
2. Identify conditions of the small bowel that result in obstruction, ischemia, inflammation, and hemorrhage.
3. Differentiate between surgical and nonsurgical causes of acute small bowel pathology.
4. Assist referring clinicians to guide management.

SATURDAY, APRIL 13, 2019

**JUNIOR AND SENIOR PLAIN
FILM HOT SEAT SESSION**

Moderator: Cameron Hague
14:45 – 16:15



Junior Hot Seats: Mario Kontolemos and Jason Shewchuk

Senior Hot Seats: Nader Zakhari and Stephanie Lam

OVERALL PRESENTATION SUMMARY: This session will provide participating residents with a foundation for approaching cases in a “hot seat” setting in preparation for various examinations. All areas of radiology will be covered. Each resident will receive at least four training-appropriate cases. The cases will be discussed and feedback will be given.

OVERALL LEARNING OBJECTIVES:

At the end of this session, participants should be able to:

1. Assimilate and apply pertinent differential diagnoses in radiology related to the sample cases.
2. Apply a patterned approach to radiographic disease via a case-based approach.
3. Analyze feedback received from the moderators and use it to improve skills while interpreting cases orally.

FILM PANEL SESSION

16:30 – 17:30

Bruce Forster, UBC

PRESENTATION SUMMARY: Two teams of radiologists will compete to read and interpret unknown cases across a variety of body systems. The panel will be an opportunity to observe colleagues and peers as they analyze images and develop diagnoses, then use those diagnoses to guide patient care.

LEARNING OBJECTIVES:

At the end of this session, participants should be able to:

1. Identify imaging findings of unusual but not rare diseases in Neuro, MSK, Chest and Abdominopelvic body systems.
2. Establish the advantages of the common modalities in demonstrating such findings.
3. Select the optimum approach to unknown case review.
4. Consider the role of humour in a late afternoon imaging review session.

SUNDAY, APRIL 14, 2019

PLENARY: DILEMMAS IN MUSCULOSKELETAL TUMOR DIAGNOSIS

Mark Murphey
American Institute for
Radiologic Pathology
08:00 – 09:00



This session will discuss the radiologic appearance and distinction of lipoma versus liposarcoma, enchondroma from chondrosarcoma and hematoma from hemorrhagic neoplasm. These are three common diagnostic dilemmas in musculoskeletal tumor imaging and the important distinguishing features will be emphasized. In addition, the clinical and surgical implications of these distinctions are also discussed.

LEARNING OBJECTIVES:

Upon completion of this lecture, participants will be able to:

1. Identify imaging appearances that often allows distinction of lipoma from well differentiated liposarcoma.
2. Distinguish the treatment options in extremity lipoma versus well differentiated liposarcoma.
3. Recognize the radiologic features of dedifferentiated liposarcoma and this diagnosis' clinical implication.
4. Identify the imaging appearance that often allows distinction of long bone enchondroma versus chondrosarcoma.
5. Describe the treatment options in extremity enchondroma and low grade chondrosarcoma.
6. Recognize the radiologic features that distinguish hematoma from hemorrhagic neoplasm.





Neuro

Benjamin Kwan, Queen's University 09:00 – 09:20

This presentation will review common types of errors in neuroradiology. Case-based examples in neuroradiology will be reviewed. Strategies to minimize errors in daily practice will be highlighted.

LEARNING OBJECTIVES:

1. Identify common categories of errors in neuroradiology.
2. Describe case examples of mistakes or errors in interpretation.
3. Apply strategies to minimize errors in neuroradiology.

ENT

Mark Levental, Jewish General Hospital 09:20 – 09:40

The presentation will deal with several cases which pose diagnostic challenges to general diagnostic radiologists. Special attention will be paid to certain diagnostic features which help narrow the differential diagnosis. Anatomy and embryology will be reviewed to help understand the imaging features.

LEARNING OBJECTIVES:

1. Review the clinical presentation, embryology, anatomy and imaging characteristics of select pathologic cases.
2. Describe the specific imaging features permitting an accurate diagnosis.

Pediatric Radiology

Christine Saint-Martin, Montreal Children's Hospital MUHC 09:40 – 10:00

With a case show presentation, I will review common mistakes and misses we do when imaging children from head to toes. I will give few tricks to facilitate the reading approach and decrease the recurrence rate.

LEARNING OBJECTIVES:

1. Recognize the most common misses and pitfalls in pediatric radiology.
2. Associate and apply technical tricks to recognize the aforementioned pitfalls.

Pitfalls in Imaging of Musculoskeletal Tumors

Mark Murphey, American Institute for Radiologic Pathology 10:00 – 10:20

This course discusses four important situations leading to mistakes and miscues in radiologic assessment of musculoskeletal tumors. These potential pitfalls include distinction of myxoid neoplasm from cystic masses, misinterpretation of myositis ossificans as an aggressive neoplasm, detection of impending pathologic fracture and differentiation of musculotendinous injury from neoplasm. Careful attention to lesion location and intrinsic characteristic usually allows accurate diagnosis which is vital to optimize patient management and outcome.

Upon completion of this lecture, participants will be able to:

- 1) Identify imaging differences between myxoid neoplasms and other high water content soft tissue masses.
- 2) Recognize the radiologic appearance of myositis ossificans and tendinous injury that allow distinction from a neoplastic process.
- 3) Recognize the imaging appearance that suggests impending pathologic fracture and its clinical implications.



Chest

Karl Sayegh, McGill University Health Center 10:35 – 10:55

Errors in radiology can occur at various time points of the process, resulting in variable consequences. The focus of this presentation is to discuss some of the interpretive errors occurring during review of CT chest.

LEARNING OBJECTIVES:

1. Detect, describe, and interpret anatomical variants in the chest.
2. Recognize potential pitfalls during interpretation of CT chest.

MSK

Rehana Jaffer, McGill University Health Centre 10:55 – 11:15

We will use a case-based approach to review pearls and pitfalls in order to improve detection and image interpretation of certain common musculoskeletal pathologies.

LEARNING OBJECTIVES:

At the end of this session, participants should be able to:

1. Recognize some common mistakes made in musculoskeletal imaging.
2. Apply strategies to reduce imaging errors.

Imaging of the Twists and Turns of the Gastrointestinal Tract

Francesca Proulx, Jewish General Hospital 11:15 – 11:35

This case-based presentation will allow the participants to review the different types of gastric volvulus and internal hernias. The imaging features of sigmoid and cecal volvulus will be examined in details. The risk factors, complications and management of acute cases of intestinal volvulus and hernias will be outlined.

LEARNING OBJECTIVES:

1. Review the imaging features of the different types of gastric volvulus.
2. Review the imaging features of the different types of internal hernias.
3. Differentiate between cecal and sigmoid volvulus.

POSTERS AND ORAL PRESENTATIONS RÉSUMÉS ET PRÉSENTATIONS ORALES



FRIDAY, APRIL 12, 2019

SCIENTIFIC RESEARCH PROJECT ORAL PRESENTATIONS

Judges: Emily Pang,
Francesca Proulx, Vivek Virmani
09:00 – 10:30
Kafka-Lamartine

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Personalized Contrast Media Injection Protocols for Abdominal CT Studies

Francesco Macri, Vancouver General Hospital; Elina Khasanova, Vancouver General Hospital; Nathaniel Mercado, MGH Institute for Technology Assessment; Avinash Kambadakone, Massachusetts General Hospital; Travis Redel, Technologist; Anushri Parakh, Radiology Department Division of Abdominal Imaging, Massachusetts General Hospital; Dushyant Sahani, Massachusetts General Hospital

OBJECTIVE: To compare abdomen CT exams using customizing contrast material (CM) injection protocol software based on total body weight (TBW) and kV to fixed CM injection protocols.

METHODS: A total of 318 patients underwent abdominal CECT studies (GE, Discovery, Revolution HD). 183 were scanned using 100kV and 136 with DECT-65-keV. CM (370 mgI/mL, Iopamidol) was administered using a software platform (Certegra-Bayer), connected to the power injector, which customized the CM injection (Cinj) based on TBW. In 181-Cinj patients (97 with 100kV; 84 with DECT) a standard of care CT comparison was available with 120kV and fixed CM injections (Finj) using TBW-based thresholds (≤ 59.9 kg, 80 ml; 60-89.9 kg, 90 ml; ≥ 90 kg, 120 ml). HU and CNR were calculated from ROIs within the liver, pancreas, portal vein, and aorta. Two radiologists assessed subjective image quality with a 5-point scale (1, unacceptable-5, excellent).

RESULTS:

Patients ≤ 59.9 kg received a mean CM volume of 70.3 ± 1.2 vs 80ml (-12%), patients 60-89.9 kg of 81.6 ± 9.2 vs 90ml (-9.2%), and patients ≥ 90 kg 107.4 ± 7.4 vs 120ml (-10.4%).

All exams were judged diagnostic. In comparison to 120 kV-Finj, 100kV-Cinj images showed significantly higher HU (+6-14%; $p < 0.05$) and CNR (+36-87%; $p < 0.05$) in all three groups.

Similarly, DECT-Cinj images showed significant higher mean HU (+7-22%; $p < 0.05$) and CNR (+14%-86%).

Radiologists estimated image quality equal/superior to acceptable in 99.4% of the cases (agreement percentage).

CONCLUSION: Personalized CM injection protocols enables substantial iodine dose reduction for low kV/keV exams while yielding diagnostic quality images with higher attenuation and CNR values compared to 120kV exams using fixed CM injection volumes.

Comprehensive Living Renal Donor Imaging: Comparison of Dual Energy Computed tomography and Low (100) kVp Exams

Elina Khasanova, Vancouver General Hospital; Francesco Macri, Vancouver General Hospital; Dushyant Sahani, Massachusetts General Hospital; Anushri Parakh, Massachusetts General Hospital

OBJECTIVES: Assessment of the performance of dual-energy CT (DECT) with a reduced total iodine dose compared to 100 kVp SECT for pre-operative evaluation of potential renal donors.

METHODS: A total of 134 potential renal donors underwent abdominal DECT and SECT-100kVp examinations. The injected intravenous contrast material (IVCM) 370 mg/ml was fixed at 60 or 80 mL (22.2 or 29.6 g I) for DECT and 70 or 90 mL (25.9 or 33.3 g I) for SECT based on total body weight. In DECT, late arterial phase images were acquired, whereas in SECT, non-enhanced and late arterial phases. Double blinded independent subjective and objective image quality analyses were done. The surgical reports (n=49) served as reference standard for diagnostic accuracy of preoperative imaging.

RESULTS: The image quality of all the CTA examinations performed with DECT and SECT exceeded diagnostic expectations of 4 by Likert scale. Attenuation and contrast-to-noise values was higher in DECT versus SECT regardless of region and weight group ($p < 0.01$). Image noise was higher in SECT group. Excellent agreement between two readers and 100% accuracy in depiction of renal vasculature (confirmed by surgical reports) was demonstrated.

CONCLUSIONS: DECT and low kVp SECT showed the potential to customize the CT protocols for comprehensive and accurate assessment of renal donors. DECT allows using lower CM dose while providing superior quality images with higher attenuation and CNR to 100 kVp SECT.

Patient Perspectives and Priorities Regarding Artificial Intelligence in Medical Imaging

Scott Adams, University of Saskatchewan; Paul Babyn, University of Saskatchewan; Rachel Tang, University of Saskatchewan; Robert Henderson, University of Saskatchewan

OBJECTIVE: To better understand patients' perceptions of artificial intelligence (AI) and patients' priorities for AI in medical imaging to inform the development and clinical implementation of AI in medical imaging.

METHODS: A patient engagement workshop was hosted with 17 participants from urban, rural, and remote communities throughout Saskatchewan, Canada, representing Indigenous and non-Indigenous perspectives. Facilitated roundtable discussions were conducted to better understand patients' perceptions of AI and patients' priorities for AI in medical imaging. Concepts from roundtable discussions were coded using NVivo 11 and analyzed using thematic analysis.

RESULTS: Patients' perceptions of AI were captured in the following three themes: fear of the unknown, trust (including uncertainty of what and whom to place trust in – AI or radiologists), and the importance of a human connection even when using AI. Patients' priorities for improvements in medical imaging included improving communication, shortening time to diagnosis, reducing wait times, increasing diagnostic accuracy, empowering patients, and increasing access to diagnostic imaging and screening. Enthusiasm and willingness for AI to be used in medical imaging were related to patient age, with greater enthusiasm among younger patients. Patients were comfortable with sharing de-identified imaging data for AI development as long as appropriate safeguards were in place.

CONCLUSION: Patients' initial perceptions of AI may lead to reluctance for AI to be used in medical imaging, suggesting the need for patient education. Patients identified numerous areas for improvement in medical imaging which could be enhanced through AI, potentially informing the prioritization of AI use cases.

Assessment of Clinician Researcher Involvement in Radiomics Validation Research: A Multi-Institution Survey of Academic Radiologists and Trainees

Marianne Stroz, University of Toronto; Masoom Haider, University of Toronto; Monika Kastner, North York General Hospital; Hans Fischer, University of Toronto

LEVEL OF TRAINING: Resident, other medical professionals, radiologist

INSTITUTIONAL AFFILIATION: University of Toronto

OBJECTIVE: Radiomics and quantitative imaging biomarker research is a new, rapidly growing field but participation by our academic faculty is sparse. We conducted a survey of academic radiologists and trainees to identify current knowledge levels, interest in and perceived barriers to involvement in this research.

METHOD: An anonymous survey was administered to 237 academic radiologists and 350 trainees affiliated with our multi-institutional academic radiology department. Survey responses were analyzed quantitatively and qualitatively.

RESULTS/DISCUSSION: A total of 89 individuals (15%) completed the survey: 56 staff (24%); 33 trainees (9%). Nearly all participants (99%) recognized the importance of radiomics research and 71% expressed interested in becoming involved in this research. However, staff and trainees were unfamiliar with the term “quantitative imaging biomarkers” (55%) and the actual development and validation of these imaging tools (68%). Different aspects of research contributions appealed to each group, ie. staff were interested in leadership activities such as securing grants. Both groups valued collaboration and image analysis concept development. Several important barriers were highlighted, including lack of access to patient outcome data (67%) and lack of image analysis expertise (66%).

CONCLUSION: Radiomics research is important to academic radiologists and trainees at our intuition, however knowledge around the field is lacking and there are many perceived barriers to engagement. We propose these areas can be addressed through knowledge translation interventions in education, multi-disciplinary collaboration and institutional support around radiomics research.

Does Cadaveric Simulation Training Improve Resident Knowledge and Confidence in Performing Fluoroscopic Guided Joint Injections?

Zaid Jibri, The Ottawa Hospital; Mandie Bzdell, The Ottawa Hospital; Rebecca Hibbert, The Ottawa Hospital; Kawan Rakhra, The Ottawa Hospital

OBJECTIVE: To assess whether cadaveric simulation training session was effective in improving radiology residents’ knowledge and confidence in performing fluoroscopic guided joint injections.

METHODS: Between July 1, 2015 and August 31, 2017, consecutive first year radiology residents participated in a dedicated musculoskeletal cadaveric injection training module. The session included a didactic component with slide presentation and discussion addressing the basic principles of arthrography, consent, safety issues, relevant anatomy, patient positioning, and techniques of injection. This was followed by a practical hands-on component, supervised by two fellowship trained musculoskeletal radiologists, with trainees performing fluoroscopic guided hip and shoulder injections on fresh whole-body cadavers. All residents completed pre- and post-session questionnaire comprised of multiple Likert-scale questions, asking about their knowledge on the indications, contraindications, preprocedural care and complications, as well as their technical ability. Each item was scored with 5 points scale (Poor=1, Fair=2, Good=3, Very good=4, Excellent=5). Additionally, the post-session questionnaire asked the trainees’ rating of the experience of the session, using the same scale.

RESULTS/DISCUSSION: 16 residents participated in the session during the period. The self-rating scores were significantly higher in the post session questionnaire in all individual items including knowledge of indications, contraindications, preprocedural care, complications, and technical ability (p-value= 0.0004, 0.0005, 0.0003, 0.0005 and 0.0005, respectively, Wilcoxon signed-rank test). 94% of the participants rated the session contents, hands on experience, teaching quality and session organization as excellent.

CONCLUSION: Cadaveric joint injection simulation training significantly improved trainees’ subjective knowledge, confidence and technical ability in performing joint injections.

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Deep Learning for Automatic Multi-Catheter Detection on Pediatric Radiographs

Robert Henderson, University of Saskatchewan; Scott Adams, University of Saskatchewan; Xin Yi, University of Saskatchewan; Paul Babyn, University of Saskatchewan

OBJECTIVE: To develop and evaluate a scale recurrent neural network (SRNN) to automatically detect catheters on pediatric radiographs.

METHODS: 2D projections of nasogastric tubes, endotracheal tubes, and umbilical arterial and venous catheters were simulated and superimposed on 2515 adult chest radiographs. This dataset was used to train a SRNN for catheter detection. Lines and tubes on 35 pediatric chest/abdomen radiographs were manually annotated to create groundtruth annotation maps which comprised the test dataset. The performance of the network to detect catheters on pediatric radiographs was subsequently evaluated by comparing catheters detected by the network with the groundtruth annotation maps using precision, recall, and an F-measure combination of precision and recall (F β , with $\beta = 0.3$). Performance of the network was compared to two previously developed networks.

RESULTS: The trained SRNN was able to successfully detect and localise multiple catheters on pediatric radiographs in the test dataset. The network at the highest scale achieved an F β of 0.8009 with precision 0.8411 and recall 0.6909. The SRNN (F $\beta = 0.80$) outperformed both a vanilla feed-forward neural network (F $\beta = 0.77$), and a previously published fully convolutional network designed to detect only single PICC lines (F $\beta = 0.58$).

CONCLUSION: The SSRN trained using simulated/synthetic data superimposed on adult chest radiographs achieved promising results for catheter detection on pediatric chest/abdomen radiographs. Use of synthetic data may reduce data requirements for training neural networks for catheter detection. This approach may inform the development of a solution to automatically flag and prioritize radiographs with malpositioned catheters.

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Gender Disparity and Women in Academic Canadian Radiology

Sadia Qamar, University of British Columbia; Faisal Khosa, Vancouver General Hospital; Kiran Khurshid, Vancouver General Hospital; Sabeena Jalal, Vancouver General Hospital; Matthew McInnes, The Ottawa Hospital; Linda Probyn, Sunnybrook Health Sciences Centre, Department of Radiology; Karen Finlay, McMaster University; Cameron Hague, University of British Columbia, Dept. of Radiology; Rebecca Hibbert, The Ottawa Hospital; Alison Harris, University of British Columbia; Frank J. Rybicki, Univ. of Ottawa Faculty of Medicine; Savvas Nicolaou, Vancouver General Hospital; Manish Joshi, University of Calgary

OBJECTIVES: To analyze and quantify the relationship of gender, research productivity and career advancement in Canadian academic radiology departments.

METHODS: Seventeen academic radiology departments with affiliated residency programs in Canada and Elsevier's SCOPUS archives were searched. The association of gender, academic rank and leadership positions was assessed keeping p-value of ≤ 0.05 as significant.

RESULTS: Out of 1266 academic Canadian radiologists 366 (35.9%) are women. Academic ranks of included female and male radiologists working as assistant professor are 22.8% and 32.5% and associate professor are 8% and 17.4% respectively. The gender gap widens at higher academic ranks, displaying a three-fold drop in ratio with 2.2% women holding the rank of full professor compared to 8.7% men professors. 29.5% of women radiologists have first in command leadership placements compared with 70.5% of men. A comparable higher H Index for women Canadian radiologists noted after adjusting for citations, number of publications and years of research.

CONCLUSION: Academic Canadian radiology departments have fewer women radiologists in senior faculty and leadership positions despite women having comparable/higher productivity metrics relative to their men counterparts. Future work evaluating for factors contributing to these disparities is warranted.

Repetitive Gadodiamide Administration is Associated with Structural Changes in Kidneys of Rodents with Normal Kidney Functions

Turker Acar, Department of Radiology, University of Health Sciences Bozyaka Education and Training Hospital; Canberk Tomruk, Department of Histology, Ege University School of Medicine; Yigit Uyanikgil, Department of Histology, Ege University School of Medicine

OBJECTIVE: In this preclinical study, we aimed to demonstrate whether histological alterations to kidneys occur in rodents with normal kidney functions which were exposed to repetitive Gadolinium Based Contrast Agent (GBCA).

METHODS: Two groups (n=6) of Wistar albino male rats were enrolled. Groups were arranged as Group 1: Control with no GBCA; Group 2: GBCA exposed cohort. GBCAs were administrated from lateral tail vein two times a week (2.5 mmol/kg, Gadodiamide) and a total of 15mmol were given to Group 2. All rats were sacrificed under high dose anesthesia after 3 weeks and each kidneys were extracted. Tissue sections were stained with hematoxylin-eosin and evaluated by two histologists, subsequently.

RESULTS: There were no histopathological findings in the control group. However, an increase in Bowman's cavity, moderate vacuolization in mesangial tissue were noted in Group 2. In addition, vasodilatation in capillary vessels, mesangial vacuolization, edema at the cellular level and fewer cells were also observed in rats which were exposed repetitive GBCA. There was mild to moderate fading of the distal tubule epithelium in Group 2.

CONCLUSION: Contrary to the existing safety of GBCAs to kidneys in individuals with normal renal functions, repetitive GBCA may be associated with histological changes in kidneys. Nowadays, linear GBCAs are not preferred due to brain accumulation in patients who referred frequent contrast enhanced MRI. Our preclinical data also highlighted histologic alterations to kidneys even under normal kidney functions. Therefore, administration of linear GBCAs may be questioned in daily clinical application for their renal histologic effects as well.

FRIDAY, APRIL 12, 2019

RADIOLOGIST-IN-TRAINING RESEARCH PROJECT ORAL PRESENTATIONS

Judges: Marco Essig, Faisal Khosa,
Mark Levental
10:45 – 12:15

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Comparison of the Subjective Visual Coronary Calcium Scoring Method Used in the Alberta Lung Cancer Screening Trial to Agatston Scoring

Vincent Dinculescu, University of Calgary; Michael Bristow, University of Calgary; Paul Burrowes, University of Calgary ; Alain Tremblay, University of Calgary

OBJECTIVE: Coronary artery calcium (CAC) is a surrogate marker of the total burden of coronary atherosclerosis² and in asymptomatic subjects can be used to stratify cardiac risk³. Calcium score has previously been quantified and reported using relatively time-intensive post-processing (Agatston score) method². In the Alberta Lung Cancer Screening trial¹, a subjective method of assigning CAC score category (None, Mild, Moderate, Severe) was employed. This study aims to examine how the subjective Visual CAC method correlates to Agatston scoring.

METHODS: 532 participants underwent baseline screening as part of the Screening study. Fifteen participants were randomly selected from each Visual CAC category. Axial reconstructions from the baseline screening scan were retrieved from PACs server (0.625-1.25mm slice thickness) and reformatted with 2.5mm slice thickness and then retrospectively scored using GE AW coronary calcium scoring⁴. The numeric Agatston score was converted into a categorical calcium score as per thresholds described in the literature² (None=0, Mild=1-100, Moderate=101-400, Severe=> 400). The categorical retrospective Agatston score was compared to the prospective Visual CAC score with Pearson's Correlation and weighted Kappa.

RESULTS: Mean participant age was 62 (55-74 years old) with 65% male, 32% diagnosed with COPD, and 42% current smokers. The subjective Visual CAC score had an excellent correlation with the numeric Agatston score (Pearson correlation 0.802, $p < 0.05$), and a good correlation with the categorical Agatston score (weighted Kappa 0.746).

CONCLUSION: The Visual CAC scoring method may serve as a quick method of grading coronary artery calcification and has good agreement with more time-intensive methods in a cohort of lung cancer screening participants

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Subclinical Coronary Atherosclerosis Among Individuals with HIV on Antiretroviral Therapy

Carl Chartrand-Lefebvre, CHUM; Irina Boldeanu, CHUM; Manel Sadouni, CRCHUM; Samer Mansour, CHUM; Cécile Tremblay, CRCHUM; Madelein Durand, CRCHUM

PURPOSE: To compare coronary plaque burden and characteristics between HIV+ and HIV- individuals.

METHODS: This cross-sectional study nested in a large prospective cohort was approved by our ethics committee. Subjects provided written consent. Consecutive HIV+ and HIV- participants were prospectively recruited for cardiac CT. Eligibility criteria were absence of known coronary artery disease and low/intermediate 10-yr Framingham risk score (FRS, 5-20%). CT was used for calcium scoring and plaque assessment. Assessors were blinded to HIV status. Multivariate regression models were used.

RESULTS: 265 participants (181 HIV+ (92% males), 84 HIV- (77 % males)) were included (mean 56 yo), with similar FRS. Smoking ($p < 0.001$) and dyslipidemias ($p \leq 0.02$) were increased in HIV+ participants. All HIV+ participants were on antiretroviral therapy. After adjusting for cardiovascular risk factors, burden of calcium and overall plaque was similar between HIV+ and HIV- participants. However, HIV+ participants had more (0.33 and 0.12 plaque/participant, $p=0.04$) and increased volume (25 and 5 mm³/participant, $p=0.04$) of noncalcified plaques compared to HIV- participants. Prevalence, frequency and volume of calcified ($p=0.27, 0.12$ and 0.54) and mixed ($p=0.25, 0.15$ and 0.18) plaques, as well as $\geq 70\%$ stenosis ($p=0.99$) were similar between HIV+ and HIV- participants.

CONCLUSION: Noncalcified plaques are more frequent and with an increased volume in asymptomatic HIV+ individuals under antiretroviral therapy in comparison to HIV- individuals, after adjustment of cardiovascular risk factors. Noncalcified plaques are usually considered more vulnerable plaques, and could be one anatomic substrate that could explain the increased risk of myocardial infarction in the HIV population.

Accuracy of the Liver Imaging Reporting and Data System (LI-RADS) in Computed Tomography and Magnetic Resonance Image Analysis of Hepatocellular Carcinoma or Overall Malignancy – A Systematic Review

Trevor McGrath, The Ottawa Hospital; Matthew McInnes, The Ottawa Hospital; Christian van der Pol, McMaster University; Christopher Lim, Sunnybrook Hospital; Jean-Paul Salameh, The Ottawa Hospital

OBJECTIVE: The liver imaging reporting and data system (LI-RADS) categorizes observations from imaging analyses of high-risk patients based on level of suspicion for hepatocellular carcinoma (HCC) and overall malignancy. The categories range from definitely benign (LR-1) to definitely HCC (LR-5), malignancy (LR-M), or tumor in vein (LR-TIV), based on findings from CT or MRI. However, the actual percentage of HCC and overall malignancy within each LI-RADS category is not known. The purpose of this review was to determine the percentage of HCC and overall malignancy in each LI-RADS category.

METHODS: We searched multiple databases from 2014 through 2018 for studies that reported the percentage of observations in each of the LI-RADS v2014 and LI-RADS v2017 categories that were confirmed as HCCs or other malignancies, based on pathology, follow-up imaging analyses, or response to treatment (reference standard).

RESULTS: Seventeen studies were included in the final analysis, comprising 2760 patients, 3556 observations, and 2482 HCCs. Pooled percentages of observations confirmed as HCC and overall malignancy, respectively, were: LR-5, 94% (95% CI, 92%–96%) and 97% (95% CI, 95%–99%); LR-4, 74% (95% CI, 67%–80%) and 80% (95% CI, 75%–85%); LR-3, 38% (95% CI, 31%–45%) and 40% (95% CI, 31%–50%); LR-2, 13% (95% CI, 8%–22%) and 14% (95% CI, 9%–21%); no malignancies in the LR-1 observations.

CONCLUSION: We found increasing LI-RADS categories to contain increasing percentages of HCCs and overall malignancy, based on reference standard confirmation. The percentage of HCCs found in the LR-2 and LR-3 categories indicate the need for a more active management strategy than currently recommended.

Susceptibility-Sensitive MRI to Distinguish MS-Related White Matter FLAIR-Lesions from Hyperintensities Due to CIS, Dementia and Concussion

Craig Stewart, Queen's University; David Li, UBC; Anthony Trabousee, UBC; Vanessa Wiggermann, Department of Physics and Astronomy, University of British Columbia; Alexander Rauscher, UBC; G.Y. Robin Hsiung, UBC; Luanne Metz, University of Calgary

OBJECTIVES: T2/FLAIR MRI identified white matter hyperintensities (WMHs) are pathologically non-specific and can appear without demyelination. Quantitative MRI may allow for the differentiation of demyelinating lesions from other WMHs. We performed quantitative comparisons between multiple sclerosis (MS) WMHs and WMHs seen in clinically isolated syndrome (CIS), mixed dementia (DEM) and hockey players (HCP) with previous concussions.

METHODS: FLAIR or T2, along with susceptibility-sensitive MRI data, were acquired at 3T in all cohorts. QSM and R2* were computed from the susceptibility-sensitive MRI data and WMHs were outlined on FLAIR or T2-weighted MRI. 21/15/38/38 subjects in the HCP/DEM/CIS/MS cohorts had WMH, respectively. Median Δ QSM and Δ R2* values were computed for each WMH and lesion contrast (iso/hypo/hyper-intensity) was established compared to perilesional WM.

RESULTS: 101/826/679/1353 WMHs were identified in HCP/DEM/CIS/MS, respectively. CIS and MS WMHs were frequently QSM-hyperintense (58.4%/43.8%), consistent with myelin degradation and loss. HCPs had more QSM-isointense WMHs (54.2%, $p < 0.002$), representing inflammation, while DEM-WMHs were equally QSM-iso/hypo/hyperintense. R2*-hyperintensities were rare in all cohorts ($< 2.4\%$), indicating QSM-hyperintensities are not driven by iron accumulation. MS-WMHs were more often QSM-hypointense, representing iron loss, than CIS-WMHs ($p=0.0001$). R2*-hypointensities dominated in MS and DEM (87.6%/74.8%), representing significant tissue damage (MS-HCP, MS-CIS, DEM-HCP all $p < 10^{-5}$). HCPs had more R2*-isointense WMHs than other cohorts ($p < 0.0014$), and were also more frequent in CIS than MS (46.4%/10.5%; $p=3.8 \times 10^{-5}$), suggesting less damage and/or a greater for repair.

CONCLUSIONS: Given its sensitivity to myelin, iron, and tissue microstructure, susceptibility-sensitive imaging allows us to gain insight into the heterogeneous pathology of WMHs. MS lesions exhibit distinct QSM and R2* patterns different from HCP/DEM/CIS.

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Post MRI-Guided Breast Biopsy Follow up Imaging: How to Improve Compliance Rates

Caitlin Ward, Western University, London Health Sciences Centre; Ilanit BenNachum, St Joseph's Health Care; Olga Shmuilovich, St Joseph's Health Care London; Anat Kornecki, St Joseph's Health Care

PURPOSE: We hypothesize that appointments for imaging follow-up post MRI-guided breast biopsy of benign lesions coordinated directly by the radiology department, will result in improved patient follow-up compliance in comparison to the published literature.

METHODS: A retrospective chart review of MRI-guided breast biopsies was performed. Patients with biopsy proven benign lesions were included. One biopsy event per patient was recorded. Compliance rates were calculated according to pre-determined criteria for the total study population and separately for high risk (>25% lifetime risk of cancer) and non-high risk patients. Chi-square tests were used to compare compliance rates between the two groups, and between patients with only benign lesions or patients with benign lesion and concurrent cancer.

RESULTS: Over the time period studied, 465 biopsies were performed with 242 lesions included in the study. Of 242 samples, 66 (27.3%) presented in high risk patients and 176 (72.7%) in non-high risk patients. An overall compliance rate of 83.5% was achieved for the total population. Compliance was higher in the high risk population (90.9%) compared to the non-high risk population (79.5%), reaching statistical significance ($p = 0.038$). Compliance rates were not statistically different for patients with only benign lesions (84.2%) versus incidental benign lesions found on malignancy work up (80.2%) ($p = 0.417$).

SIGNIFICANCE: At our institution, the radiology department directly coordinates, monitors, and audits post MRI-guided biopsy imaging follow-up. Our overall compliance rate of 83.5% exceeds rates published in the literature (approximately 71%), demonstrating that appointments coordinated directly by the radiology department improves compliance for return to follow-up.

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Does the Prostate Mri Definition of Sextant Regions Adequately Correspond with Transrectal Ultrasound to Direct Non-Fusion TRUS Biopsy of Suspicious MRI Masses?

Timothy Miao, London Health Sciences Centre; Beatrice Lau, Western University; Aaron Fenster, Robarts Research Institute; Lori Gardi, Robarts Research Institute; Jonathan Izawa, London Health Sciences Centre-Victoria Hospital; Joseph Chin, London Health Sciences Centre-Victoria Hospital; Ashley Mercado, St. Joseph's Health Care; Derek Cool, London Health Sciences Centre-Victoria Hospital

OBJECTIVE: To determine if prostate sextant anatomical nomenclature is consistent between multiparametric MRI (MP-MRI) and transrectal ultrasound (TRUS) biopsy.

METHODS: 35 patients (age 60.9 ± 7.3 years, prostate volume 53 ± 27 mL) underwent MR-TRUS fusion biopsy. Standard 12-core sextant biopsies were also performed purely under TRUS guidance and the biopsy core locations relative to the MP-MRI were recorded. A radiologist sectioned each MP-MRI into base, mid-gland and apex regions as defined by the Prostate Imaging Reporting and Data System version 2 (PI-RADS). Each TRUS-guided biopsy core location was compared to 3D reconstructions of the MP-MRI sextant regions to determine the length of the biopsy core located within each sector.

RESULTS: 411 biopsy cores were analyzed. Only 45% (61/137) of TRUS-cores targeting the base sampled any of the MP-MRI defined base, which was significantly less than TRUS-cores targeting the mid-gland (96%, 134/139) and apical (96%, 130/135) regions ($p < 0.0001$). Sampling percentages were not significantly different between right and left-sided TRUS-biopsies of base ($p=0.10$), mid-gland ($p=0.17$) and apical regions ($p=0.69$). Of the 45% of TRUS-cores targeting the base that did touch the MP-MRI defined base, only $26\% \pm 18\%$ of the total core length was within the base region—significantly less than mean total core lengths of mid-gland ($58\% \pm 24\%$) and apical ($58\% \pm 27\%$) TRUS-targeted cores within their corresponding MP-MRI regions ($p < 0.0001$).

CONCLUSION: The PI-RADS MP-MRI definitions of apex, mid-gland and base do not match standard TRUS-biopsy, particularly in the prostate base. These results have implications for TRUS-guided biopsy of MP-MRI prostate lesions without software fusion assistance, and may lead to inaccurate targeting.

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Automated Detection, Localization and Sub-Classification of Radiographically Suspicious Pulmonary Tuberculosis: A Deep Transfer Learning Approach

Tiffany Fung, McGill University; Jaron Chong, McGill University; Jack W Luo, McGill University; Chang Heng Mo, McGill

OBJECTIVE: Tuberculosis is a leading cause of death worldwide and despite improved screening methods and treatments, its burden remains a significant Canadian and global issue. Limited resources available to interpret radiographs pose key barriers to timely diagnosis and isolation. We propose a convolutional neural network (CNN) based pipeline to automatically detect, localize and sub-classify suspected tuberculosis on chest radiographs. Such an approach, used within a triaging workflow, could reduce the time to interpretation of this critical finding.

METHODS: RIS keyword search queries were created to identify radiographically suspicious TB chest radiographs. 175 TB positive frontal radiographs were identified, with 156 infiltrate, 89 cavitary, and 19 miliary cases. 8,933 negative control images were identified. We employed a pre-trained RetinaNet/ResNet101 convolutional neural network (CNN), with RSNA Pneumonia Challenge dataset pre-training, and fine-tuning on our local dataset. Final evaluation consisted of mean average precision (mAP), AUC, and a qualitative review of proposed boxes.

RESULTS/DISCUSSION: Overall performance on all three pulmonary presentations for TB performs at an mAP[0.50-0.95] of 0.320 on the test dataset. The network performs at an mAP[0.50-0.95] of 0.384 for infiltrate, 0.253 for cavitary, and 0.346 for miliary cases. Classification AUC of our network is 0.897. Our network effectively transfers latent pneumonia representations to TB given the previous best score on RSNA of 0.246.

CONCLUSION: Utilizing a RetinaNet DCNN transfer learning approach is able to identify automatically identify, localize, and sub-classify findings of radiographically suspicious tuberculosis on chest radiographs.

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Appropriateness of MRI at a Tertiary Care Canadian Hospital According to CAR Referral Guidelines

Samuel Neufeld, University of Manitoba; Iain Kirkpatrick, University of Manitoba

OBJECTIVE: To analyze the appropriateness of MRI studies performed at a tertiary care hospital according to the CAR Referral Guidelines and to identify referral patterns that could be improved.

METHODS: During the first week of January 2018, 429 studies were performed. Requisitions were reviewed and classified as appropriate or inappropriate according to CAR Referral Guidelines and categorized based on study type and referring practitioner (specialist or non-specialist).

RESULTS: 88% of the 429 examinations met CAR criteria for appropriateness. Specialists and non-specialists ordered inappropriate examinations 5% and 20.6% of the time respectively. Of 226 neurological examinations performed, 10.6% were inappropriate. Specialist and non-specialist rates of inappropriate scans were 4.3% and 20.9% respectively ($z: -3.92, p: 0.0008$). Of a subset of 39 lumbar spine examinations, 20.5% were inappropriate. Of 98 abdominal examinations were performed, 8.2% were inappropriate. Of 61 musculoskeletal exams performed, 18.7% were inappropriate.

CONCLUSION: The percentage of appropriate MR examinations performed (88% overall) was significantly higher than previously reported at other centres. Specialists ordered significantly fewer inappropriate abdominal and neurological examinations and fewer inappropriate studies overall. Inappropriate examinations were most frequently performed on the musculoskeletal system and the lumbar spine.

The findings suggest that education regarding MRI appropriateness should focus on clinicians who order musculoskeletal and lumbar spine examinations and non-specialists ordering any type of examination.

4-Year Utilization Trend of Musculoskeletal Knee Ultrasound Prior to MRI

Ryan Rawski, University of Calgary; Aman Wadhvani, Department of Radiology, University of Calgary; Peter Salat, Department of Radiology, Cumming School of Medicine, University of Calgary; Richard Walker, Cumming School of Medicine, University of Calgary

OBJECTIVE: Despite guidelines specifying appropriate indications for musculoskeletal knee ultrasound (MSKUS), we suspect that an increasing number of referrals for knee MRI to evaluate internal derangement have already undergone inappropriate MSKUS. Our objective is to examine the utilization of MSKUS prior to MRI from 2013-2016 and assess the appropriateness of referral.

METHODS: 100 studies/year were randomly selected from the 22,488 knee MRI exams reported from 2013-2016 in our local database. The 125 studies with MSKUS prior to MRI were retrospectively reviewed to determine demographics, presence/absence of appropriate prior radiographs, ordering physician specialty, and indication for XR/US/MRI. Indications for MSKUS were assessed for their appropriateness based on published guidelines. MRI studies for the assessment of a solid soft-tissue mass, bone lesion, infection, inflammatory arthritis or popliteal entrapment syndrome were excluded.

RESULTS/DISCUSSION: There was a statistically significant trend of increasing frequency of MSKUS prior to MRI year-over-year ($P=0.005$). Of the 125 patients with MSKUS prior to MRI, appropriate knee radiographs were obtained in 71% of assessable cases. Based on current guidelines, 72% of provided indications for MSKUS were inappropriate. These inappropriate MSKUS studies result in significant additional cost to the healthcare system and may harm patients by delaying appropriate imaging, diagnosis and management. Family physicians accounted for 93% of MSKUS referrals. Development of local guidelines disseminated to family physicians may reduce inappropriate MSKUS utilization.

CONCLUSION: There is a statistically significant increase in MSKUS prior to MRI over our 4-year study period with at least 72% of these studies done for inappropriate indications.

FRIDAY, APRIL 12, 2019

VALUE OF RADIOLOGY RESEARCH PROJECT ORAL PRESENTATIONS

Judges: Scott Harris, Daria Manos,
Charlotte Yong-Hing
13:00 – 14:30
Kafka-Lamartine

How Can We Help You? Elevating the Value of Radiology for Liver Reporting by Asking Our Surgical and Clinical Colleagues What They Need from Our Reports

Ania Kielar, University of Toronto; Victoria Chernyak, Montefiore Hospital; Claude Sirlin, UCSD; Khaled Elsayes, MD Anderson; An Tang, Department of Radiology, Université de Montréal; Richard Do, Memorial Sloan Kettering Cancer Centre; Gary Dellacerra, Thomas Jefferson University; Sandeep Deshmukh, Thomas Jefferson University

PURPOSE: Determine preferences of physicians regarding radiology reporting of liver observations in patients at risk for HCC

METHODS: Members of the LI-RADS Outreach & Education Group created a survey for clinicians and surgeons to determine how radiology can add value to imaging in patients at risk for HCC. The survey consisted of 18 questions: 3 regarding respondent's demographics (type of physician, geographic location, type of work (academic/community)), 4 related to current use of LI-RADS by radiologists, 5 related to their opinions about LI-RADS, and 6 related to what they would like to see in the future.

RESULTS: 133 North American physician responses were collected: 55% from academic liver transplant centers, 31% from academic centers without transplant, and 14% from community settings. 89% of responders prefer reports using LI-RADS and 97% value having a radiologist at multidisciplinary rounds. Interestingly, 60% of surgeons do not want radiologists to make recommendations, while 70% of other clinicians (gastroenterologists, hepatologists and oncologists) and 82% of clinicians in the private practice/community setting would like standardized recommendations in the reports. Moreover, 71% either sometimes or always manage LI-RADS 4 observations differently from LI-RADS 5. Only 27% of responders said that their input was sought at the time LI-RADS was implemented at their institution.

CONCLUSIONS: By asking those who receive radiology reports what they find helpful, we can increase future value of radiology by implementing their requests, when possible. The LI-RADS steering committee has been presented these results and will take them into consideration for future LI-RADS versions.

Introduction of Mobile Radiography Guidelines Reduced the Number of Inappropriate Mobile Chest Radiographs Performed in British Columbia

Kevin Kobes, University of British Columbia; Charlotte Yong-Hing, BC Cancer; Yogesh Thakur, Vancouver Coastal Health Authority; Annemarie Bymoan, University of British Columbia

OBJECTIVE: To reduce inappropriate mobile chest radiographs through new guidelines and staff education in hospital sites across British Columbia.

METHODS: A new set of guidelines was finalized in 2015 for ordering mobile radiography. The number of annual mobile chest radiographs in 2014 was compared to that of 2017, following the implementation of guidelines with staff education at 21 hospital sites in British Columbia.

RESULTS/DISCUSSION: The number of mobile chest radiographs performed between 2014 and 2017 decreased by 9.2% while the total number of all chest radiographs performed during this time, including both departmental and mobile, increased by 4.0%. These results represent a reduction in inappropriate mobile radiographs. Mobile radiography provides a vital role in health care by providing medical imaging to patients who cannot be safely transported to the main imaging department. However, limitations to mobile radiography include poor image quality when compared to department exams and higher ionizing radiation doses to patients. Poor quality images may require repeat imaging which subsequently delays patient care and exposes patients to additional ionizing radiation. In addition, performing inappropriate mobile radiography can strain the medical imaging department and reduce the overall efficiency and throughput of the entire hospital as a result. Guidelines aimed at appropriate mobile radiograph ordering are an effective way to reduce waste in healthcare and promote value for radiography and radiology services.

CONCLUSION: Mobile radiography ordering guidelines encourage a more responsible allocation of valuable healthcare resources, promote sustainable quality of patient care, and reduce unnecessary exposure to harmful ionizing radiation.

The Economic Impact of Wait Times and Forecasting the Need for Medical Imaging Equipment

Nigel Russell, Conference Board of Canada; Isabelle Gagon-Arpin, Conference Board of Canada; Greg Sutherland, Conference Board of Canada; Alexandru Dobrescu, Conference Board of Canada

OBJECTIVE: Building on the Value of Radiology Report published by the Conference Board of Canada, this study identifies the economic impact of wait times for medical imaging and the gap in diagnostic medical equipment and related human resources in Canada.

METHOD: An economic model based on the CMA's The Economic Cost of Waiting (2008) analysis was used to calculate the cost efficiencies of reduced wait times for CT and MRI scans, nationally and by province. The future need for medical imaging equipment was projected using CADTH data on the number of CT and MRI examinations and the age of medical imaging units.

RESULTS: The annual economic cost of waiting longer than recommended for medical imaging is estimated at \$1.2 billion for CT scans and \$800 million for MRI scans, for a total impact of \$2 billion. Furthermore, Canada's medical imaging equipment is aging and needs to be updated. By 2035, there are expected to be nearly 8.9 million CT and MRI examinations combined. To accommodate this growth in examinations, the current stock of approximately 930 units will need to increase.

CONCLUSION: Excessive wait times for patients seeking medical imaging services is costing the Canadian economy billions every year in lost productivity. With the proper investment in medical imaging equipment, future wait times can be reduced and health care costs will be more sustainable.

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An Unconference on Communication Adds Value: One Approach to Improving Communication in the Radiology Department

Rebecca Spouge, University of British Columbia; Kathryn Darras, University of British Columbia; Yael Blum, University of British Columbia; Julie Jenkins, University of British Columbia; Bruce Forster, The University of British Columbia

PURPOSE: To develop, implement and evaluate an unconference on communication for trainees, scientists, and radiologists in an academic radiology department.

METHODS: Using the unconference approach, department members selected the session topics through an online survey: communicating ideas to a larger audience, communication in conflict resolution and using new techniques to communicate with millennial learners. Following a plenary session on social media, individuals participated in a “world café” style session on the three topic areas. Facilitated by content experts, small groups focused on learning through dialogue and reflection. Following the unconference, an anonymous online survey was sent to participants to determine their attitudes.

RESULTS: 48 department members attended and the survey response rate was 47.9%. Most radiologists stated that the event was relevant to their practice (87%), effective use of their time (82%) and that they learned something new (96%). Overall, the plenary session on social media communication was ranked the most helpful (87%) and new teaching methods was rated the most helpful small group session (80%). Reasons for this included practicality, importance in millennial learners and the interactive nature of the session. Most respondents (91%) preferred to have a semi-annual unconference event centered on various communication topics. Topics suggested for future sessions included communication around medico-legal challenges and novel technologies.

CONCLUSION: Although communication is integral to academic radiology, few radiologists receive structured teaching on this topic. This study demonstrates how a relatively simple evidence-based session can enhance participants’ understanding of communication and ultimately enable better communication with colleagues and patients.

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Communication in Emergency Radiology

Siobhan O’Neill, University of British Columbia; Arvind Vijayasarithi, University of British Columbia; Savvas Nicolaou, Vancouver General Hospital; Frances Walstra, University of British Columbia; Noriko Salamon, University of British Columbia; Peter Munk, Vancouver General Hospital; Canadian Association of Radiologists Journal; Faisal Khosa, Vancouver General Hospital

PURPOSE: To assess the pattern of result communication that occurs between radiologists and referring physicians in the emergency department setting.

METHODS: An IRB approved prospective study was performed at a large academic medical center. Emergency radiologists logged information regarding all result-reporting communication events that occurred over a 168-hour (1 week) period.

RESULTS: A total of 286 independent result communication events occurred during the study period, the vast majority of which occurred via telephone (232/286). Emergency radiologists spent 10% of their working time communicating results. Equivalent amounts of time were spent relaying negative and positive results for cross sectional imaging examinations. In a small minority of communication events additional information was gathered through communication that resulted in a change of interpretation from a normal to an abnormal study or vice versa.

CONCLUSIONS: Effective and efficient result communication is critical to care delivery in the emergency department setting. Discussion regarding abnormal cases, both in person and over the phone is encouraged. However, in the emergency setting, time spent on routine direct communication of negative examination results in advance of the final report may lead to increased disruptions, longer turn around times, increased errors, and may negatively impact patient care. In very few instances does the additional information gained from the communication event result in a change of interpretation. Current communication guidelines pertaining to communication of urgent/emergent findings may require revisitation for this radiology subspecialty.

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Targeted MRCP Leads to Decreased Time to Diagnosis and Multi-Fold Increase in Value in Patients with Symptomatic Cholelithiasis or Acute Biliary Pancreatitis

Roberto Kutcher, University of Massachusetts Medical School; Khashayar Rafatzand, University of Massachusetts; Betty Albo, University of Massachusetts Medical School; Muhammad Alsayid, University of Massachusetts Medical School; Gustavo Churrango, University of Massachusetts Medical School; Wahid Wassef, University of Massachusetts Medical School; Ahmed Sobieh, University of Massachusetts Medical School; John Levey, University of Massachusetts Medical School

PURPOSE: To perform a comparative effectiveness study between standard vs. targeted MRCP protocols in patients with symptomatic cholelithiasis or acute biliary pancreatitis.

METHODS: IRB Approved (Consent Waived), HIPPA Compliant, Single Tertiary Center, Prospective.

INCLUSION: Age>18, hospitalized & ED patients, acute biliary pancreatitis or symptomatic cholelithiasis with elevated LFTs.

EXCLUSION: Age

A 3-sequence non-contrast MRCP protocol targeted at diagnosis of CBD stones in setting of acute pancreatitis was successfully implemented in a tertiary academic institution. It led to shorter time-to-diagnosis and 32-fold increase value compared to the standard protocol.

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Adding Value to Care: Impact of 24/7 on Site, Staff Radiologist Coverage on Prioritizing Image Utilization by Acuity, at a Tertiary Care, Level 1, Trauma Centre

Sabeena Jalal, Vancouver General Hospital; Savvas Nicolaou, Vancouver General Hospital

BACKGROUND: Millions of dollars are wasted annually in North America on “low value” health care services such as unnecessary diagnostic tests. 24/7 on site staff radiology coverage helps promote the right health care, the right way. Objective: We wanted to see whether implementing 24/7 had any impact on the no. of patients being imaged, stratified by the level of acuity. Standard: Methods: A retrospective audit of 51,147 patient encounters, before after the implementation of onsite 24/7 staff Emergency Radiologist coverage. Results: Pre 24/7 we looked at 25,543 patients and Post 24/7 we looked at 25,604 patients. Comparing the percentages of imaged & non-imaged patients, during pre 24/7 & post 24/7 periods, for each CTAS category, we noted that in post 24/7, 88.27% CTAS 1 were imaged. 65.95% of CTAS 2 were imaged; whereas 40.25% CTAS 4 were imaged and 16.23% of CTAS 5 were imaged. There was a significant difference in the number of patients being imaged post 24/7 (Chi square = 9.51; p value = 0.04) and not imaged post 24/7 (Chi square =13.1 ; p value = 0.011) for comparable levels of acuity.

DISCUSSION: This initial analysis, shows that having a 24/7 staff Radiologist assists the system prioritizes imaging of more acute patients, reducing inefficiency in service delivery.

CONCLUSION: 24/7 on-site Staff Emergency Radiologist coverage resulted in more acute patients moving faster through the ED. Clinical Relevance: Reducing “low value” services are essential to achieve value based care, in which treatment’s effectiveness ultimately helps determine its value. Thus reducing adverse patient outcomes & poor patient experience.

Peer Review Tool for General Radiography Technologists Improves Image Quality

Andrew Hsiao, University of Edinburgh; Annemarie Bymoan, University of British Columbia; Petar Seslija, Vancouver Coastal Health Authority; Charlotte Yong-Hing, BC Cancer; Yogesh Thakur, Vancouver Coastal Health Authority; Kevin Kobes, University of British Columbia

PURPOSE: Quality improvement is vital to ensure healthcare providers meet optimal patient care standards. Within our jurisdiction, accreditation requires image peer review as part of the quality assurance program. We propose a method to improve quality assurance in radiography by implementing a novel software-based peer review system for radiographers.

METHODS: A peer-review tool was developed in Microsoft Excel and Visual Basic. The tool has 14 image quality criteria each containing a standardized answer ensuring a common scoring regime. The tool provides data storage and data analysis of all peer-review examinations performed. Radiography supervisors used the tool to evaluate image quality of various body parts in 34 general radiography departments within 28 hospitals (Figure 1a-f). The tool enabled each site to automatically score image quality from their site. Additionally, the tool allowed for regional analysis based on site, body part and quality criterion.

RESULTS: Initial findings exposed equipment-related issues such as worn plates, artifacts and poor exposures, which prompted increased preventative maintenance. Other documented issues included foreign objects, inadequate collimation and centering, and inconsistent usage of lead. After identifying quality assurance-related issues, education was implemented resulting in improved outcomes in subsequent audits.

CONCLUSION: The development of a peer review tool has helped identify and correct various issues affecting image quality. This has reduced the number of unnecessary repeat radiographs and associated radiation exposure and may improve overall department workflow. The tool ensures our program meets accreditation standards. Furthermore, staff found using the tool improved collaboration and ongoing education between staff.

FRIDAY, APRIL 12, 2019

DEPARTMENTAL CLINICAL AUDIT PROJECT ORAL PRESENTATIONS

Judges: Andreu Costa, Suki Dhillon,
Ania Kielar, Matt McInnes
14:45 – 16:25
Kafka-Lamartine

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Implementation of an Electronic City-Wide Protocolling System for After-Hours Radiology Studies

Hussam Kaka, McMaster University, Department of Radiology; Abdullah Alabousi, McMaster University; Anna Sacchini, St. Joseph's Healthcare Hamilton; Linda Celeste, Juravinski Hospital and Cancer Centre

PRESENTER'S LEVEL OF TRAINING: Resident.

PRINCIPAL LOCATION OF AUDIT: Radiology department in a university-based practice.

BACKGROUND AND AIM: At our institution, two on-call radiology residents provide overnight coverage for multiple academic hospitals in the city, and CT scans are protocollered verbally with pages and phone calls to technologists at distant sites.

The aim is to assess and improve the efficiency of after-hours protocolling and to assess the impact on overall workflow.

STANDARD: Communication between radiologists and technologists must be timely in compliance with the American College of Radiology White Paper on Teleradiology Practice.

AUDIT TARGET: Protocol relay time should be less than 10 minutes.

METHODS: Over a two month period, residents documented the time an order is placed for after-hours CT studies and the time the protocol is acknowledged by the technologist. This process was repeated after the intervention. Residents and technologists scored relative disruptiveness to workflow pre- and post-intervention from 1 (least) to 5 (most).

INTERVENTION: With input from residents and technologists, a new electronic system was developed in-house for electronic protocolling. It integrates with the hospital network and pager system, and automatically sends a notification to the appropriate technologist at the target hospital when a protocol is entered.

RESULTS: Pre-intervention, average protocolling time was 16:11 minutes (n=938, median=08:00, STD=28:59). Post-intervention, average time was 05:30 minutes (n=960, median=01:17, STD=12:47). The old system was more disruptive to workflow (median 4/5 for technologists, 5/5 for residents) compared to the new (median 1/5 for technologists, 1/5 for residents).

CONCLUSIONS: Using an electronic protocolling system for after-hours studies is efficient and decreases disruption to resident and technologist workflow.

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Protect Yourself Before You Wreck Yourself: Radiation Protection in Interventional Radiology

Dennis Parhar, University of British Columbia; Brendan Quiney, St. Paul's Hospital; Yogesh Thakur, Vancouver Coastal Health Authority; Michelle Smith, St. Paul's Hospital; Carly Launza, St. Paul's Hospital; Sheila Boyd, St. Paul's Hospital

TRAINING LEVEL: Resident

LOCATION: Radiology department at a university-associated hospital.

BACKGROUND: The link between radiation exposure and both neoplastic and non-neoplastic radiation-induced injury (e.g., cataracts) is established in those who work in interventional radiology. Use of leaded eyewear and barrier protection is shown to dramatically reduce radiation exposure. Our aim is to assess the use of radiation protection equipment during interventional radiology procedures.

STANDARD: Radiologists and radiographers must make every effort to keep exposures as low as reasonably achievable (ALARA).

TARGET:

Leaded eyewear: 100%

Barrier protection: 80%

METHODS: In consultation with our local radiation safety officer and lead regional medical imaging physicist, two technologists audited 100 procedures in each of two cycles, collecting the date, procedure type, and use of barrier protection (ceiling-mounted and waist-level shields) and eyewear protection (among staff physicians, trainees, technologists, and nurses).

RESULTS: First cycle: Ceiling shields were used in 9% of cases, waist shields in 78%, and eyewear in 64%; none of these met the target. Second cycle: Ceiling shields were used in 26% of cases, waist shields in 91%, and eyewear in 63%; waist shields now met the target. Complete results are summarized in Figure 1.

INTERVENTION: Existing published data and first round results were presented during interventional radiology quality assurance rounds, followed by a multidisciplinary discussion to elucidate reasons for failing to meet targets.

CONCLUSION: The audit was successful in identifying poor accessibility to eyewear as a cause for failure to meet targets, while the second cycle showed significant improvement in the use of barrier protection. Audit success has led to the purchase of additional eyewear protection with potential for a third audit cycle.

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CT Pulmonary Angiogram Contrast Enhancement Quality Improvement Project

Rollin Y. Yu, University of British Columbia

LEVEL OF TRAINING: Resident

LOCATION: Community-based hospital

BACKGROUND AND AIM: Suboptimal enhancement of CT pulmonary angiograms leads to non-diagnostic studies and therefore unnecessary exposure to contrast and radiation. The aim of the audit is to assess contrast enhancement in CT pulmonary angiograms performed our hospital to ensure diagnostic quality.

STANDARD: 211HU was used as optimal main pulmonary artery attenuation.

TARGET: Literature suggests that the standard should be achieved in 89% of CTPAs.

METHODS: 100 consecutive CTPAs were obtained from PACS starting January 1, 2018. Repeated studies were excluded. Details of the scan such as IV access location and needle size were extracted from the scanned protocol sheets. Main pulmonary artery attenuation was measured and recorded using more than 50% of the pulmonary arterial trunk lumen as the region of interest.

RESULTS: 91/100 CTPAs were optimal based on the 211HU threshold. The most common reason was due to inadequate IV access location. The target was achieved.

INTERVENTIONS / ACTION PLAN / DISCUSSION: Results were discussed during an interdepartmental quality improvement research presentation. As the IV access location appeared to strongly affect opacification, it was proposed that the IV access team be involved in all cases where the IV access was not at the antecubital fossa or higher. Furthermore, we will remind technologists to record the site of IV access. A re-audit will assess improvement in IV access as well as optimal opacification in CTPAs.

Cauda Equina Syndrome

Lilyane Saleh, University of Montreal; Céline Bard, University of Montreal

BACKGROUND and Aim of the study: Cauda equina syndrome is an indication for an urgent MRI (magnetic resonance imaging). In the context of optimal use of imaging resources, the study aims to:

- Review the MRI in the context of cauda equina syndrome.
- Assess the therapeutic intervention rates.
- Explore whether imaging demands are consistent with practice guidelines.

STANDARD/TARGET: The literature review shows that the rate of MRI supporting the clinical hypothesis of cauda equina syndrome varies between 13.8% and 48%. The rate of urgent therapeutic intervention varies between 19% and 22%.

METHODS: It is a retrospective study. Emergency MRI done to rule out cauda equina syndrome, between January 2017 and February 2018 were selected. Files were reviewed for data collection. The specialties of MRI requesters have been divided into three categories.

RESULTS:

- 116 MRI exams were done, of which 28.45% were positive.
- The positivity rate was 22% and 42.5% for emergency physicians and spine specialists respectively.
- The urgent therapeutic rate was 11.2%.
- The average waiting time for a therapeutic intervention was 11 days.
- In up to 32% of patients, questionnaire and physical examination categories were not documented.

ACTION PLAN: Results were discussed with the emergency department and the Committee for Assessment of Medical Act. We recommended documenting clinical red flags on MRI demands when a therapeutic intervention within 48 hours is considered.

CONCLUSION: In the context of optimal use of imaging resources, a prospective phase will follow with these recommendations.

Use of Ultrasound in Stented Carotid Artery Follow-up

Euan Zhang, Hamilton General Hospital; Arun Mensinkai, Hamilton General Hospital; Dawn Whyte, Hamilton General Hospital; Ramiro Larrazabal, Hamilton Health Sciences

BACKGROUND/AIM: Carotid artery stenting is an effective alternative to carotid endarterectomy in the treatment of severe carotid artery stenosis. As the population of stented patients grows, so does the importance of follow-up imaging, for which ultrasound plays a key role. To our knowledge, there are no published ultrasound criteria for evaluating carotid stents during follow-up.

TARGET: Our aim is to identify whether there is heterogeneity within our practice and establish a standardized protocol to improve consistency of targeted features in follow-up ultrasound evaluations.

METHODS: We retrospectively reviewed all patients (91) who have undergone carotid artery stenting in the last 10 years and their follow up ultrasound examinations. Each follow-up ultrasound examination evaluated features of the carotid stent targeted by the technologist.

RESULTS: Of 91 patients, 72 received more than one follow-up examination, with a mean follow-up duration of 17 months. Mid-stent diameters and their associated peak systolic velocities (PSVs) were consistently evaluated in 58% (n=53) and 96% (n=69), respectively. Proximal-stent diameters and their associated PSVs were consistently evaluated in 99% (n=71) and 44% (n=32), respectively. Distal-stent diameters and their PSVs were consistently evaluated in 61% (n=44) and 74% (n=53), respectively.

INTERVENTION/ACTION PLAN: A standardized protocol based on specific parameters will be implemented and appropriate training will be provided to all vascular certified technologists.

DISCUSSION: This study demonstrates that within our institution, there is heterogeneity in the targeted features of follow up carotid stent evaluation. As such this highlights the need for the development of standardized practice guidelines for sonographic evaluation within our institution and nation wide.

Appropriateness of CT Head Imaging in 1st Episode Psychosis

Raman Srivastava, Department of Psychiatry, University of British Columbia; Tong Lam, Vancouver General Hospital; Davis Holmes, Department of Radiology, University of British Columbia; Jason Shewchuk, University of British Columbia

BACKGROUND/AIM: The diagnostic yield of brain imaging for first episode psychosis (FEP) is low. A Choosing Wisely guideline supported by the Canadian Psychiatric Association does not recommend CT or MRI in FEP in the absence of headache, nausea or vomiting, seizure-like activity or later age of onset. The aim was to assess the proportion of CT head studies performed for FEP that are appropriate.

STANDARD: 100% of CT imaging requests in patients with FEP have valid indications per Choosing Wisely guidelines.

TARGET: At least 90% of CT imaging requests in patients with FEP have a valid indication.

METHODS: Perform retrospective search of all requests for CT head in patients with first episode psychosis from January 1st, 2018 to June 30th, 2018. Review patient records and document any valid indication based on Choosing Wisely guidelines, the frequency of requests and the ordering clinical specialty.

RESULTS: 106 CT head requests for 'psychosis' occurred over the 6 month period with 60 of these cases being first episode psychosis. Psychiatry (36/60) and Emergency (22/60) physicians made nearly all CT head requests. A valid indication was present in 30/60 cases. The target was not achieved

INTERVENTIONS/ACTION PLAN/DISCUSSION: Results of the audit will be presented to the Emergency and Psychiatry physicians. The imaging guidelines will also be discussed as the radiology group's new departmental policy. A re-audit will assess compliance with the guideline after the intervention.

CONCLUSION: Adherence to CT imaging guidelines in first episode psychosis requires improvement. An education-based intervention will be implemented prior to re-audit



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HRCT Features of Pulmonary Aspergillosis in Patients with Solid Organ Transplant

Davood Koochehbaghi, Shahid Beheshti Hospital; Mohammad Ali Karimi, Department of Radiology, Modarres Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran

OBJECTIVE: The aim of this study was to determine the findings of Invasive pulmonary aspergillosis (IPA) in HRCT of patients with solid organ transplant.

METHODS: HRC images of 23 patients with histopathologically proven IPA in Masih-e-Daneshvari hospital of Tehran were reviewed. All patients had solid organ transplant. Mean time interval between transplant to diagnosis of IPA was 8 ± 10 (1-48) months.

RESULTS: HRCT findings in order of decreasing frequency were: pulmonary nodule(s) (87%), halo sign (61%), ground glass opacities (GGO) (56.5%), consolidation (52.5%), cavity (47.8%), nodular infiltration with or without tree-in-bud (43.5%), hypodense sign (21.7%), bronchiectasis (17.4%), pleural effusion (13%), interlobular septal thickening (13%), mass (4.3%), and air crescent sign(4.3%). Most of the nodules were multiple (80%), larger than 10mm (85%), and cavity was seen in 40% of nodules. Forty six percent of GGOs were diffuse and 56% were patchy. Forty two percent of consolidations were patchy and 58% were segmental or lobar. There were no significant differences in frequency of HRCT findings of IPA between age, sex, type of transplant, or interval groups.

CONCLUSION: The main features of IPA have not changed in comparison to previous studies and include a combination of nodule, halo sign, GGO, consolidation and cavity. Whoever, radiologist should consider IPA with other findings such as nodular infiltration, hypodense sign, and bronchiectasis, especially in the presence of at least one common feature and in the appropriate clinical setting.

3

Dual-Energy Computed Tomography (DECT) for Evaluation of Indeterminate Renal Masses: Systematic Review and Meta-Analysis

Trevor McGrath, The Ottawa Hospital; Jean-Paul Salameh, The Ottawa Hospital; Matthew McInnes, The Ottawa Hospital; Nicola Schieda, The Ottawa Hospital

PURPOSE: To determine the diagnostic accuracy of dual-energy CT (DECT) using quantitative iodine concentration in patients with indeterminate renal masses using histopathologic analysis and/or follow-up imaging as the reference standard. The secondary objective is to compare accuracy of iodine concentration to conventional Hounsfield Unit (HU) measurements to quantify enhancement.

METHODS: We searched Medline, Embase and CENTRAL for studies evaluating the accuracy of DECT for renal mass characterization between 1947-2018. Inclusion criteria: studies evaluating quantitative iodine concentrations in human patients with indeterminate renal masses. Risk of bias and applicability were assessed using QUADAS-2. Bivariate random-effects model was used to determine pooled sensitivity and specificity. Variability was assessed by subgroup analyses (DECT technique, risk of bias, and meta-regression (DECT vs conventional CT)).

RESULTS: Of 201 studies identified, 5 were included (412 patients). Pooled sensitivity and specificity for DECT were 96.6 (95% CI: 85.9-99.3) and 95.1 (95% CI:90.7-97.5) respectively. Meta-regression evaluating the influence of the test type (DECT vs. conventional CT) did not identify differences in accuracy ($P = 0.06$). In subgroup analyses, no difference in accuracy based on risk of bias, or DECT technique were identified. Limitations include small number of included studies, most of which were at risk of bias.

CONCLUSION: DECT with iodine quantification shows sensitivity and specificity (>95%) for evaluation of indeterminate renal masses and may be an alternate to conventional CT for assessment of renal masses. Larger scale trials are needed to corroborate our findings.

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Second Opinion Ultrasound for Appendicitis and Intussusception in a Pediatric Tertiary Care Centre: Disagreement Rate and Outcome Assessment

Joseph Yang, Queen's University; Michael Aquino, The Hospital for Sick Children; Ghufan Al-Hashmi, The Hospital for Sick Children; Afsaneh Amirabadi, The Hospital for Sick Children

OBJECTIVE: To evaluate the rate of discrepancy in the diagnosis of appendicitis and ileocolic intussusception between initial ultrasounds performed at referring hospitals and second opinion ultrasounds at a pediatric tertiary care hospital.

METHODS: The inclusion criteria included age ≤ 18 years with an ultrasound (US) performed at a referring hospital for suspected appendicitis or ileocolic intussusception, and a repeat US at our institution within 48 hours. A medical student and a pediatric radiology fellow recorded the reported US findings of both the initial and the second opinion US, any discrepancies, and compared the results with the final clinical diagnosis.

RESULTS: A total of 389 patients – 239 suspicious of appendicitis, and 150 suspicious of intussusception were assessed. The results were discrepant in 34.7% of query appendicitis cases, 33.3% of cases query intussusception cases, and 34.2% of all cases. The difference between the results was statistically significant for each diagnosis ($p=0.0001$). Among all discrepant cases, second opinion US agreed with the final diagnosis in 94.7%. Among cases with concern for appendicitis, the appendix was visualized in 75.7% of initial US and in 88% on the second opinion US. The discrepancy among intussusception cases was due to small bowel intussusception in 38%, bowel thickening in 38%, appendicitis in 20%, and other causes such as complicated Meckel's diverticulum and ovarian torsion in 4%.

CONCLUSION: Obtaining a second opinion US by specialized pediatric sonographers and radiologists can be of value in pediatric cases with clinical suspicion of appendicitis and intussusception.

7

Reducing the Volume of Low-Value Outpatient MRI Joint Exams in Patients ≥ 55 Years of Age

Joshua Kandiah, University of British Columbia Faculty of Medicine; Bruce Forster, The University of British Columbia; James P. Nugent, Vancouver General Hospital; Vivian Chan, Vancouver Coastal Health; Jing Luo, Vancouver Coastal Health and Providence Health Care; Flora Dong, Vancouver Coastal Health

MRI is not beneficial in patients with joint pain and concomitant osteoarthritis (OA). We attempt to determine if evaluation of OA via X-rays can reduce inappropriate MRI and CT arthrogram use. In our jurisdiction, CT arthrograms are used as surrogate tests because of MRI wait times.

Our intervention required recent, weight bearing X-rays (within one year) for patients ≥ 55 years of age who were scheduled for outpatient MRI of the knee/hip/shoulder at an urban hospital. Red flags (i.e. neoplasm, infection) were identified for which MRI would be indicated regardless. Through review of radiographs on PACS/digital media and use of the validated Kellgren-Lawrence (KL) OA scale, radiologists assessed the presence and degree of OA. A finding of significant OA (KL > 2) without red flags would preclude MRI. Monthly averages of MRI and CT arthrogram exams were measured 33 months before and 23 months following introduction of the intervention.

The proportion of protocol MRI requisitions that were avoided was 16%. If extrapolated to the province of British Columbia, 1872/11700 exams could have been prevented in the past year. The average monthly number of knee/hip/shoulder MRI exams as a percentage of total MRI exams decreased from 4.9% to 4.3% ($P \geq 55$ years of age with joint pain by implementing an evaluation for OA via recent X-ray imaging).

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Predictors of Citation Rate in Original Research CARJ Publications

Mostafa Alabousi, McMaster University; Nanxi Zha, McMaster University; Michael Patlas, McMaster University

OBJECTIVE: This study aimed to identify predictors of citation rate of original research studies published in the Canadian Association of Radiologists Journal (CARJ).

METHODS: A search of MEDLINE was conducted from January 1, 2000 to June 30, 2013 to identify all studies published in the CARJ. Original research studies were included. Reviews, pictorial essays, guidelines, and original studies with a sample size < 10 (including case studies and case series) were excluded. Variables assessed for association with citation rate included number of authors, study design (prospective, retrospective, or cross-sectional), sample size, multi-institutional study, multi-national study, study type (clinical or non-clinical), presence of statistically significant result, presence of funding, and number of references. Statistical analysis was completed using linear regression and Pearson correlation coefficients (r).

RESULTS: A total of 714 studies were published in CARJ, of which 181 were original research publications that were cited a total of 1517 times. Twelve original research studies were uncited, while the most-cited one was cited 58 times. Sample size ($r=0.177$, $p=0.017$) and number of references ($r=0.164$, $p=0.028$) demonstrated statistically significant positive correlations with citation rate. Number of authors, study design, setting, statistically significant results, and funding were not associated with citation rate.

CONCLUSION: Only a very small number of original research studies published at the CARJ remained uncited five or more years after the publication. Sample size and number of references were the only identified predictors of citation rate in CARJ.

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A Systematic Review of the Effects of Breast Reduction on Back Pain and the Vertebral Column

Lysa Huneault, The Ottawa Hospital; Marcos Sampaio, The Ottawa Hospital; Maryse Fortin, Concordia University

OBJECTIVE: Chronic back pain associated with breast hypertrophy has been demonstrated in numerous studies. While surgery is a treatment actively sought out by woman looking to relieve back pain, insurance companies believe this procedure to be predominantly cosmetic and many patients face challenges when it comes to reimbursement. The purpose of this study was to systematically review the literature on current radiological data regarding the effects of breast reduction mammoplasty on the vertebral column, and examine whether breast reduction leads to significant changes in the cervical, thoracic, lumbar and sacral angles measured using the Cobb method.

METHODS: A 1970- 2017 literature search for studies with 10 or more subjects in which lateral radiographs of the spine were compared before and after surgery was undertaken.

RESULTS: Of the 115 studies identified, only four studies met our inclusion criteria for a total of 126 subjects. All four studies reported a decrease in thoracic kyphosis after surgery, with three reaching statistical significance. Two out of the four included articles measured the cervical lordosis and both found a statistically significant decrease after reduction mammoplasty. There were no significant variations in the sacral region after the surgical procedure, with two of the studies measuring this variable. With regards to the lumbar region, results were inconsistent as two studies reported a significant decrease, while the other two reported no change after surgery.

CONCLUSION: This systematic review on current radiological data hints to significant postural changes that may explain pain relief following breast reduction.

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Biparametric versus Multiparametric Prostate MRI for the Detection of Prostate Cancer in Treatment-Naive Patients: A Diagnostic Test Accuracy Systematic Review and Meta-Analysis

Mostafa Alabousi, McMaster University; Jean-Paul Salameh, The Ottawa Hospital; Kaela Gusenbauer, McMaster University; Lucy Samoilov, Western University; Ali Jafri, New York Institute of Technology School of Osteopathic Medicine; Hang Yu, McMaster University; Abdullah Alabousi, McMaster University

PURPOSE: To perform a diagnostic test accuracy (DTA) systematic review (SR) and meta-analysis comparing multiparametric (DWI, T2WI, and DCE) magnetic resonance imaging (mpMRI) and biparametric (DWI and T2WI) MRI (bpMRI) in detecting prostate cancer (PC) in treatment-naïve patients.

METHODS: MEDLINE and EMBASE were searched to identify relevant studies published after January 1, 2012. Articles underwent title, abstract, and full-text screening. Inclusion criteria consisted of patients with suspected PC, bpMRI and/or mpMRI as the index test(s), histopathology as the reference standard, and a DTA outcome measure. Methodologic and DTA data was extracted. Risk of bias was assessed using the QUADAS-2 tool. DTA metrics were pooled using bivariate random-effects meta-analysis. Subgroup analysis was conducted to assess for heterogeneity.

RESULTS: From an initial 3502 studies, 31 studies reporting on 9244 patients (4161 with PC) met the inclusion criteria for the meta-analysis; 24 studies reported on mpMRI (6764 patients, 2819 with PC) and 11 studies reported on bpMRI DTA (2480 patients, 1342 with PC). Pooled summary statistics demonstrated no significant difference for sensitivity (mpMRI: 85%, 95%-confidence interval [CI] 80-89; bpMRI: 88%, CI 81-92) or specificity (mpMRI: 74%, CI 65-82; bpMRI: 72%, CI 54-86). The summary ROC curves were comparable for mpMRI (0.87) and bpMRI (0.89).

CONCLUSIONS: No significant difference in DTA was found between mpMRI and bpMRI in diagnosing PC in treatment naïve patients. Study heterogeneity warrants cautious interpretation of the results. With replication of our findings in dedicated validation studies, bpMRI may serve as a faster, cheaper, gadolinium-free alternative to mpMRI.

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Multidetector CT for Suspected Hip Fractures: A Diagnostic Test Accuracy Systematic Review and Meta-Analysis

Mostafa Alabousi, McMaster University; Isabelle D Gauthier, University of Ottawa; Nicole Li, University of Ottawa; Gonçalo M Santos, University of Ottawa; Dmitry Golev, McMaster University; Abdullah Alabousi, McMaster University

PURPOSE: To perform a diagnostic test accuracy (DTA) systematic review (SR) and meta-analysis to determine the DTA of multidetector computed tomography (MDCT) for detecting occult hip fractures in patients with a negative initial radiograph.

METHODS: MEDLINE and EMBASE were searched to identify relevant studies published between January 2000-May 2018. Articles underwent title and abstract screening followed by full-text screening. Study inclusion criteria: patients with suspected hip fracture, negative initial radiograph, MDCT as the index test, magnetic resonance imaging (MRI) or clinical follow-up as the reference standard, and DTA measure as the outcome. Demographic, methodologic, and study outcome data was extracted. Risk of bias was assessed using the Quality Assessment of Diagnostic Accuracy Studies (QUADAS)-2 tool. DTA metrics were pooled using bivariate random-effects meta-analysis.

RESULTS: From an initial 1385 studies, four studies reporting on 418 patients (174 with hip fractures), were included. Study demographic and risk of bias data was listed in Table 1. Pooled summary statistics included the following: sensitivity (87%; 95% confidence interval [CI] 79-93), specificity (98%; 95% CI 95-99), and the area under the summary receiver operating characteristic (ROC) curve (0.972).

CONCLUSIONS: Our pooled DTA findings suggest that MDCT may serve as a suitable second-line modality for occult hip fractures, given its widespread availability, lower cost, and shorter scan time compared to MRI. Cautious interpretation of the results is warranted given the risk of bias and small sample size. Larger validation and direct comparison studies of MDCT and MRI may help guide future appropriateness guidelines.

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Dosing Iodinated Contrast Media According to Lean vs. Total Body weight at Abdominal CT: A Stratified Randomized Controlled Trial

Kris Peet, Dalhousie University; Andreu Costa, QEII Health Sciences Centre; Mohamed Abdolell, Dalhousie University

OBJECTIVE: To compare the magnitude and inter-patient variability in mean hepatic enhancement (MHE) when dosing CM according to total body weight (TBW) vs lean body weight (LBW).

MATERIALS AND METHODS: This prospective, single-center randomized controlled study evaluated hepatic enhancement of outpatient CTs acquired in the portal venous phase using a 35-second fixed injection duration of Omnipaque 350. Patients with chronic kidney, liver or heart disease were excluded. Patients were stratified by sex and randomized to either TBW-dosing (51 women and 60 men, 1.22 mL/kg) or LBW-dosing (59 men, 1.52 mL/kg LBW; 59 women, 1.67 mL/kg LBW). Liver attenuations were obtained from regions of interest. The MHE, MHE per gram of iodine (MHE/I) and adjusted MHE (aMHE=MHE/(I/TBW)) values and standard deviations were compared (unpaired t-tests and F tests).

RESULTS: Cohorts were similar in age, sex, TBW and LBW. TBW groups received more contrast than LBW groups: men, 106.5±20 vs. 98.4±11 mL, p=0.007; women, 93.7±20 vs. 77.5±11 mL, p<0.0001). MHE was greater in the TBW groups, but was not statistically significant in men: men, 54.8±11 vs. 51.5±10 HU, p=0.087; women, 54.6±11 vs. 49.4±14, p=0.0248. There was no statistically significant difference in MHE/I or aMHE for men or women (p>0.05). The variances in MHE, MHE/I and aMHE were also not significantly different across all groups (p>0.05).

CONCLUSION: Using overall less contrast media dose, LBW dosing yielded similar MHE in men but not women. The yield of hepatic enhancement per gram of iodine was similar regardless of dosing technique.

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Outcomes of Transrectal Drainage of Deep Pelvic Abscesses in Children: A Single-Centre Experience

Usman Khan, University of Ottawa; Nazih Shenouda, Children's Hospital of Eastern Ontario; Khaldoun Koujok, Children's Hospital of Eastern Ontario; Nishard Abdeen, Children's Hospital of Eastern Ontario

OBJECTIVE: The purpose of this study was to retrospectively evaluate outcomes of deep pelvic abscesses drained using a transrectal approach and identify factors associated with longer hospitalizations.

METHODS: We conducted a retrospective review of all appendicitis-related transrectal drainage procedures at our pediatric institution over a 6-year period. Radiological, discharge, and all emergency department reports within 30-days of the procedure were reviewed. Cox's regression analysis was performed to identify factors impeding time to discharge from drainage.

RESULTS: Thirty-three patients were enrolled. Median patient age was 13 (IQR 11-15). Twelve (36%) were male. Twenty-four (73%) required drainage for a perforated appendicitis, while 9 (27%) after an appendectomy. Eight (24%) required a tandem transabdominal drainage procedure. Technical success was achieved in all cases. Repeat management was not required in any case. Imaging was completed for 25 (76%) cases with ultrasound after drain insertion and 23 demonstrated improvement. Two cases had developed new, non-communicating abscesses. Median from drain insertion to discharge was 5 days (IQR 3-10). Male gender (HR 2.24 [1.07-5.57], p = 0.03), no tandem transabdominal drainage (HR 3.17 [1.16-8.70], p = 0.03), and no follow-up imaging (HR 2.96 [1.05-8.30], p = 0.04) was significantly associated with shorter hospitalizations in multivariate Cox modelling. Longer drain in-situ times (HR 0.73 [0.59-0.89], p = 0.04) were found to be associated with longer stays. No cases required repeat drain insertion after discharge.

CONCLUSIONS: Transrectal drainage for deep pelvic abscesses is safe and effective in children, with high rates of clinical and technical success.

High-Risk Patients During Pregnancy and Breastfeeding: A Proposed Management Algorithm Based on A Systematic Review of the Literature

Nanxi Zha, McMaster University; Mostafa Alabousi, McMaster University; Peri Abdullah, York University; Vivianne Freitas, University of Toronto; Rhys Linthorst, McMaster University; Narry Muhn, St. Joseph's Healthcare; Abdullah Alabousi, McMaster University

OBJECTIVES. Despite the high incidence of breast cancer and multitude of breast cancer risk factors, there are limited guidelines for breast cancer screening in high-risk women during the pregnancy and breastfeeding period. The objective of this systematic review (SR) is to assess the available evidence on breast cancer screening in this population and to propose an evidence-based algorithm for screening high-risk pregnant or breastfeeding patients.

METHODS. We performed a systematic search of the literature using the electronic databases MEDLINE and Embase. Predetermined inclusion and exclusion criteria were used during the abstract screening phase and full-text data extraction phase.

RESULTS. 16 studies were included out of 2274 retrieved abstracts based on predetermined eligibility criteria. Clinical breast exam (CBE) was recommended by 12 studies in the pregnancy period and by 6 studies in the breastfeeding period. Mammography was recommended in the breastfeeding period by 2 studies. Ultrasound was limited as an adjunct for symptomatic patients with a palpable mass. Magnetic resonance imaging (MRI) was recommended in the breastfeeding period by 2 studies.

CONCLUSIONS. Based on our SR, we are proposing the first algorithm for screening high-risk women during pregnancy and breastfeeding. It is imperative to promptly identify patients at increased risk for developing breast cancer in this population. Ideally, necessary screening is completed prior to pregnancy. A CBE early in pregnancy is recommended to establish a baseline and repeated exams are recommended in women with high-risk genetic mutations. In the breastfeeding phase, breast cancer screening using imaging should be promptly resumed.

An Investigation of the Effects of Anti-Scatter Grid Usage on Ureter Visibility in Pediatric Voiding Cystourethrography as a Function of Patient Size

Graham McInnis, Max Rady College of Medicine; Martin Reed, Department of Diagnostic Imaging, Children's Hospital

OBJECTIVE: Evaluate at what patient thickness anti-scatter grid usage becomes beneficial in children undergoing voiding cystourethrography

METHODS: A water-based phantom was constructed with an insert containing three cylinders of different diameters to simulate ureters which could be moved within the phantom to vary its depth within the water. The images were acquired using a VCUG protocol. Multiple tank depths were used to simulate different patient thicknesses with five images acquired at each depth with and without the grid in place. Images were then randomized, and ureter visibility was assessed by two pediatric radiologists and two imaging physicists. Images were scored on a four-point Likert scale as follows: 1=Not visible, 2=Questionably visible, 3=Visible but indistinct, and 4=Visible and clear.

RESULTS: Image quality scores were similar with and without the anti-scatter grid in place. For the maximum tank depth of 19.4cm, simulating a large pediatric patient, with the grid in place the four readers gave three scores of 2, thirteen scores of 3, and four scores of 4. With the grid removed the scores were not substantially different with three scores of 2, ten scores of 3, and seven scores of 4. Formal measures of inter-reader reliability were not possible due to high agreement between readers.

CONCLUSIONS: Image quality did not differ substantially between images acquired with the anti-scatter grid in place and with it removed. These results suggest that for most pediatric patients

Defining a Parsimonious Breast Cancer Risk Model to Risk-Stratify Average Risk Women for Follow-Up Screening

Mohamed Abdolell, Dalhousie University; Jennifer Payne, Dept of Diagnostic Radiology, Dalhousie University; Peter Brown, QEII; Penny Barnes, Department of Pathology, Dalhousie University; Judy Caines, Breast Imaging, IWK Health Centre; Kaitlyn Tsuruda, Cancer Registry of Norway; Sian Iles, Dalhousie University; Olivia Tong, Nova Scotia Breast Screening Program; Pam Talbot, Department of Diagnostic Radiology, Dalhousie University

PURPOSE: This study evaluated the consistency and discriminatory power of short-term breast cancer risk models with and without biopsy history (BxHx) within a general screening population.

METHODS and materials: All screen-detected breast cancer cases among digitally screened women 40-75 years (2009-2015) within a population-based breast screening program and 3 age- and screen year-matched controls were sampled. Clinical risk factors, fully-automated percent mammographic density (PMD), and breast volume assessments were obtained for 1,593 cases and 5,003 controls and used to derive patient-specific risk estimates from a series of logistic regression models. Predictive performance was assessed using area under receiver operator characteristic (AUROC), and agreement between models for assigning women to low

RESULTS: Predictive performance of the multivariate models varied substantially (AUROC: 0.547-0.655). A reduced model with PMD, breast volume, age, family history, and BxHx performed equivalently to the full model that additionally included menopausal status and HRT use (AUROC=0.655 and 0.656 respectively); removing BxHx from the reduced model decreased performance (AUROC= 0.591). Agreement between predicted probabilities of the full versus reduced model classified into low versus high risk was almost perfect ($\kappa=0.982$).

CONCLUSION: A short-term risk model incorporating PMD, breast volume, family history, BxHx, and age may provide a practical solution for risk stratification within a screening population without the need to collect other clinical risk factors that are prone to recall bias and are not always available.

The Role of Breast Density in Predicting Interval Detected Breast Cancer

Mohamed Abdolell, Dalhousie University; Jennifer Payne, Dept of Diagnostic Radiology, Dalhousie University; Peter Brown, QEII; Penny Barnes, Department of Pathology, Dalhousie University; Judy Caines, Breast Imaging, IWK Health Centre; Kaitlyn Tsuruda, Cancer Registry of Norway; Sian Iles, Dalhousie University; Olivia Tong, Nova Scotia Breast Screening Program; Pam Talbot, Department of Diagnostic Radiology, Dalhousie University

PURPOSE: This study evaluated the predictive performance of short-term interval breast cancer risk models within a general screening population.

METHODS and materials: This case control study was performed among digitally screened women aged 40-75 (2009-2015) within a provincial breast screening program in Canada. The sample included all 132 interval breast cancer cases and 885 controls. Interval breast cancer was defined as breast cancer diagnosed after a negative screening examination or after an abnormal screening examination with negative work-up but before the next regularly scheduled screening examination. Data on clinical risk factors including age, breast volume (as a surrogate for BMI), first degree family history, history of breast biopsy, menopausal status, and HRT use were obtained for all subjects. Percent mammographic density (PMD) and breast volume assessments were obtained via automated software (Densitas Inc.). Logistic regression models were used to derive patient-specific risk estimates. Predictive performance was assessed using the area under receiver operator characteristic (AUROC).

RESULTS: There was no difference in the average age of cases and controls at 55 and 56 years respectively. The model with PMD alone outperformed a model with all other clinical risk factors combined (AUROC=0.679 vs 0.614, respectively). Adding PMD to a model with all the other clinical risk factors increased the AUROC to 0.716.

CONCLUSION: Percent mammographic density was the most significant predictor of interval detected cancers and was a stronger predictor of interval detected cancers than all other clinical risk factors combined. Model performance needs to be validated using a separate dataset.

The Importance of Standardized Breast Density Assessments when Implementing Breast Density in Breast Cancer Risk Prediction Models

Mohamed Abdoell, Dalhousie University; Jennifer Payne, Dept of Diagnostic Radiology, Dalhousie University; Peter Brown, QEII; Penny Barnes, Department of Pathology, Dalhousie University; Judy Caines, Breast Imaging, IWK Health Centre; Kaitlyn Tsuruda, Cancer Registry of Norway; Nicole Paquet, Dalhousie University; Sian Iles, Dalhousie University; Olivia Tong, Nova Scotia Breast Screening Program

PURPOSE: The objective of this study was to evaluate the impact of interrater variability in assessments of breast density on risk estimates generated from breast cancer risk models.

METHODS and materials: A breast cancer risk model (base model) was developed that included age at screening, hormone replacement therapy use, family history of breast cancer, biopsy history, parity, menopausal status, breast volume and percent mammographic density (PMD). Both breast volume and PMD were computed using automated breast density software. Four sets of PMD readings (N=6598) were simulated from the PMD measures used in the base model to represent four radiologists' visual assessments. The base model was applied to each of the four sets of simulated PMD measures and the full set of risk factors. Each of the five sets of predicted probabilities were classified into high versus low risk categories using a threshold of 0.3. Agreement between the classifications from the base model versus those from each of the four simulations was assessed using the Kappa statistic.

RESULTS: Agreement between the predicted probabilities from the base model and from the four simulations using 0.3 as the threshold value were Kappa=0.82, 0.71, 0.85 and 0.66.

CONCLUSION: Use of a risk estimate threshold can lead to the same patient being assigned high risk by one radiologist and low risk by another. It is important to standardize breast density assessment so that there is assurance of uniformity of risk-stratification when density is incorporated into clinically-implemented breast cancer risk models.

Mammography Positioning Errors: A Multi-centre Study

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PURPOSE: The primary objective of this study is to evaluate the level of agreement between radiologists and radiographers in evaluating mammographic image quality. The secondary objective is to determine on which image positioning errors readers may find greater agreement when evaluating positioning errors.

METHODS and materials: 672 FFDM studies were independently reviewed by nine Radiographers and one Radiologist from three breast imaging centres in Canada, Norway and the UK. The studies were rejected due to positioning errors. Readers were provided with a PGMI scale and trained on the use of the image quality review tool (Densitas Inc.). Reviewers assigned PGMI scores and evaluated studies for positioning errors including posterior-nipple line (PNL), CC exaggeration, nipple position, skin folds, portion cut-off, patient related artefacts, posterior tissue, pectoralis muscle (position, shape, and thickness), inframammary fold (IMF), sagging, positioning on image receptor. Interrater agreement overall and by centre was evaluated using weighted Fleiss' Kappa.

RESULTS: Agreement between readers on individual positioning errors across all centres was slight to moderate (kappas ranging from 0.09 to 0.49), and was only slight for PGMI score (kappa=0.176). Agreement between readers within centres was fair. Positioning errors with highest agreement between readers within centres included portion cut-off, patient related artefacts, PNL length difference Conclusion: Agreement amongst readers on mammography positioning criteria within and between centres ranges widely. An automated tool may help to standardize image quality assessment.

Investigating the Relationship Between Mammographic Breast Density and Triple Negative Breast Cancer

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PURPOSE: The objective of this study is to evaluate how mammographic breast density (MBD) discriminates between triple negative breast cancers (TNBC) cases and non-breast cancer controls.

METHODS and Materials: This case-control study consists of all screen-detected and interval TNBC cases with a prior FFDM screening mammogram (n=121) in 2009-2015 in Nova Scotia. The controls are individuals with a normal FFDM screening mammogram (n=6821) in the same time period. Clinical risk factors include menopausal status, HRT use at the time of screen, parity, first degree family history, biopsy history, and total breast volume as a surrogate for BMI. Density was measured using an automated software, densitasdensity™. Logistic regression analysis was used to build six risk models; one with each of percent MBD, a qualitative measure of the pattern of density (BI-RADS 5th ed.), and with both measures, and then again with clinical risk factors. Model discrimination was measured using the area under the receiver operator characteristic (AUROC) curves.

RESULTS: The measures MBD demonstrated similar results; percent MBD yielded an AUROC curve of 0.600; the BI-RADS 5th ed. scale yielded a 0.580; the combined model resulted in an AUC of 0.598. The same three models with the addition of clinical risk factors yielded AUROC curves of 0.703, 0.694 and 0.707, respectively.

Conclusion: The predictive performance of the model did not vary with the form of breast density measure. The addition of clinical factors substantially improved the predictive performance of the density models.

Magnetic Resonance Enterography (MRE) – A Single Institution Audit of Referral Compliance with Appropriateness Criteria

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PRINCIPAL Location of Audit: University-based Hospital

AIM: Diagnosis and follow-up of Inflammatory Bowel Disease (IBD) in patients younger than 50 is the accepted indication for Magnetic Resonance Enterography (MRE). At our institution, there has been a gradual increase in the average age of referred patients and in inappropriate indications. Our aim is to determine referral practices for MRE and to educate the referring physicians about the appropriateness of the test.

TARGET: MRE indications limited to diagnosis and follow-up of IBD in patients 50 or younger.

METHODS: 150 consecutive MREs were retrospectively reviewed (July-October 2017). The study date, patient age, clinical indication and quality of the study were recorded. Indications were categorized based on the pathology in question.

RESULTS: 52 patients (35%) were older than 50 years. 127 studies (85%) involved IBD as an indication and 107 studies (71%) involved specifically Crohn's disease. Six studies (4%) were related to ulcerative colitis. The remaining studies included other indications such as chronic small bowel obstruction and suspected carcinoid.

INTERVENTION: An educational letter was drafted to the top 20 referring clinicians to clarify the appropriateness criteria for MRE.

CONCLUSIONS: While majority of indications were appropriately related to IBD, 21% of cases had inappropriate indications and up to 35% of patients were older than 50. For both these groups, a CT Enterography is the study of choice. An educational letter was drafted to the top 20 referring clinicians. A similar analysis is currently being performed to investigate the impact of this intervention.

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Prospective Evaluation of the Value of Dynamic Contrast-Enhanced (DCE) Imaging for Prostate Cancer Detection and Staging with Pathology Correlation

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OBJECTIVE: The main aim is to evaluate the value of dynamic contrast-enhanced (DCE) imaging in multi-parametric prostate MRI (mpMRI) for the detection and staging of prostate cancer in comparison with T2W and DWI images alone in biparametric MRI (bpMRI), in treatment naïve patients.

METHODS: One hundred consecutive patients who underwent a prostate MRI at our institution from June-August 2017, as well as a systematic ultrasound-guided prostate biopsy or prostatectomy, were included. Strictly following the PIRADSv2, the MRI studies were independently interpreted by a body radiologist and a body-imaging fellow on two different occasions 8-10 weeks apart. Initially, with all mpMRI sequences and then without the DCE sequence (bpMRI). The readers were blinded to the clinical information. Ethics approval was obtained.

RESULTS/DISCUSSION: One hundred treatment-naïve patients were included (median age 64, age range 48-81, mean PSA 10.3). There was excellent intra-observer agreement of the mpMRI versus bpMRI for both readers [Cohen's Kappa (k) 0.88-0.86] and very good inter-observer agreement (k=0.74 for mpMRI and 0.76 for bpMRI). The sensitivity and specificity did not significantly change between the multi-parametric and bi-parametric MRI (Sensitivity 91.7% and 90%, Specificity of 85.5% and 85% for mpMRI and bpMRI, respectively).

CONCLUSION: Prostate MRI without DCE (bpMRI) is of comparable diagnostic accuracy to mpMRI in treatment-naïve patients. Performing prostate MRI without DCE (bpMRI) will reduce acquisition time, decrease cost and potentially improve patient safety.

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Selective Citation Practices in Imaging Research: Are Diagnostic Accuracy Studies with Positive Titles and Conclusions Cited More Often?

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OBJECTIVE: To examine whether diagnostic accuracy studies with a positive title or conclusion are cited more frequently than those with a negative (or neutral) title or conclusion.

METHODS: Medline was searched for meta-analyses of diagnostic accuracy studies published from January 2005 to April 2016. Primary studies from the meta-analyses were screened for inclusion and classified independently in duplicate. A negative binomial regression was performed to obtain regression coefficients, controlling for various confounders; P-values were obtained via likelihood ratio testing.

RESULTS: 995 primary studies were included. Title and conclusion positivity were found to be statistically significant predictors of citation rate ($p=0.031$ and $p=0.031$, respectively). Regression coefficients were 1.1 (95% CI: [-0.078]-2.2) and 0.91 (95% CI: [-0.27]-2.0) for positive and neutral titles, respectively, relative to negative titles. Similarly, regression coefficients were 0.19 (95% CI: 0.026-0.35) and 0.078 (95% CI: [-0.12]-0.27) for positive and neutral conclusions, respectively, relative to negative conclusions. Studies with positive, neutral, and negative titles were cited an average of 0.66, 0.50, and 0.063 times per month, respectively. Studies with positive, neutral, and negative conclusions were cited an average of 0.54, 0.42, and 0.34 times per month, respectively.

CONCLUSION: Studies with a positive title or conclusion are cited more frequently in imaging diagnostic accuracy literature, which may lead to an overestimation of the accuracy or usefulness of a test, contributing to sub-optimal patient outcomes.

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Comparative Reviews of Diagnostic Test Accuracy in imaging Research: Evaluation of Current Practices

Anahita Dehmoobad Sharifabadi, The Ottawa Hospital; Matt McInnes, University of Ottawa; Lee Treanor, University of Ottawa; Jean-Paul Salameh, The Ottawa Hospital; Mostafa Alabousi, McMaster University

OBJECTIVE: To determine the extent to which comparative imaging systematic reviews of diagnostic test accuracy (DTA) use primary studies with comparative designs or non-comparative designs.

METHODS: MEDLINE was used to identify DTA systematic reviews published in imaging journals between Jan 2000 and May 2018. Inclusion criteria: systematic reviews comparing at least 2 index tests (one of which was imaging-based); review characteristics and primary study designs were extracted.

RESULTS: 103 comparative imaging reviews were included; 11 (11%) included only comparative studies, 12 (11%) included only non-comparative primary studies and 80 (78%) included both comparative and non-comparative primary studies (with a median proportion of 81% (IQR 57%-90%) non-comparative primary studies). Of 92 reviews that included non-comparative primary studies, 86% did not recognize this as a limitation. Furthermore, among 4,182 primary studies, 3,438 (82%) were non-comparative and 744 (18%) were comparative in design.

CONCLUSION: Several challenges in comparative imaging reviews are identified: 1) a minority of reviews rely exclusively on primary studies with comparative designs; 2) the majority of primary studies included in comparative imaging reviews are non-comparative in design; 3) awareness of the risk of bias conferred from inclusion of primary studies with non-comparative design is low. The demand for comparative accuracy data combined with minimal awareness of valid comparative accuracy study design may lead to counter-productive research and inadequately supported clinical decisions for diagnostic tests.

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An Audit of the Completion of MRI Request Forms by Ordering Physicians

Kylie Everard, MUN; Jennifer Young, MUN

LOCATION: University hospital

BACKGROUND/AIM OF THE AUDIT: MRI request forms contain significant information including the specific exam required, patient information, and importantly, a safety checklist. Aside from serious adverse events, failure to appropriately complete these forms may also result in unnecessarily cancelling scans, thus representing a misuse of healthcare funding. The Royal College of Radiologists recognizes in its guidelines the importance of adequately completing radiology request forms to prevent adverse events and improve the usefulness of these exams. The aim of this audit was to analyze how adequately these forms are being completed in accordance with Royal College guidelines and how often scans are cancelled due to inaccuracies on request forms.

TARGET: 100% of request forms submitted should be properly completed.

METHOD: All MRI request forms submitted in November 2017 across 3 different hospital sites were analyzed. Forms were assessed to determine whether all sections were filled out, whether there was a discordance between the initial information recorded and that on the second safety checklist, and whether the exam was cancelled or rescheduled.

RESULTS: Of 1173 forms, 416 had all sections completed. There were 248 discrepancies in information between the initial form and the second safety checklist (ex: missed aneurysm coil). 40 exams were cancelled or rescheduled.

INTERVENTIONS/ ACTION PLAN: Results were discussed with department manager. Revisions to MRI request forms are suggested to improve completion rates, reduce errors in information transfer, and reduce unnecessary cancellations.

CONCLUSION: Inadequate completion of MRI request forms is a worldwide issue. Form revisions may improve completion rates and reduce transfer of incorrect information.

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Demographic, Imaging and Histopathological Findings of Mucinous Breast Cancer: A Retrospective Study of 21 Hospital-Based Series of Cases

Eman Abbas, Hamad Medical Corporation

OBJECTIVE: To illustrate the demographic, imaging findings of mucinous breast carcinoma collected from Hamad General Hospital case series during 6 years from 2012 to 2017, with histopathological correlation.

METHODS: A retrospective review of our own database of patients in Hamad General Hospital diagnosed with breast cancer.

THE medical records of 21 patients with pathologically proven invasive mucinous cancer were reviewed. We evaluated the demographic, clinical data, imaging and pathological findings of these cases.

RESULTS/ DISCUSSION: We identified 15 cases of pure and 6 cases of mixed mucinous breast carcinoma that constituted 1.7 % of all proven breast cancer. The age of the patients ranged from 27 to 73 years and were divided into 2 groups with 16 cases above 40 years and 5 below 40 years. Metastasis to the lymph nodes were found in 25% in group 1 and 80% in group 2, while distant metastases was 0% in group 1 and 60% in group 2. Radiologically 31% of group 1 and 40% of group 2 were categorized as BIRADS 3, with the remainder as BIRADS 4 and 5.

Mucinous carcinoma is a rare histological variant of invasive ductal breast cancer. It accounts for 1 to 7% of all breast cancers with increased prevalence in older women. the imaging appearance of mucinous breast carcinoma is challenging.

CONCLUSION: This study showed apparent altered demographic results of mucinous breast carcinoma with most of patients presented in their forties and fifties and very aggressive behaviour in younger women < 40 years old. This may be attributed to the high proliferation marker Ki-67.

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Time-to-event Bayesian Optimal Interval Design to Accelerate Phase I Radiotherapy Trials

Ying Yuan, MD Anderson Cancer Center

OBJECTIVE: Late-onset toxicity is common for radiotherapy and causes major logistic difficulty for existing adaptive phase I trial designs, which require the observance of toxicity early enough to apply dose escalation rules for new patients. Our objective is to develop a novel Bayesian design to accelerate phase I trials by allowing for real-time dose assignment decisions for new patients while some enrolled patients' toxicity data are still pending.

METHODS: We proposed the time-to-event Bayesian optimal interval (TITE-BOIN) design to accelerate phase I trials by allowing for real-time dose assignment decisions for new patients while some enrolled patients' toxicity data are still pending. The TITE-BOIN works by predicting the unobserved toxicity outcome of pending patients based on a time-to-event model to facilitate real-time decision making.

RESULTS: Extensive numerical study shows that the TITE-BOIN is more flexible in choosing the target DLT rate and has higher accuracy to identify the MTD than the rolling six design. Compared to the more complicated model-based time-to-event continuous reassessment method (TITE-CRM), the TITE-BOIN has comparable accuracy to identify the MTD, but is simpler to implement with substantially better overdose control.

CONCLUSION: The TITE-BOIN design supports continuous accrual, without sacrificing patient safety nor the accuracy of identifying the MTD, and therefore has great potential to accelerate early phase drug development.

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Validation of the Use of Region of Interest (ROI) Measurements for Objective Assessment of Post-Contrast Enhancement of Renal Lesions on Magnetic Resonance Imaging (MRI)

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OBJECTIVE: The aim of this study was to validate the use of region of interest (ROI) measurements in magnetic resonance imaging (MRI) to objectively assess for enhancement in suspected solid renal masses and to determine a minimum threshold value for true enhancement.

METHODS: 104 consecutive patients between January 2015 and December 2017 who had renal MRI and subsequent biopsy or partial/radical nephrectomy were included. Two body imaging fellows independently measured the mean ROI values of renal masses, normal renal parenchyma, ipsilateral psoas muscle and external air on the pre- and post-contrast sequences. The absolute and percentage changes in the mean ROI values were calculated. The readers were blinded to the pathology results.

RESULTS/DISCUSSION: 104 patients were included in this study (mean age of 65 years; 58 males and 46 females). 74 patients (71%) had a diagnosis of renal cell carcinoma (RCC). Pathology showed clear-cell RCC in 55%, papillary RCC in 22%, and other RCC subtypes in 23%. There were 30 non-RCC renal lesions (29%), including oncocytoma, renal papillary adenoma, and renal metastasis.

The minimum percentage change in ROI values in the pre- versus post-contrast images for all pathology-proven RCCs was 25% (range: 25-415%). The percentage change for normal renal parenchyma ranged from 32-317%. There was excellent inter-observer agreement between the two readers [Cohen's Kappa (k) 0.84].

CONCLUSION: The percentage change in ROI values (signal intensity index) can be a helpful tool in the objective assessment of true enhancement of renal masses and can supplement subtraction images.

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Multiphase CT Angiography Calgary Collateral Score Reliability for the Evaluation of Patients with Acute Stroke

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Collateral status is usually considered as a parameter for patient selection to thrombectomy in acute stroke. One of the commonly used methods to determine collateral circulation status is the multiphase CT angiography Calgary Collateral Score. The aim of this study was to measure the inter-reader reliability of this classification.

For this single centre transversal study, we selected consecutive adult patients with acute ischaemic stroke and occlusion of the proximal anterior artery circulation proven by multiphase CT angiography (mCTA). The evaluation of collateral circulation was assessed on every patient's images by two experienced neurointerventional radiologists blinded to all clinical and non-contrast CT information. The Calgary Collateral Score was reported as a scale of 6 points and dichotomized according to two clinically relevant categories (Poor/Moderate vs. Good, Poor vs. Moderate/Good). Cohen's kappa coefficients were calculated for inter-rater reliability.

Among 128 patients included, 72 (56%) were women. Mean age was 73.6 ± 13.5 years and mean NIHSS score at baseline was 14.3 ± 6.3 . A fair agreement was reported between readers when good collaterals were considered as a score from 2 to 5 (k 0.3961; 95% IC: 0.2505-0.5417, percentage agreement 91%) or as a score from 4 to 6 (k 0.3112; 95% IC: 0.0115-0.6108, agreement of 69%).

The preliminary results seem to highlight that collateral circulation assessment by mCTa has to be considered with caution in order to select patients for the appropriate treatment. This assessment probably needs more standardization and training to increase its reliability.

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Pelvic Reconstruction with the VRAM Flap: Does Preoperative Muscle-to-Surgical Pelvic Defect Ratio Affect Postoperative Outcomes?

Kelly Harper, University of Ottawa; Blair Macdonald, The Ottawa Hospital; Michael J. Stein, University of Ottawa

PURPOSE: To evaluate whether the ratio of rectus abdominis muscle to surgical pelvic defect (M:P ratio) calculated using preoperative imaging correlates with postoperative outcomes in patients undergoing vertical rectus myocutaneous (VRAM) muscle flap pelvic reconstruction.

METHODS: A single centre retrospective review was performed on patients who underwent abdominoperineal resection (APR) or pelvic exenteration (PEX) with immediate VRAM reconstruction. Preoperative CT abdomen/pelvis was used to calculate rectus muscle volume and MRI pelvis was used to calculate planned surgical pelvic defect volume. M:P ratios were compared to outcomes using independent t-tests. Outcomes extracted from electronic medical records included major complications (wound dehiscence, complete flap loss, surgical drainage), minor complications (partial flap loss or dehiscence, small hematoma/seroma, local infection), and time to wound healing. The effect of gender on M:P ratios and outcomes was also evaluated.

RESULTS: Overall, the M:P ratio had no significant impact on major or minor complication rates ($p=0.84$ and $p=0.90$). Women had significantly smaller M:P ratios (mean 0.6 vs 0.3, $p=0.009$) without difference in major or minor complication rate ($p=0.92$ and $p=0.84$). Regression analyses demonstrated a negative correlation of M:P ratio and time to wound healing.

CONCLUSIONS: The VRAM muscle flap is used in pelvic reconstruction with the belief that obliteration of the pelvic defect contributes to improved outcomes.

This theory is supported with the demonstration of less obliteration of the pelvic defect resulting in increased time to wound healing. Furthermore, it suggests increased post-operative recovery time for female patients due to their smaller M:P ratio.

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CT-Guided Biopsies in Antibiotic Management of Vertebral Osteomyelitis

Jingyu Zhou, Stony Brook University Hospital; Kiyon Naser-Tavakolian, Stony Brook University Hospital; Isael Perez, Stony Brook University Hospital; Michael Clifton, Stony Brook University Hospital; Valmore Suprenant, Stony Brook University Hospital

OBJECTIVE: We aim to determine the usefulness of surgical pathology and other clinical factors in guiding antibiotic treatment of vertebral osteomyelitis.

METHODS: This was an IRB-approved retrospective review of 69 CT-guided core biopsies for suspected vertebral osteomyelitis which met our inclusion criteria. A chart review was performed and took account of the following clinical factors to determine their impact on antibiotic regimen changes: microbiological cultures, pre-biopsy antibiotics, presence of a fever, elevated erythrocyte sedimentation rate (ESR), elevated C-reactive protein, and an elevated white blood cell count. An analysis was performed using SPSS (version 25, IBM) and p-values were obtained using a Chi-squared test.

RESULTS: Of the 69 biopsied cases of vertebral osteomyelitis, 26 patients (37%) yielded positive cultures. Among the patients with positive biopsy cultures, empiric antibiotic regimen changes were seen in 15 (57%) patients (p Conclusion: Empiric antibiotics prior to biopsy has no negative effects on biopsy specimen culture yield. A positive biopsy culture result significantly associated with a change in empiric antibiotics when compared to negative cultures.

The Post-Surgical Upgrade Rate of Breast Papillary Lesions – A Single Centre Audit

Suad Al Duwaiki, McMaster University; Abdullah Alabousi, McMaster University

AUDIT TITLE: The Post-Surgical Upgrade Rate of Breast Papillary Lesions – A Single Centre

PRESENTER'S LEVEL OF TRAINING: Clinical Fellow

PRINCIPAL LOCATION OF AUDIT: University-based practice

BACKGROUND AND AIM OF THE AUDIT: Management of benign intraductal papillomas is controversial because of its nonspecific radiologic findings and the sometimes non-representative histologic findings in the setting of under-sampling. Our aim was to assess the post-surgical upgrade rate of papillary lesions diagnosed at core biopsy.

AUDIT TARGET: Published papillary lesion surgical upgrade rates range from 0-33%.

METHODS: 215 consecutive patients with a papillary lesion diagnosed at core biopsy (stereotactic, ultrasound and MRI) performed between January 2014-June 2018 were reviewed. Core biopsy results were compared with the final surgical pathology upon excision.

RESULTS: Of the 215 patients, 48 were excluded due to lack of surgical pathology (patients did not undergo surgical resection). Of the remaining 167 (age: 41-90, lesion size: 2-46 mm), 97 had a biopsy diagnosis of papilloma, 42 had papilloma with atypia and 28 had papillary carcinoma. Post-operatively, 65 of the 97 benign papillomas had no change in diagnosis (58%). 27 papillomas diagnosed at biopsy were upgraded post-operatively (28%). Upgraded diagnoses included: atypical ductal hyperplasia, ductal carcinoma in-situ, lobular carcinoma in-situ, invasive lobular carcinoma, papilloma with atypia and papillary carcinoma.

DISCUSSION / CONCLUSIONS: When compared with the published rates of papillary lesion upgrade rates, which range from 0-33%, our upgrade rate of 28% is fairly high.

Adherence to Standard Views in Skeletal Surveys Performed on Children with Known or Suspected Abuse

Kathryn Zhao, McMaster University; Kelly Ainsworth, Hamilton Health Sciences

BACKGROUND AND AIM OF THE AUDIT: There were 108 child maltreatment cases per 1000 children in 2010 in Canada. The highest rates of investigation involved children less than 2 years of age. Radiologists play pivotal roles in identifying inflicted injuries. Standardizing the imaging protocol is key to ensuring consistent care and preventing misses, which can have devastating consequences. The ACR and SPR collaboratively set out pediatric SS performance and interpretation practice parameters in 2016.

This audit aims to assess adherence to the inclusion of all recommended views in SS performed on patients less than 2 years of age presenting with known or suspected non-accidental trauma.

AUDIT TARGET: 100%

METHODS: 100 SS reports for suspected child maltreatment were reviewed. SS for other indications and follow-up surveys were excluded. In accordance with our institutional policy, we also assessed if SS were double-read by two Radiologists.

RESULTS: Ninety-eight SS were adherent. One of the two non-adherent SS was performed portably in the PICU. Ninety-eight SS were double-read.

INTERVENTIONS/ACTION PLAN/DISCUSSION: Factors/ barriers related to non-adherence will be assessed. Results will be presented and discussed at an interdepartmental meeting. Solutions to facilitate adherence will be initiated.

CONCLUSIONS: While close to meeting the audit target, there is still room for improvement. This audit proved valuable in identifying barriers to adherence.

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Ct Assessment Of Anterior Ethmoidal Canal Dehiscence; An Interobserver Agreement Study

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PURPOSE: To evaluate the interobserver agreement in the CT assessment of the anterior ethmoidal artery canal (AEC) dehiscence

METHODS: A retrospective review of consecutive 1008 CT scans of the paranasal sinuses (PNS) between January 1, 2012 and December 31, 2012 was performed. Cases with the AEC in the ethmoidal roof/skull base, postoperative changes or pathology causing alteration of the anatomy were excluded. Two neuroradiologists, read all the cases. Each neuroradiologist assessed the presence of AEC dehiscence, the presence of paranasal opacification and the best plane to evaluate the AEC. The interobserver agreement was calculated for all the cases.

RESULTS: A total of 301 AEC was included. 102 cases demonstrated the AEC below the skull base bilaterally (51,2%), 44 cases were only in the right side (22,1%) and 53 cases only on the left side (26,6%). The best plane to assess the anterior ethmoidal canal for reader 1 was the coronal (53%), for reader 2 the best plane was the sagittal (77.7%). Dehiscence of the AEC was found in 41 cases (20%) for reader 1, for reader 2 was found in 22 cases (11%). The Kappa for dehiscence of the AEC was 0,246 indicating fair interobserver agreement. Opacification of the paranasal sinuses was found in 59 cases (19%) for reader 1 and in 77 cases (25%) for reader 2. The kappa for the dehiscence of the AEC in cases with opacification of the paranasal sinuses was 0,754, indicating good interobserver agreement.

CONCLUSION: Suboptimal interobserver agreement can potentially limit the usefulness of CT scan to preoperatively assess the AEC dehiscence.

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Impact of Internship (PGY1) on Development of Radiologists' Interdisciplinary Skills.

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PURPOSE: The objectives of this survey were to (a) assess radiologists' experiences regarding the value of internship in development of their interdisciplinary skills; (b) examine their perceptions of additional rotations that could potentially accentuate their performance, and (c) explore suggestions on how to enhance skills of future radiologists.

MATERIALS AND METHODS: Members of Canadian Association of Radiologists (CAR) were invited by e-mail to complete an anonymous survey developed by Radiology Department at the University of Manitoba. Participants were asked to identify if internship added value to their professional development, and share opinions on how to enhance internship learning experience. Statistical analyses were performed by using the χ^2 test and analysis of variance.

RESULTS: 121 CAR members responded to the survey. Most respondents (84%, 102 of 121) agreed that internship added value to their interdisciplinary and decision-making abilities. The majority (75%, 91 of 121) commented that additional rotations such as anatomy, physics, and radiology-technology hands-on rotations would add benefit to internship. The majority (83%, 101 of 121) commented on the importance of interdisciplinary skill development during residency. Participants suggested that future radiologists' performance can be improved by a) integration of clinical rotations into the radiology residency; b) allocating residents to collaborate as radiology consultants and liaisons with clinical teams, and c) providing longitudinal radiology education during PGY1.

CONCLUSION: The majority of radiologists supported the continuation of internship; however, suggested internship experience can be improved by a "radiologist-centered" approach that allows radiology residents to integrate into clinical teams as consultants and liaisons.

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Acute PICA Territory Infarct Demonstrates Conjugate Gaze Deviation and May Be a Potential Mimicker of Large Vessel Occlusion on Computed Tomography

Nancy Jiang, McMaster University; wei wu, McGill University Faculty of Medicine; Crystal Fong, Hamilton Health Sciences; Demetrios Sahlas, Hamilton Health Sciences; Ramiro Larrazabal, Hamilton Health Sciences

PURPOSE: Conjugate gaze deviation (CGD) is a predictor of acute large vessel occlusion and may help expedite patients to CTA and endovascular capable sites to maximize patient outcome. However, patients with acute cerebellar infarcts have also been observed to exhibit CGD, particularly in the PICA territory. Thus, when there is no established imaging markers of arterial occlusion, such as hyperdense vessel sign or loss of grey white differentiation, acute PICA occlusion may be a potential mimicker of large vessel occlusion on nonenhanced CT (NECT). So far, the association of CGD with acute PICA infarction has not been examined. We investigated whether measuring degree of CGD on NECT may help differentiate these two groups.

MATERIALS AND METHODS: We retrospectively reviewed clinical records and imaging of 27 patients acute PICA occlusions and 114 patients with acute proximal vessel occlusion (ICA, M1, and M1/2) over 2 year period. Degree of CGD was measured for both groups. A positive CGD was defined as ipsilateral eye deviation with $> 5^\circ$ on imaging.

RESULTS: In the 27 patients with acute PICA occlusions, 9 (33%) have positive gaze deviation (6 with ipsilateral and 3 with contralateral gaze deviation). Of the 72 out of 114 (63%) patients with proximal vessel occlusion have +CGD. The median degree of CGD between the two groups is statistically significant (32° vs 25° , $p < 0.05$). Infarct location is predominantly in the vermis or flocculonodular lobe.

CONCLUSION: The degree of gaze deviation is significant higher in acute PICA occlusion than proximal vessel occlusion. Therefore, measuring gaze deviation may help identify mimickers and streamline patients for the endovascular pathway.

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Adherence to BI-RADS Lexicon for Reporting Breast Calcifications on Mammography

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PRINCIPAL LOCATION of Audit: University-based practice.

BACKGROUND AND AIM OF THE AUDIT: Breast calcifications are diverse and challenging to report on mammogram. Adherence to the standardized Breast Imaging Reporting and Data System (BI-RADS) can improve reporting quality and assist with prognosis. At our site, we noticed inconsistent use of the BI-RADS fifth edition lexicon, potentially impacting BI-RADS grading and biopsy recommendations.

STANDARD: BI-RADS fifth edition mammography lexicon.

AUDIT TARGET: Radiologists and residents.

METHODS: We performed a retrospective site review of mammograms performed for calcification work-up. We electronically identified the most recent 105 mammograms predating July 1, 2018 with either magnification or cone compression views containing the keyword "calcifications". We assessed adherence of originally reported calcification descriptors to BI-RADS lexicon, compared with a consensus panel review by fellowship-trained mammographers. Agreement between the two reporting groups for BI-RADS grading and biopsy recommendations was evaluated using the Kappa coefficient.

RESULTS: The adherence of originally reported calcification descriptors to BI-RADS lexicon was 8/105 studies. There was fair agreement (Kappa=0.21, $p < 0.001$) in BI-RADS grading and moderate agreement (Kappa=0.43, $p < 0.001$) in biopsy recommendation between the original reporting radiologist and gold standard consensus panel.

INTERVENTIONS /ACTION PLAN /DISCUSSION: We are planning departmental teaching on the BI-RADS lexicon and reporting template development, prior to re-auditing.

CONCLUSIONS: There is low adherence at our site to BI-RADS lexicon for reporting calcifications. Improving this may concurrently improve BI-RADS grading and biopsy recommendations

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Diagnostic Radiology Residency Assessment Tools: A Systematic Review

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OBJECTIVE: The multifaceted learning in diagnostic radiology residency requires a variety of assessment methods, the quality of which has not been formally examined. This study is a scoping systematic review to identify which assessment tools are available for radiology resident training, and to assess the validity of these tools.

METHODS: A literature search was conducted through multiple databases, grey literature, and on-line resources. Inclusion criteria: any tool used in assessment of radiology resident competence. Data regarding residents, evaluators and specifics of each tool was extracted. The validity of each tool was examined with a customized tool using the five categories of validity: content, response process, internal structure, relations to other variables, and consequences. Inter-rater agreement was calculated.

RESULTS: The initial search returned 445 articles; 50 were included. Evaluation tool characteristics: 15(30%) overall knowledge, eight(16%) subspecialty competencies, seven(14%) competency on call, seven(14%) reporting skills, three(6%) procedural competence, three(6%) communication skills, three(6%) perception skills, two(4%) professionalism, and two(4%) end of rotation evaluations. In terms of validity, a majority of the articles (56%) did not assess validity at all; while 14% presented evidence from multiple domains.

CONCLUSION: We identify 50 evaluation tools covering a broad scope of areas. However, the validity of these tools is quite variable. Validation of these tools to ensure they are applicable prior to implementation in a competency based resident education curriculum would be optimal.

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Reproducibility of Epicardial Fat Quantification Using Non-Contrast Cardiac CT in an HIV Population

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OBJECTIVE: Epicardial fat quantification could have prognostic benefit over traditional cardiovascular risk stratification in the HIV population. In general, methods to evaluate reproducibility of epicardial fat have varied. We aim to evaluate the reproducibility of different epicardial fat measurements using non-contrast cardiac CT in HIV+ and HIV- patients.

METHODS AND MATERIALS: This is a cross sectional study, nested in the Canadian HIV and Aging Cohort, a large prospective cohort following more than 800 HIV+ and HIV- patients. Consecutive participants with low/intermediate cardiovascular risk were invited to undergo non-contrast cardiac CT. For inter-observer agreement assessment, two observers performed the measurements of epicardial fat volume, area and thickness in all patients, independently of each other. For intra-observer agreement, observer 02 repeated all measurements in a random subset of 40 patients, \geq 1 month after the first assessment. Agreement was assessed with the intraclass correlation coefficient (ICC).

RESULTS: A total of 167 HIV+ and 58 HIV- patients underwent cardiac CT. The inter-observer agreement was excellent for epicardial fat volume (ICC 0.75) and area (ICC 0.95) and good for epicardial fat thickness (ICC at a level near the left anterior descending artery (LAD) 0.64, ICC near right coronary artery (RCA) 0.64). The intra-observer agreement was excellent for epicardial fat volume (ICC 0.97), area (ICC 0.99), thickness at the level of the LAD (ICC 0.71) and good for epicardial fat thickness at the level of the RCA (ICC 0.68).

CONCLUSION: Quantification of epicardial fat using non-contrast cardiac CT is adequately reproducible for volume and area.

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Comparison of Knee MRIs Ordered by General Practitioners and Orthopedic Surgeons

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OBJECTIVE: In Saskatchewan, MRI ordering is limited to either specialist physicians or general practitioners (GPs) on radiologist recommendation. This study compares surgical intervention rates in patients referred for knee MRIs by GPs vs. orthopedic surgeons. Intervention rate was also assessed among GP referrals with various levels of radiologist recommendations.

METHODS: Retrospective study of 363 patients referred by GPs (n=173) and orthopedic surgeons (n=190) for knee MRIs in Saskatoon during 2017. Radiologist recommendations for GP cases were grouped as “verbal discussion” of the case or by comment on previous imaging (follow-up of a “specific structure”, follow-up of a “non-specific finding” such as joint effusion, or general statement to get MRI “if concerned”). Chi-square testing and multivariable logistic regression were used to compare patients by surgical intervention status. In modeling the relationship between physician type and surgical intervention, patient age and sex were evaluated as confounders.

RESULTS: The intervention rate was higher for orthopedic referrals (27%). Overall intervention rate for GPs referrals was 19%, but by recommendation subgroup (verbal discussions or follow-up of specific findings) were 21% and 24% respectively (Table 1). Mean patient age was higher in GP referrals (46 vs. 38), and older age was associated with less frequent surgery. When age difference was taken into consideration, the difference in overall group intervention rates resolved.

CONCLUSION: Surgical intervention following MRI is highest for patients referred by orthopedic surgeons, but some GP referred subgroups are similar. Lower intervention rates among GP patients appear partly attributable to older patient age.

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The utility of short-interval follow-up high-risk breast MRI

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OBJECTIVE: PATIENTS deemed to be at high risk for developing breast cancer (25% lifetime risk or higher) qualify for high-risk screening with annual mammography and breast magnetic resonance imaging (MRI). A proportion of these patients undergo short-interval follow-up breast MRI 3-6 months following their baseline study. Our objective was to assess the utility of these short-interval follow-up breast MRI studies for patients at high risk for breast cancer.

METHODS: A total of 330 baseline high-risk screening breast MRI studies performed at our institution between 2013-2017 were retrospectively reviewed. Of these, 70 baseline studies (21%) had a recommendation for short-interval follow-up MRI at 3-6 months [Breast Imaging Reporting and Data System – BIRADS 3]. The findings at baseline MRI and the outcome of the short-interval follow-up, including any interventions, were recorded.

RESULTS/DISCUSSION: Of the 70 studies, 2 were excluded due to lack of follow-up. 68 high-risk patients were included (age range 30-67, mean 42). Patients had short-interval follow-up due to moderate/marked background parenchymal enhancement, benign-appearing non-mass enhancement and/or benign appearing lesions. Of the 68 patients, 5 (7%) went on to have a biopsy, 4 of which had benign histopathology. One patient had atypical lobular hyperplasia (ALH). The remaining 63 patients (93%) had no suspicious findings on follow-up imaging.

CONCLUSION: Short-interval follow-up breast MRI in high-risk patients after a baseline screening study with likely benign findings is unlikely to yield clinically significant findings. This needs to be further confirmed with evaluation of a larger cohort of patients.

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The Imaging Requisition: The 'No Man's Land' of Radiology and Emergency Medicine

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BACKGROUND: Incomplete clinical information with respect to patient history and clinical presentation on imaging requisitions is often a point of contention amongst emergency medicine physicians and radiologists given its impact on study selection, protocol and diagnosis.

STANDARD/TARGET: No known standard. Canadian Association of Radiologist best practice guidelines consulted. The target standard is to achieve 100% completeness in all cases.

METHODS: Imaging requisitions and clinical encounter sheets for 50 CT and 50 ultrasound scans were randomly selected from a central emergency medicine database. A radiologist and a resident assessed and graded completeness as adequate, inadequate, or good clinical information.

RESULTS: The resident reviewer rated 28% of requisitions as adequate while the staff radiologist rated 16%. 69% and 80% of the requisitions were rated as inadequate by the resident and staff, respectively, and only 3% and 4% were rated as good clinical information. The staff radiologist identified 14 studies that would have an altered protocol and the resident identified 11, 5 of which overlapped with the staff's choice of study. Overall, 96.5% of imaging requisitions contain at least adequate clinical information for a radiologist to direct their study selection but drops to 86% for optimization of study protocol.

INTERVENTIONS: The results will be discussed in an interdepartmental Grand Rounds.

DISCUSSION: A second audit cycle will be carried out to reassess any progress in the completeness of clinical information provided on imaging requisitions.

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Evaluation of the Thyroid Using Ultrasound with Cine Loop Increases Detection Rate of Pyramidal Lobes

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OBJECTIVE: To evaluate whether cine loops through the thyroid gland increase detection of the thyroid pyramidal lobe (TPL) compared to still images, and to characterize the TPL and its associated pathologies.

METHODS: From November 2015 to February 2016, 1579 patients scheduled for routine thyroid ultrasound were enrolled. A standard scanning protocol was established which instructed sonographers to obtain still images and transverse cine loops from the hyoid bone to the inferior thyroid glands bilaterally. Sonographers were instructed to record the presence or absence of a TPL. Prior to initiation of the study, still images were the standard on routine exams and if a patient had a previous study, this was used as a control. A radiologist and a radiology resident evaluated current and previous exams for the presence and features of TPLs.

RESULTS: 1475 patients were included in the final study. A total of 660 cases of TPL (44.7%) were identified by the radiologist/radiology resident. Sonographers correctly identified 580 (88%) of cases. Of the 660 positive cases, 480 cases had previous thyroid ultrasounds. On review of the prior images, only 7% of cases (32/480) identified a TPL with confidence. TPLs predominantly originated from the left (53%) and was found less frequently in men than women (40.0% VS 46.4%). The mean length was 18.6 mm (5-60mm). 4% of TPLs were abnormal with pathologies including thyroid nodules, cysts, and pseudo-nodules.

CONCLUSION: Our study indicates that thyroid sonography with cine loop significantly increases detection of TPL when compared with conventional methods.

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Assessment of Procedural and Clinical Outcomes in Endovascular Treatment of Ischemic Stroke Between Regular Working and on Call Hours

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PURPOSE: Rapid restoration of cerebral blood flow is essential for optimizing patient outcomes in acute ischemic stroke. The current standard of care for large vessel occlusion includes CTA and endovascular treatment(EVT). To achieve reperfusion as fast as possible, all en-route and in hospital time delays have to be carefully assessed in order to streamline EVT for eligible patients. Since the stroke team is not in house during the on-call hours, we assess whether there is any differences in process time and clinical outcome between daytime versus on-call.

METHODS: We retrospectively reviewed 309 consecutive endovascularly treated stroke patients at our tertiary stroke center over 3 years. Patients with symptoms-onset between 8:00am to 5:00pm were placed in the daytime group (n = 143) and between 5:01pm to 7:59pm were placed under on-call group (n=166). Demographics, imaging scores, process time, procedural and clinical outcomes were collected.

RESULTS: The time of symptom-onset to admission is slightly longer during the on-call hours (median 166 vs. 187 minutes, $p < 0.05$) especially during the weekend time hours. In addition, stroke fanout to puncture time shows statistically difference (53 vs 59 minutes, $p = 0.04$) but this may not be clinically significant since the overall time between symptom onset to recanalization remains comparable between the daytime and on-call group (148 vs. 152 minutes).

CONCLUSION: Although slight difference in time is noted during weekend on-call hours, our study demonstrates that there are no clinically significant differences between process time, procedural and clinical outcome between daytime and on-call hours at our institute.

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Implementation of a Tailored MR Stroke Protocol

Graeme Bell, University of Saskatchewan; Kyle Moulton, University of Saskatchewan

BACKGROUND/AIM: Patients with acute stroke benefit from prompt diagnosis and treatment. Frequently used MR protocols at our institution contain sequences that add time but do not routinely contribute clinical information in the setting of stroke. Through implementation of a dedicated "fast stroke" protocol with fewer, more specialized sequences (DWI, FLAIR, and SWI), this initiative aims to improve the stroke clinical and imaging pathway by facilitating prompt diagnosis and triage.

TARGET: Achieve significant reduction in MRI acquisition times without increasing the number of non-diagnostic studies.

METHODS: The formalized fast stroke protocol was implemented and encouraged in late January 2018. The local RIS database was queried for unenhanced MRI brain exams performed for stroke. Five months of pre-intervention and ten months of post-intervention data were collected and reviewed (from Sep 2017-Nov 2018). All reports and image series were assessed to determine if studies were diagnostic and to confirm sequences used. A two-sample t-test was applied to identify significant differences in scan times between groups.

RESULTS: The fast stroke protocol was used in 115/264 (56.4%) cases post-intervention, compared to 8/129 (6.2%) pre-intervention, resulting in a significant reduction in acquisition times (p

ACTION PLAN/DISCUSSION: By disseminating results within our department and to other practices, we will encourage further increased adoption of the new protocol and facilitate similar quality and throughput improvement initiatives.

CONCLUSION: This study validated the use of a specialized MR protocol in the acute stroke pathway.

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Rate of Significant Misses in Resident Preliminary CT Head On-Call Reports

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BACKGROUND AND AIM OF THE AUDIT: One method of assessing the quality of a radiology resident's on-call reports is by the rate of clinically significant misses when compared to the final attending report. High number of misses delays proper patient care and lowers trust with patients and clinicians.

The aim of this audit is to determine the rate of significant missed findings in resident CT head preliminary reports. If the audit target is not met, then the secondary aim is to propose an intervention for quality improvement.

AUDIT TARGET: Target rate should be equal to or less than that in literature— 2.4%. 1

METHODS: CT head scans performed on the 1st, 12th, and 24th day of every month between July 1, 2017 and June 30, 2018, during call hours at university hospitals were included. A total of 848 cases were reviewed to determine the number of RADPEER type 3 and 4 misses. All identified and equivocal cases were reviewed by a subspecialty neuroradiologist.

RESULTS: 12 cases were identified to contain a RADPEER type 3 or 4 miss, a miss rate of 1.4%.

INTERVENTIONS / ACTION PLAN / DISCUSSION: The target of the audit was met. These cases will be shown to junior radiology residents with a checklist and teaching to determine if their performance could be further improved. The results will be discussed at departmental research day.

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A Review of Outcomes of Insertion of Magnetic Seeds in Non-Palpable Breast Cancers

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PURPOSE: To assess the feasibility of pre-operative insertion of magnetic seed to localise non-palpable breast lesions.

METHODS: A retrospective review of radiological and pathological data.

RESULTS: A total of 36 female patients with biopsy proven non- palpable breast cancers, age range 36- 82years (median 61.5years), had localisation of their tumours by magnetic seeds under ultrasound guidance over a 7-month period prior to surgical wide local excisions. All underwent a check mammogram to confirm its position on the day of insertion. A second mammogram carried out on the day of surgery in the initial 9 patients, confirmed non-migration of the device. The second mammogram was no longer carried out thereafter. The time to surgery from insertion of the magnetic seed ranged from 0 to 24days (median 7days). Specimen radiographs of all 36/36 resection samples confirmed the presence of magnetic seed device. All resections samples had positive pathology with clear margins. The pathology ranged from infiltrating ductal carcinoma to fibrosis with no residual disease following neoadjuvant chemotherapy. Sample weights ranged 10- 63grams (median 28.5grams) with median sample dimensions 54.5 x 48 x 25.5 mm. The Nottingham Prognostic Index ranged 2.05- 5.44 (median 3.36).

CONCLUSIONS: We have successfully showed that the magnetic seed device can be reliably and safely inserted days prior to the day of surgery leading to a successful resection of non- palpable breast cancers. We have observed that this procedure has reduced patients' pre-operative anxiety; improved radiology service planning; and helped surgical planning and outcomes.

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Evaluation of Liver Mri Examinations with Two Dosages of Gadobenate Dimeglumine: A Retrospective Blinded Intra-Individual Study

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PURPOSE: There is discrepancy in the literature regarding the optimal dose of gadobenate dimeglumine for liver MRI. This study evaluated the quality of liver MRIs performed in the same individual using two dosages.

METHODS AND MATERIALS: This retrospective intra-individual study was performed with ethics approval. Patients who underwent liver MRIs between Sept 2015-May 2017 (0.06 mmol/kg) and May 2017-September 2018 (0.10 mmol/kg) were included. Regions of interest were drawn over the aorta, portal veins and liver on unenhanced, arterial, portal venous and delayed phases; relative enhancement values were compared (paired t-tests). Two blinded radiologists graded the arterial and portal venous sequences of each MRI from 1-4 (1=suboptimal, 2=adequate, 3=good, 4=excellent); grades were compared (Wilcoxon's signed rank test). Radiologists also graded each MRI pair from 1-5 (1=substantially inferior, 2=slightly inferior, 3=equivalent, 4=slightly improved, 5=substantially improved). Inter-reader agreement was assessed (kappa statistic).

RESULTS: 60 patients were included. Relative enhancement increased significantly with the higher dose for all structures on all phases ($p < 0.05$). Compared to the low-dose MRIs, the number of standard-dose MRIs graded 1-5 were 9, 31, 97, 88 and 11 for all patients, and 6, 13, 26, 45 and 6 in cirrhotics. Inter-observer agreement was fair-moderate (κ range, 0.22-0.44).

CONCLUSIONS: A higher dose of gadobenate dimeglumine results in increased relative enhancement but little improvement in subjective imaging quality, although a trend towards better image quality is observed in patients with cirrhosis.

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Comparison of Radiomics Prediction Models of Treatment Response in Oropharyngeal Squamous Cell Cancers Based on Features of the Primary Tumour and Metastatic Lymph Nodes

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OBJECTIVE: To compare radiomics models of treatment response in oropharyngeal squamous cell carcinoma (OPSCC) patients using features derived from the primary tumour (PT), the metastatic lymph nodes (LNs), and a combination of both (PT+LN). We hypothesize that inclusion of metastatic lymph node features may yield improved performance.

METHODS: Ethics approval was obtained. Eighty-four patients who underwent curative treatment for OPSCC with chemo/bio/radiotherapy were included retrospectively from 2006–2016. The primary tumour and one target lymph node (deemed the most radiologically pathological) were segmented from pre-treatment CECT scans (512x512 matrix, 1–3 mm slice thickness, 120–140 kVp) in two dimensions. The pyradiomics tool was used to extract 760 first, second and third-order features in the native and wavelet domains. Analysis was performed in Matlab. Feature selection was based on Spearman's rank correlation to response. Five-fold cross validation was used. Ten different machine-learning classifiers were trained with 1-to-10 features, obtaining 100 models each for the PT, LN, and PT+LN groups.

RESULTS: AUC was computed for each model. The Wilcoxon rank sum test, using Bonferroni correction, showed a statistically significant increase in AUC for the PT+LN models ($p = 4.78 \times 10^{-4}$) overall: specifically, 4-of-10 models showed improved performance when trained on combined primary tumour and lymph node features. There was no significant difference in AUC between the PT- and LN-only models ($p = 0.49$).

CONCLUSION: Our preliminary results suggest that prognostic radiomics models in OPSCC can use metastatic lymph node features to further improve their performance. As well, there may be a role for lymph node-only analysis in cases of occult primaries.

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Diagnostic Yield of CTPA in the Emergency Department

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PRINCIPLE LOCATION OF AUDIT: The emergency department of a tertiary care academic hospital.

BACKGROUND AND Aim of Audit: The use of CT pulmonary angiogram (CTPA) to diagnose suspected pulmonary embolism has steadily increased, with a corresponding decline in positive yield. In the United States, recent analyses report PE yields as low as 5-6%, while limited data in Canadian hospitals show yields in the range of 15-18%.

Standard/Target (British College of Radiologists)

Positive yield of > 15% (Target > 15%)

Alternate diagnosis in > 56% (Target > 56%)

Preceding CXR in 100% (Target = 100%)

METHODS: Patient demographics, radiological diagnosis (presence/absence of PE, alternate CT diagnosis), and presence of a preceding chest radiograph was extracted from the local PACS based on a search of all CTPA studies performed on emergency department patients in the month of January 2018. Patients with known PEs were excluded.

RESULTS: Acute PE was diagnosed in 10% (14/142) of ED patients. An alternative diagnosis was made in an additional 60% (80/134). 81% (115/142) of patients had preceding chest radiographs.

DISCUSSION/CONCLUSIONS: The optimal yield for CTPA has not been definitively established. After discussion with stakeholders, a yield of 10% was considered acceptable at our institution. Since clinical gestalt and objective criteria, such as the Wells score, are both supported methods of risk stratification for suspected PE, we did not think that an intervention targeting adherence to objective criteria would be beneficial. Future strategies may focus on the use of the age adjusted D-dimer as a criteria to improve yield.

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Repeatability and Reproducibility of MRI-based Radiomic Features in Cervical Cancer

Sandra Fiset, University of Toronto

OBJECTIVE: The aims of this study are to evaluate the stability of radiomic features from T2-weighted MRI of cervical cancer in three ways: [1] repeatability via test-retest; [2] reproducibility between diagnostic MRI and simulation MRI; [3] reproducibility in inter-observer setting.

METHODS: This retrospective cohort study included FIGO stage IB-IVA cervical cancer patients treated with chemoradiation between 2005 and 2014. There were three cohorts of women corresponding to each aim of the study: [1] 9 women who underwent test-retest MRI; [2] 20 women who underwent MRI on different scanners (diagnostic and simulation MRI); [3] 34 women whose diagnostic MRIs were contoured by three observers. Radiomic features based on first-order statistics, shape features and texture features were extracted from the original, Laplacian of Gaussian (LoG)-filtered and wavelet-filtered images, for a total of 1761 features. Stability of radiomic features was assessed using intraclass correlation coefficient (ICC).

RESULTS: The inter-observer cohort had the most reproducible features (94.5% with $ICC \geq 0.75$) whereas the diagnostic-simulation cohort had the fewest (6.4% with $ICC \geq 0.75$). Overall, 105 features had $ICC \geq 0.75$ in all three tests. Features extracted from test-retest images were most reproducible in original images, versus the diagnostic-simulation features which had better reproducibility in filtered images. Shape features emerged as the most reliable features in all cohorts.

CONCLUSION: The diagnostic-simulation test was the most stringent test for reproducibility, given its limited number of reproducible features. Further research in MRI-based radiomics is required to validate the use of reproducible features in prognostic models.

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Artificial Intelligence Identification of 3D Ultrasound Scan Quality in Infant Hip Dysplasia

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OBJECTIVE: Ultrasound is vital for diagnosis of infant hip dysplasia (DDH). Poor quality scans can limit its utility. We previously showed that 3D ultrasound (3DUS) of DDH can be reliably performed by inexperienced users. An important limitation to scan quality is infant motion. Artificial intelligence could help a novice user identify whether their scan is of adequate quality for analysis. We tested whether a convolutional neural network could correctly identify high-quality motion-free 3DUS images in infants suspected of DDH.

METHODS: A medical student trained by a musculoskeletal radiologist assessed ultrasound image quality by six parameters, including presence/absence of artifacts such as motion, on custom Matlab software. A convolutional neural network (CNN) was trained using 835 of these data sets (3D scan volumes) and tested on the remaining randomly selected 161 volumes. Training loss was set to be cross-entropy and convergence occurred within 10 epochs.

RESULTS/DISCUSSION: In our scans obtained by a novice, 114/161 test volumes had artifacts. The CNN correctly identified 92% of the scans with artifacts, with overall accuracy of 82% for 2-way classification vs. human reader.

CONCLUSION: A convolutional neural network can be trained with relatively few scans to accurately identify low-quality 3DUS containing artifacts such as motion. An objective means of assessing scan quality at the time of imaging could help train new sonographers and improve quality of images available for interpretation by human radiologists and/or artificial intelligence.

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Impact of 24/7 on site, Staff Radiologist Coverage on Patient Admissions in a Level 1 Trauma Centre

Sabeena Jalal, Vancouver General Hospital; Savvas Nicolaou, Vancouver General Hospital

BACKGROUND: Unnecessary patient admissions within a hospital create a “low value”, thus unnecessarily burdening the hospital and the patients.

AIM: We wanted to determine whether a 24/7 reduces the percentage of patients being admitted in a single payer health care system.

METHODS: A retrospective audit of 51,147 consecutive patient encounters in a level one trauma center, before after the implementation of onsite 24/7 staff Emergency Radiologist coverage.

RESULTS: Pre 24/7 we looked at 25,543 patients and Post 24/7 we looked at 25,604 patients. During the Pre 24/7 period, 21.71% of the patients coming the ED were being admitted to the hospital. However, post 24/7 we saw a slight difference in the percentage, about 20.16% patients coming to the ED were being admitted to the hospital. In this sample of data, for those patients who were being admitted, the median MD to disposition time post 24/7 was about 2 minutes less than the median MD to disposition time pre 24/7. Even though this difference appears small in magnitude, however, perhaps due to the sample size, on hypothesis testing at alpha 0.05, this was a significant difference (p value = 0.023).

DISCUSSION: This initial analysis, shows that having a 24/7 staff Radiologist assists the single payer system facilitate lesser number of people being admitted to the hospital. Conclusion: There could be other factors influencing this decrease in admission rate observed in this study. More research needs to be conducted with more variables to study the association of decreased rate of admission and establishment of 24/7 on site staff radiology coverage within a level 1 Trauma centre.

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Emphasizing the Diagnostic Value of Digital Tomosynthesis in Detecting Hip Fractures

Cory Ozimok, McMaster University; Naveen Parasu, McMaster University; David Koff, Hamilton Health Sciences

OBJECTIVE: To evaluate the diagnostic accuracy of digital tomosynthesis for detection of hip fractures in the emergency department compared to radiography.

METHODS: We retrospectively reviewed all patients who underwent hip digital tomosynthesis over a 17-month period from July 2017 – November 2018 in our emergency department. We recorded the imaging results from that visit, including radiographs, tomosynthesis and if applicable, CT and MR imaging. Electronic medical records of patients without subsequent cross-sectional imaging were reviewed for concordant clinical evidence of fracture or to determine if they returned within 30-days of the initial visit with a confirmed fracture.

RESULTS/DISCUSSION: Over our study period, 91 patients underwent hip tomosynthesis. There were 34 fractures diagnosed: 10 pubic ramus, 7 greater trochanter, 7 femoral neck, 5 acetabular and 5 other fracture types. Radiographs were positive in 18 cases and negative in 73. Tomosynthesis was positive in 29 cases and negative in 62. Subsequent CT (n = 26) and MR (n = 5) detected 6 fractures missed by tomosynthesis. Two patients diagnosed with a fracture on radiograph were negative on tomosynthesis. One patient diagnosed with a fracture on tomosynthesis alone, did not have documented clinical evidence of a fracture. No patients with negative tomosynthesis alone returned within 30-days with a confirmed fracture. The sensitivities and specificities are 82% and 98% for tomosynthesis compared to 47% and 96% for radiographs, respectively.

CONCLUSION: Digital tomosynthesis has greater sensitivity for hip fracture detection than radiography. It may minimize use of cross-sectional imaging which is more cost effective and reduces radiation exposure.

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Research on Research: How Many Resident Presentations at Canadian Medical Imaging Research Days Go on to Publication?

Sarah Melendez, University of Saskatchewan; David Lewsick, University of Saskatchewan

OBJECTIVE: Determine the percentage of resident presentations at Canadian medical imaging resident research days that go on to publication.

METHODS: Each of the thirteen English speaking diagnostic imaging residency programs across Canada was contacted via email to request data and participation in the study. Since one responding program participated on the condition of anonymity, presented results are anonymized. Programs were then asked to provide details about presentations at resident research days between 2013 and 2017, including presenter name, presentation title and abstract (if available). Internet searching was then performed to confirm if presenters were medical imaging residents at the time. Repeat presentations on the same topic in subsequent years were excluded.

In summer 2018, publications were identified via internet searching using resident name and keywords for each presentation via PubMed, web of science, and google. Identified publications were linked with the presentation to determine total number of publications and how many presentations resulted in publications by year at each school.

RESULTS/DISCUSSION: 7 programs agreed to participate in the study, with presentations from a total of 31 research days available to review. From this, 291 unique resident presentations were evaluated. There were a total of 120 identified publications, from 100 individual presentations (34% of presentations went on to publication). Publication rates were lower for 2017 than other years, and overall publication rates ranged between 13% and 73% by school.

CONCLUSION: 34% of medical imaging research day presentations went on to publication, with variation in number of presentations and publications between schools.

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3D Morphometric Analysis of the Supraspinatus Muscle in Rotator Cuff Tear Patients

Marie-Pierre Ingham, Centre Hospitalier de l'Université de Montréal; Nathalie J Bureau, Centre Hospitalier de l'Université de Montréal; Samuel Kadoury, Polytechnique Montréal; Mahsa Shakeri, Polytechnique Montréal; Shirin Shakeri, Polytechnique Montréal; Karim Saydy, Université de Montréal

OBJECTIVE: To assess supraspinatus muscle volumetric and 3D shape alterations in patients with full-thickness rotator cuff tears (RCT).

METHOD: Retrospective study in 47 patients with RCT (mean age, 57 years; range, 39-67 years) and 30 asymptomatic volunteers (mean age, 56 years; range, 35-64 years). Morphometric assessment of the entire supraspinatus muscle was performed by 2 independent readers, with good interobserver reliability (ICC=0.916), on large field-of-view coronal oblique T1-weighted MR scans. The supraspinatus muscle was segmented using ITK-SNAP tool. Volume, length, surface area, surface-to-volume ratio (S/V), and 3D shape statistical analysis were computed in Matlab. ANOVA with covariates (height, sex and BMI), multiple comparisons and a non-parametric permutation testing scheme were used to test for significant differences.

RESULTS: Supraspinatus mean volume

CONCLUSION: The supraspinatus muscle atrophies but does not contract significantly as tendon tear size increases. Its posterior head (caudal portion) is more affected by this volume reduction than its anterior head.

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Outcome in Patients with Contrast Staining After Endovascular Treatment for Acute Ischemic Stroke

Eduardo Portela de Oliveira, University of Ottawa; Dana Iancu, The Ottawa Hospital; Santanu Chakraborty, Ottawa Hospital; Mihil Patel, University of Ottawa

INTRODUCTION: Hyperdense cerebral areas are commonly seen on head CT performed early after endovascular treatment may be secondary to contrast extravasation or hemorrhage transformation.

OBJECTIVE: The goal of this study is to evaluate the imaging findings of contrast staining in patients who underwent endovascular treatment for acute ischemic stroke in the last 7 years in our institution and their clinical outcome.

MATERIALS AND METHODS: We retrospectively review a database of patients who underwent Digital Subtraction Angiography (DSA) and/or interventional for treatment of acute ischemic stroke (AIS) over past 7-year period in our institution. PACS database search was performed for "contrast staining" to include any patients where hyperdensities were seen in acute stroke patients. Inclusion criteria for the study was acute stroke patients with findings of contrast staining in a head CT examination within 72 hours following DSA.

RESULTS: Of approximately 750 thrombectomies performed, 29 patients met the inclusion criteria. Average ASPECT was considered 8.3. Average NIHSS and MRS pre-procedure was 15 and 1, respectively. 23 patients had CT and/or MRI for follow up of possible contrast staining, with 17 (58,6%) was considered essentially contrast staining and 6 (20%) a combination of contrast staining and hemorrhage. Overall mortality was about 20% (6 patients) and average mRS post procedure.

CONCLUSION: Patients with AIS who underwent DSA for mechanical thrombectomies and presented contrast staining in the follow up CT demonstrated high mortality and high mRS post procedure.

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Ultrafast MRI Protocol for Hepatocellular Carcinoma Follow-up

Wilfred Dang, University of Ottawa; Matthew McInnes, The Ottawa Hospital; Ania Kielar, University of Toronto; Claude Sirlin, UCSD; Satheesh Krishna, The Ottawa Hospital; Linda Scully, The Ottawa Hospital; Thomas Shaw-Stiffel, The Ottawa Hospital; Bardia Moosavi, Beth Israel Deaconess Medical Center; Erin Kelly, The Ottawa Hospital

OBJECTIVE: Comparing an ultrafast multi-arterial phase MRI protocol versus a standard protocol for follow-up of indeterminate liver lesions.

METHODS: Adults with a prior MRI LI-RADS 3 or 4 observation and underwent MRI from January 2017 to June 2018 were enrolled prospectively. Patients underwent MRI every 3 months over 9 months. A liver MRI with all standard sequences was performed with an additional 3D fast gradient echo-based sequence known as Liver Accelerated Volume Acquisition (LAVA, GE Healthcare, Milwaukee, WI, USA). The ultrafast MRI protocol consisted of the following select sequences: pre-contrast, multiphase-arterial (LAVA), portal venous phase, and 3-5 min delayed images.

Two blinded reviewers categorized these liver observations using LIRADS, first with the standard MRI sequences and 6 weeks later using only the ultrafast protocol.

RESULTS/DISCUSSION: 132 observations were analyzed. 46% of observations were matched in LIRADS characterization (Table 1). 37% were overestimated by the ultrafast protocol as compared to all sequences, while 17% of observations were underestimated.

Intra-rater Cohen's Kappa for LIRADS scores between protocols is 0.25, demonstrating fair agreement ($P < 0.001$). A subanalysis, where LIRADS scores were grouped into likely benign (1-2), indeterminate (3-4) and malignant (5/TR-M) categories, demonstrated a Kappa=0.46, or moderate agreement ($P < 0.001$). Inter-rater Kappa between reviewers for all sequences is 0.90 ($P < 0.001$) and 0.85 ($P < 0.001$) for ultrafast protocol, respectively.

Only two LIRADS observations had clinically significant discordance (Table 1).

CONCLUSION: An ultrafast MRI protocol is a reasonable alternative to conventional MRI for characterization of indeterminate LIRADS lesions, as there is minimal clinically significant discordance between protocols.

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Comparison of MRI and Pathological Tumour Size in Invasive Breast Carcinoma

Omar Metwally, University of British Columbia; Rashid Alsharhan, VGH ; Nicolas Murray, Vancouver General Hospital, University of British Columbia; Savvas Nicolaou, Vancouver General Hospital

OBJECTIVE: Tumor size is important in making clinical and pathological assessment of invasive breast cancer. Tumor size > 5 cm is listed as a relative contraindication for breast conserving therapy. This study aims to determine whether the preoperative measurement of tumor size, by MRI, differs from the postoperative pathological measurement.

METHODS: Retrospective study of 128 consecutive patients diagnosed with invasive breast carcinoma from 2012 – 2014 who underwent MRI prior to surgery and met inclusion criteria. Sixteen patients had two separate carcinomas. Maximum MRI measurements and maximum postoperative pathological measurements of tumour size were compared using the paired t-test.

RESULTS / DISCUSSION: The 100 ductal carcinomas showed a trend towards overestimating size with MRI vs pathology (mean of 2.82 cm vs 2.64 cm), which was not statistically significant ($p=0.07$). The 42 lobular carcinomas were significantly underestimated ($p < 0.05$) pathologically, two had discordant MRI size ≤ 5 cm. These two received lumpectomy, while almost all the rest (9/10) received mastectomy.

CONCLUSION: While there was no significant difference in invasive ductal carcinomas size by MRI and pathology, there was a trend towards MRI overestimation. However, invasive lobular carcinomas are underestimated by preoperative MRI measurement when compared to pathological size. This underestimation has the potential to cause inappropriate use of breast-conserving surgery in tumours > 5 cm in pathological size, where mastectomy would typically be applied.

The Role of Clinical History Collected by Diagnostic Imaging Staff in Interpreting of Imaging Examinations

Nick N. Maizlin, McMaster University

BACKGROUND: The requisitions for diagnostic imaging (DI) study may occasionally contain incomplete, or lack any, clinical information. The value of the technologist notes for interpreting DI examinations, has not yet been reported.

OBJECTIVE: The purpose of this study is to evaluate if the addition of clinical information by technologist notes assists in interpreting DI examinations and if note's impact depends on the completeness of medical history provided by the referring physician.

MATERIALS AND METHODS: The completeness of clinical information in 250 requisitions and effect of technologist's notes on radiological interpretation was recorded. The chi-square test was used to evaluate the distribution of outcomes.

RESULTS: Technologist notes were important for interpreting a DI examination in 69.2% of cases and not important in 30.8%. Notes were significantly more useful for reading radiographic examinations than US examinations. 52.8% of requisitions contained full, 25.6% – incomplete, 21.6% did not contain any medical history. Requisitions for ultrasound exams containing a full medical history more frequently than for radiographic examinations. The usefulness of technologist notes for both radiographic and US examinations was not different for groups with full, incomplete, or absent medical history.

CONCLUSION: Technologist notes were important for interpreting DI examinations in more than 2/3 of cases and were more useful for reading of radiographic than US examinations. Their usefulness did not depend on the degree of completeness of patient history provided in the requisition.

Therefore, the addition of technologist notes with clinical information is recommended regardless of medical history provided by the referring physician.



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A Case-Based Approach to the Patterns of Late Gadolinium Enhancement in Cardiac MR Imaging of Nonischemic Cardiomyopathies

Philip Araoz, Mayo Clinic

LEARNING OBJECTIVES:

1. To describe the technique of late gadolinium enhancement (LGE) in cardiac magnetic resonance (CMR) imaging.
2. To review the spectrum of nonischemic diseases affecting the myocardium and illustrate the associated patterns of LGE.
3. To contrast the differences between ischemic and nonischemic LGE.
4. To develop a differential diagnosis for nonischemic cardiomyopathies (NICMs) when given a particular pattern of LGE.

BACKGROUND: Late gadolinium enhancement (LGE) on CMR imaging for myocardial infarction was first described more than 20 years ago and has become the standard for evaluation of myocardial scar. Since then, the value of LGE has also been demonstrated in the CMR evaluation of NICMs. NICMs refer to myocardial disorders in which the myocardium is abnormal in the absence of other diseases such as hypertension and coronary artery disease. The classification of NICMs is complex and the Canadian Cardiovascular Society divides them into primary and secondary types. LGE imaging is performed using an inversion-recovery gradient-echo (GRE) pulse sequence, with the inversion time set to null the signal from normal myocardium. LGE is seen as a bright area against the background of dark normal myocardium. The myocardium can be divided into subendocardial, subepicardial, and midmyocardial components. LGE can be patchy, nodular or diffuse. Ischemic cardiomyopathy tends to cause LGE in the subendocardial or transmural pattern that follows a vascular distribution. This is in contrast to the NICMs which tend to cause LGE in a nonvascular territory when restricted to the subendocardium or can spare the subendocardium completely. Assessing the distribution and pattern of LGE allows differentiation between ischemic and NICM and, in cases of NICM, narrowing of the differential diagnosis.

CONCLUSION: LGE on CMR is invaluable for the evaluation of cardiomyopathies and can help to distinguish between ischemic and nonischemic etiologies. In this exhibit, we have illustrated the differences between ischemic and nonischemic patterns of LGE using cases from our institution to help create a pattern-based approach to the assessment of LGE.

5

Yttrium-90 Radioembolization: Expected and Unexpected Findings

Csilla Egri, University of British Columbia; Stefano Tolhurst, University of British Columbia; Timothy Murray, University of British Columbia; Darren Klass, Vancouver General Hospital; David Liu, Vancouver General Hospital; Silvia Chang, University of British Columbia; John Chung, Vancouver General Hospital; Alison Harris, University of British Columbia

LEARNING OBJECTIVES:

1. To highlight for both general and specialist radiologists the expected and unexpected findings post hepatic Y90 radioembolization
2. To provide a pictorial summary to aid in separating expected post-treatment change from either residual and/or recurrent malignancy. Common post procedure findings include hypoenhancement and/or reduction in size of treated lesion, transient rim enhancement, atrophy of treated liver lobe with hypertrophy of untreated lobe, and capsular retraction. Post-procedural complications include biliary or hepatic injury/disease, infection and radiation pneumonitis.

BACKGROUND: Y90 radioembolization has become an established treatment for a variety of hepatic malignancies for both loco-regional therapy and as a bridge to transplant. The release of beta radiation leads to radiation necrosis, which is different to the coagulative necrosis seen with conventional embolization. As a result of the different pathophysiology of cell death, the post-treatment appearances on contrast-enhanced CT can be varied, and challenging to interpret.

CONCLUSION: Patients who receive Y90 treatment often undergo cross sectional imaging for indications other than routine follow up, and may be imaged at centers remote from their administration. All radiologists therefore, should be familiar with the spectrum of Y90 treatment responses, and recognize imaging features of both post-procedural complications and viable tumor.

8

Imaging Spectrum of Hepatic Infections: Common, Rare and Exotic

Vijayanadh Ojili, UT Health San Antonio; Pankaj Nepal, St. Vincent's Medical Center; Neeraj Kaur, UT Health San Antonio; Arpit Nagar, Ohio State University Wexner Medical Center

LEARNING OBJECTIVES:

1. To describe the etiopathogenesis, clinical presentation and imaging manifestations of hepatobiliary infections.
2. To discuss the clinical implications of specific imaging findings.
3. To discuss the role of image-guided interventions and pertinent management issues.

BACKGROUND: Hepatobiliary infections range from more commonly encountered pyogenic and amoebic abscesses to relatively uncommon mycobacterial infections such as TB, fungal infections such as candidiasis, mucormycosis and parasitic infections such as schistosomiasis, hydatid cyst, oriental cholangiohepatitis, biliary ascariasis, etc. These infections may be suspected clinically or come as a surprise on imaging. Cross-sectional imaging techniques, particularly CT enables accurate detection of these infections.

CONCLUSION: A wide spectrum of hepatobiliary infections are encountered in the clinical practice of which some are relatively uncommon and may pose a challenge for the unwary radiologist. Knowledge of salient imaging features of these infections is of utmost importance because prompt recognition enables appropriate management.

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Imaging in Anterior Knee Pain

Mitch Wilson, Department of Medical Imaging, The Ottawa Hospital; Kawan Rakhra, The Ottawa Hospital; Ryan Foster, Department of Medical Imaging, The Ottawa Hospital; Abdulrahman Khawaji, Department of Medical Imaging, The Ottawa Hospital; Zaid Jibri, Department of Medical Imaging, The Ottawa Hospital

LEARNING OBJECTIVES:

1. Review the anatomy of the anterior knee
2. Discuss the pathology and pathophysiology of several conditions affecting the anterior knee
3. Describe the characteristic imaging manifestations for the common sources of anterior knee pain with emphasis on MRI Review the guidelines for ordering imaging investigations in anterior knee pain.

BACKGROUND: Anterior knee pain frequently presents to primary care and orthopedic clinics. Medical imaging plays a vital role in the diagnosis of many conditions presenting with anterior knee pain. A few of these conditions may constitute a clinical diagnostic challenge as they often share a somewhat similar clinical picture. Anterior knee pain can be secondary to abnormalities related to the osseous structures such as the patella, patellofemoral joint disorders such as chondral damage and patellar maltracking, and conditions affecting the ligaments, plicae, fat pads and bursea. Knowing the appropriate imaging tests to perform and being able to distinguish the common pathologic entities affecting the anterior knee is crucial to make the accurate diagnosis.

CONCLUSION: Patients with anterior knee pain often require imaging to elucidate the cause of their symptoms. It is paramount for the radiologists to be familiar with the various pathologic entities that affect the anterior knee in order to make the accurate diagnosis and assist the clinician in formulating the appropriate management strategies.

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Pathologies of the Iliopsoas

Mitch Wilson, Department of Medical Imaging, The Ottawa Hospital; Kawan Rakhra, The Ottawa Hospital; Adnan Sheikh, Department of Medical Imaging, The Ottawa Hospital, University of Ottawa

LEARNING OBJECTIVES:

1. Review the anatomy of the iliopsoas tendon
2. Discuss the most commonly encountered iliopsoas pathologies
3. Describe the imaging features of iliopsoas pathologies using representative imaging from ultrasound, CT and MRI.

BACKGROUND: The iliopsoas muscle is a powerful hip flexor that provides strength and stability at the hip joint. Although relatively uncommon, the incidence of iliopsoas tendon pathologies is increasing. These pathologies may be traumatic, infectious, hemorrhagic or neoplastic in nature. Detailed knowledge of the anatomy of the iliopsoas and familiarity with the imaging features of various iliopsoas pathologies are essential for making an accurate diagnosis and producing concise and comprehensive reports.

CONCLUSION: The iliopsoas muscle can be affected by a broad range of pathologies. An understanding of normal iliopsoas anatomy and recognition of the characteristic imaging manifestations of iliopsoas pathologies are essential for radiologists to make accurate diagnoses and assist clinicians in their management of patients with known or suspected pathology of the iliopsoas tendon.

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Competency Based Medical Education in Diagnostic Radiology: Leadership in Education

Benjamin Kwan, Queen's University; Omar Islam, Queen's University; Ben Mussari, Queen's University; Christina Rogoza, Queen's University; Xi Wang, Queen's University

OBJECTIVE: To present an overview of the newly instituted competency based medical education (CBME) experience in Diagnostic Radiology residency at Queen's University.

METHODS: The CBME curriculum for Diagnostic Radiology Residency has been developed and implemented at Queen's University utilizing guidelines from the Royal College of Physicians and Surgeons of Canada's Competency by Design (CBD). Training is broken down into four stages: 1. Transition to Discipline, 2. Foundation of Discipline, 3. Core of Discipline, and 4. Transition to Practice.

The program CBME Lead developed the entrustable professional activities (EPAs) and the milestones for each stage. Assessment strategies for each EPA were designed to ensure frequent low-stakes observations with appropriate sampling criteria. The curriculum was uploaded into the Queen's electronic delivery system for reporting and tracking competencies. Two cohorts have now engaged in the CBME framework with decision for promotion based on the data provided.

RESULTS / DISCUSSION: (the discussion is expected to be expanded in the final oral presentation) This presentation discusses the experience of key considerations in development and implementation of the CBME framework for Diagnostic Radiology Residency at Queen's University. The design and implementation of CBME curriculum involves multiple stakeholders including the program director, CBME Lead, faculty, residents, academic advisors, and a newly created Competence Committee. This has involved an expansion of roles and expectations for engagement in this new context for assessment. Strategies and tools for stakeholder support are in development.

CONCLUSION: This presentation describes the experience of creating a CBME curriculum in Diagnostic Radiology Residency.

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Globe Imaging: A Global Overview of Globe Pathologies

Joseph Yang, Queen's University; Benjamin Kwan, Queen's University; Omar Islam, Queen's University; Donatella Tampieri, Queen's University; Ian Silver, Queen's University; Jonathan Butler, Queen's University; Martin ten Hove, Queen's University; Nancy Yufeng Chen, University of Ottawa

OBJECTIVES: Correlate clinical findings with radiological manifestations to establish diagnosis of globe pathologies Illustrate characteristic imaging findings of commonly encountered globe abnormalities on CT and MRI Learn to create a differential diagnosis of globe abnormalities based on anatomic location

BACKGROUND: Globe abnormalities can present as a conundrum on CT and MRI images and often are under recognized. Abnormalities can be divided based on anatomical location and can involve neoplastic, infection, traumatic, iatrogenic and inflammatory locations. Common surgical hardware involving the globe will also be presented. Globe abnormalities can present on CT and MRI and may be incidental findings. Correlation of imaging findings with clinical eye exam helps guide diagnosis. Precise understanding of orbital anatomy and characteristic imaging features leads to timely diagnosis and appropriate management plan.

CONCLUSION: Understanding characteristic features of globe abnormalities and relation to corresponding ophthalmological clinical exam will aid radiologists in establishing diagnosis with improved accuracy and efficiency, while providing concise consultations to appropriate physicians.

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Keeping 'aBREAST' of Male Imaging

Daniel Shane, University of Guelph; Inga Isupov, Sunnybrook Health Sciences Centre; Rashin Rastegar, Sunnybrook Health Sciences Centre; Mia Skarpathiotakis, Sunnybrook Health Sciences Centre, University of Toronto; Belinda Curpen, Sunnybrook Health Sciences Centre

LEARNING OBJECTIVES:

1. Review male breast imaging and familiarize radiologists with diverse imaging characteristics of many different male breast lesions.
2. Differentiate gynecomastia from invasive ductal carcinoma (IDC).
3. Emphasize the radiological features of male breast lesions which are important in making a differential diagnosis and guiding further management.

BACKGROUND: Male breast imaging is an under reported topic as the majority of papers and case studies concentrate on the female breast. It is essential that radiologists are able to differentiate benign versus malignant lesions in the male breast. What may appear malignant in a female breast might be benign in a male breast, and vice versa. Using mammography and ultrasound, as well as pathologic correlation when pertinent, we will present 10 cases of benign and malignant findings within the male breast. This will include gynecomastia, carcinomas, metastatic cancers, cysts, abscesses, and other benign tumors.

CONCLUSION: Understanding the characteristics of radiological presentations of male breast lesions is essential for an accurate diagnosis. Further tests as well as clinical management recommendations are dependent on the interpretation of the image findings.

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Rare liver lesions that every radiologist should know about

Frederieke Elsinger, Vancouver General Hospital; Laura Cormack, Vancouver General Hospital; Ewan Simpson, Vancouver General Hospital; Alison Harris, University of British Columbia; Silvia Chang, University of British Columbia; Emily Pang, Vancouver General Hospital; Christopher Lunt, University of British Columbia

LEARNING OBJECTIVES:

1. Educate radiologists about the existence of several rare liver lesions
2. Describe imaging characteristics on different imaging modalities
3. Discuss the diagnostic work up and how to differentiate these lesions from the more commonly seen ones.

BACKGROUND: Focal liver lesions are frequently encountered in radiology practise and may show characteristics that are specific for a certain diagnosis, such as hemangiomas, FNH, HCC or adenomas. However, when imaging features do not conform to one or more common conditions, they present a diagnostic challenge which could require multi-modality characterization or ultimately pathological assessment.

CONCLUSION: Gaining familiarity with unusual cases may aid in earlier recognition, helping to guide further investigations, imaging and treatment.

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Beyond the Node: Atypical Presentations of Non-Hodgkin's Lymphoma

Jessica Dobson, Memorial University of Newfoundland, Faculty of Medicine; Lisa Smyth, Faculty of Medicine, Memorial University of Newfoundland

LEARNING OBJECTIVES:

1. Review typical presentations of lymphoma
2. Review imaging features of lymphoma
3. Review four atypical presentations of lymphoma: Primary Bone Lymphoma, Primary Breast Lymphoma, Primary Pulmonary Lymphoma, Primary CNS Lymphoma

BACKGROUND: Lymphoma is typically identified by lymphadenopathy, constitutional symptoms, and, in a minority of cases, associated extranodal manifestations. Diagnosis is based on morphology, immunological markers, and cytogenetics from tissue biopsy, while staging relies mainly on PET/CT. It is not often that lymphoma is identified first by diagnostic imaging, without clinical suspicion. Moreover, primary lymphoma of the bone, breast, lung, and CNS are rare entities themselves. In this poster, we review each of these extranodal lymphomas through cases detected by imaging.

CONCLUSION: When the typical clinical picture of lymphoma is not black and white, it is important to be aware of how one may present in the shades of grey of diagnostic imaging. In an atypical presentation marked by an isolated symptom or screening abnormality, radiologists may be the first to suggest a pathology like lymphoma. It becomes important, then, to have a raised index of suspicion for indolent or aggressive forms of lymphoma when interpreting images without a clinical history of constitutional symptoms.

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Pancreatitis Caused by Biliary Ascariasis in a 29-Year Old Female

Nicole Lorraine Co, Chong Hua Hospital

OBJECTIVE: This case is presented to have better understanding of the epidemiology, clinical presentation, diagnosis, treatment and prognosis of pancreatitis caused by biliary ascariasis.

BACKGROUND: Biliary ascariasis results from the entry of the nematode, *Ascaris lumbricoides* (*A. lumbricoides*), from the duodenum into the biliary ductal lumen. A wide spectrum of symptoms of biliary and pancreatic disease is seen in these patients. This is a case of a 29 years old female who came in for epigastric pain. Patient was initially managed as a case of gastritis. She was managed as case of pancreatitis after laboratory results of high serum lipase and amylase levels. The cause of pancreatitis was then known after having CT scan, as well as MRCP. ERCP was then done, with removal of three ascaris worms from the patient. Patient was then discharged improved on the fifth hospital day.

CONCLUSION: This paper presented female, who was diagnosed with pancreatitis secondary to biliary ascariasis. The condition could present with a myriad of hepatic and pancreatic symptoms. When the final diagnosis was made, the patient was then managed accordingly through ERCP which alleviated her symptoms and led to her gradual recovery. This case clearly highlighted the importance of radiographic imaging in recognition and management of the case, which one might encounter in the future.

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The Use of Student Radiology Interest Groups to Promote Ultrasound Education – a Single Center Experience

Victoria Linehan, Memorial University of Newfoundland; Ravindra Gullipalli, Memorial University of Newfoundland; Angus Hartery, Memorial University of Newfoundland

LEARNING OBJECTIVES:

1. To review the increasing need of ultrasound education in Canadian medical schools.
2. To discuss how student-led Radiology Interest Groups (RIG) can support ultrasound training as an adjunct to the medical curriculum.
3. To describe the running of a student RIG ultrasound workshop, including challenges faced, lessons learned, and successes achieved.

BACKGROUND: Ultrasound is a rapidly evolving technology with growing applications across many specialties. Despite this, many Canadian medical schools have limited hours allotted for ultrasound in their curriculum. Faculties have recognized the need to teach ultrasound early in pre-clerkship with a focus on Point of Care Ultrasound (POCUS); however, limited teaching time can impede this. A potential way to overcome this limitation and increase ultrasound competency-based learning among medical students is to offer ultrasound workshops through student RIGs.

CONCLUSION: Ultrasound training workshops through student RIGs can be a useful adjunct to medical school curricula. Such workshops can support the emerging learning needs of students while the curriculum adapts to address those needs. Additionally, student feedback from ultrasound workshops can guide administrators on how best to integrate these competencies into medical education.

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Common and Uncommon Complications of Gastrointestinal Diverticular Disease

Paul Sathiadoss, The Ottawa Hospital, University of Ottawa; MOHAMMAD HAROON, The Ottawa Hospital, University of Ottawa; Mitch Wilson, Department of Medical Imaging, The Ottawa Hospital; Satheesh Krishna, The Ottawa Hospital; Adnan Sheikh, Department of Medical Imaging, The Ottawa Hospital, University of Ottawa

LEARNING OBJECTIVES:

1. Understand commonly encountered diverticular conditions of the GI tract
2. Review key imaging findings in uncomplicated and complicated diverticular disease throughout the GI tract
3. Highlight the uncommon presentations of diverticulosis and diverticulitis, so as to sensitize the radiologist to the 'unexpected'

BACKGROUND: Diverticular disease of the GI tract is one of the most commonly encountered radiological entities. Imaging findings and diagnosis are usually straightforward. However, diverticular disease may present at unusual locations or with unexpected complications which may render the diagnosis difficult. Familiarity with these complications will help the radiologist to make a rapid and accurate diagnosis. This exhibit aims to review some of these conditions in a brief format.

CONCLUSION: Diagnosing uncommon complications of diverticular disease may be challenging, especially when the clinical presentation is unusual. As these may warrant drastic treatment measures, the radiologist needs to be aware of these conditions to guide appropriate clinical management.

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Large Epiphrenic Esophageal Diverticulum with Achalasia

Karl John A. Koa, Chong Hua Hospital Department of Radiology

OBJECTIVES: to present a case of a patient with a large epiphrenic esophageal diverticulum (EED) presenting with dysphagia to review esophageal diverticula in general to discuss the clinical presentation, complications, diagnostic exams, radiographic findings and management of EED

ABSTRACT AND BACKGROUND: This case report describes a 57-year old male, with a 4-year history of progressive dysphagia to both solid and liquid food. Progression of symptom with associated regurgitation prompted consult with his physician. CT scan of the chest with contrast confirmed a dilated esophagus with a large diverticulum in its distal third. Barium swallow revealed a giant diverticulum approximately 8 cm from the gastroesophageal junction with a tapered beak deformity at the lower esophageal sphincter. All diagnostic exams pointed to the diagnosis of a Large EED with achalasia. Patient was then managed surgically. The large diverticulum was resected employing a Laparoscopic Transhiatal approach. A Heller's esophagocardiomyotomy with Partial (Dor) Fundoplication was also performed to treat the achalasia and decrease the incidence of postoperative acid reflux. Patient had resolution of symptoms post-operatively.

CONCLUSION: EED is a rare entity, the most uncommon of all the esophageal diverticula, with an estimated incidence of 1:500,000/year and prevalence of 0.06-4%. It affects mostly male adults and the elderly. Achalasia, an esophageal motility disorder, is thought to be the major reason for the formation of EED. Dysphagia is the main accompanying symptom. Longstanding and untreated conditions may predispose the diverticulum to enlarge causing compression of the neighboring structures.

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Chest Radiographs- Lines, Tubes, and Non- Cardiac Medical Devices & Materials

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LEARNING OBJECTIVES:

1. To identify the various lines, tubes, and non-cardiac medical devices and materials on chest radiographs (CXRs).
2. To evaluate these iatrogenic objects on CXRs for their accurate placement and to look for any complications.

BACKGROUND: Among the various imaging modalities available for assessing the cardiothoracic system, the chest radiograph (CXR) is the most commonly utilized investigation. In addition, the CXR is very useful in evaluating the numerous tubes, lines and medical devices and materials, and for identifying any equipment related complications. A CXR is recommended immediately following placement of a medical tube/catheter/device by the American College of Radiology (ACR), in order to check for malposition or for intra/post-procedural related complications. As any line/ tube/ device has the potential for coiling, malpositioning, kinking/fracturing, and malfunctioning, the complications that may ensue are often not immediately apparent clinically. Hence, it is of utmost importance to identify these on the immediate post procedural CXR or follow-up CXRs in order for the physician/surgeon to replace or reposition these iatrogenic objects.

CONCLUSION: It is not uncommon for the radiologist to encounter CXRs with a conundrum of lines, tubes and medical devices. The role of the radiologist does not end by just identifying and reporting these objects. A thorough assessment for their accurate placement and evaluation for any complications are of utmost important.

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Endovascular Aneurysm Repair (EVAR) – A Multi-Modality Pictorial Review of Endoleaks

Heather Martin, Memorial University of Newfoundland - Faculty of Medicine; Angus Hartery, Memorial University of Newfoundland; Ravindra Gullipalli, Memorial University of Newfoundland

LEARNING OBJECTIVES:

- Review endoleak subtypes and current guidelines regarding post-EVAR screening with ultrasound and CT
- Recognize imaging presentation of each endoleak subtype (Type I-V) on ultrasound and CT
- Highlight the importance and effectiveness of ultrasound as a post-EVAR screening tool

BACKGROUND: Individuals who undergo endovascular aneurysm repair (EVAR) require lifelong surveillance to discover potential endoleaks and receive timely corrective treatment. Endoleaks are classified into five categories based on the direction of blood flow in the aneurysmal sac outside the graft and this classification determines clinical consequence and treatment. CT scanning is currently viewed as the gold standard for endoleak monitoring. However, this practice exposes patients to nephrotoxic IV contrast as well as high and cumulative doses of radiation. Ultrasonography offers a non-invasive and cost-effective alternative to CT monitoring of endoleaks.

CONCLUSION: This pictorial review provides ultrasound and corresponding CT images of each of the five subtypes of endoleak, thereby illustrating the effectiveness of duplex ultrasound in screening for potential endoleaks post-EVAR. In an effort to reduce risk of nephrotoxicity and radiation exposure, the use of duplex ultrasound as a long term screening modality for post-EVAR surveillance can become the new standard of care.

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Spectrum of Non Contrast Computed Tomography Head Findings in a Trauma Centre in Cases of Acute Head Injuries

Abhishek Dwivedi, Army College of Medical Sciences – Delhi Cantt

BACKGROUND: Noncontrast computed tomography (NCCT) head provides clinically and surgically important information in brain trauma. It can depict the severity, level, and prognosis of head injuries.

AIM: To depict the spectrum of NCCT brain in cases of head injuries.

Standard – all the fresh cases of head injuries in the trauma centre in the last two years

Audit target – to cover more all patients seen in this period for the head injuries in this duration .

MATERIAL AND METHODS: NCCT head examination with Somatom Emotion 16 CT of 518 patients were retrospectively included in the study for the duration of the year 2015 to 2016 and 2016 to 2017 by retro- spective screening of the electronic report's data of last two years of about 7000 patients, who had history of head injury.

RESULT: A total of 518 patients were covered with age varies from 1 month to 92 years with a total number of deaths noticed in the study were 13. The road traffic accident was the commonest mode of injury. The radiological findings most common findings are contusion followed by Diffuse axonal injury, Sub- arachnoid haemorrhage, extradural haemorrhage, sub-dural haemorrhage, skull fractures, midline shift and scalp hematoma were seen.

Interventions – as per standard protocols of neurosurgical of hospital

CONCLUSION: The NCCT head is very useful in decreasing the mortality. The more radiological findings showed a significant relation with mortality in the study.

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The Chest Wall: Thinking Outside the Parenchyma

Rhiannon Tracey, Faculty of Medicine, Memorial University of Newfoundland; Lisa Smyth, Faculty of Medicine, Memorial University of Newfoundland

The Chest Wall: Thinking Outside the Parenchyma Faculty of Medicine, Memorial University of Newfoundland, Department of Diagnostic Imaging at St. Clare's Mercy Hospital Learning Objectives: Review signs and symptoms of chest wall masses Review the imaging modalities used to assess chest wall masses Review 5 clinical cases of chest wall masses unrelated to lung cancer Breast sarcoma Aneurysmal bone cyst Nerve sheath tumour Chondrosarcoma Lymphoma Background The causes of chest wall masses are wide and varied, but as physicians and learners, it is not uncommon to place lung cancer at the top of our differential. Imaging modalities used to assess chest wall masses should be chosen based on the patient's specific presentation and aid in guiding treatment decisions. This poster will review signs and symptoms of chest wall masses, the imaging modalities used to study these masses and 5 clinical cases of chest wall tumours unrelated to cancer of the lung.

CONCLUSION: When patients present with history and physical exam findings of the thorax, it is essential that the radiologist assessing the images related to the case analyse image findings with a broad differential diagnosis in order to avoid diagnostic oversights. Radiological findings are fundamental to guiding treatment and the radiologist studying these findings will be able to assess whether further imaging is required and what radiological studies should be performed next. The five clinical cases reviewed in this poster illustrate the varied radiological studies that may be required to appropriately diagnose and treat patients.

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IgG4-Related Disease: Current Status and Future Directions

Darya Kurowecki, McMaster University; Michael Patlas, McMaster University; Ehsan Haider, St. Joseph's Healthcare Hamilton, McMaster University; Abdullah Alabousi, McMaster University

LEARNING OBJECTIVES:

1. To discuss the common and uncommon multi-organ manifestations of immunoglobulin G4-related disease (IgG4-RD).
2. To understand the indications, challenges, and pitfalls of various cross-sectional imaging modalities, including MDCT, MRI, and US, in the diagnosis and evaluation of IgG4-RD.
3. To review the spectrum of imaging findings, mimics, and differential diagnosis of IgG4-RD from head-to-toe.

BACKGROUND: IgG4-RD is an autoimmune disorder characterized by infiltration of organs with IgG4-positive plasma cells resulting in fibro-inflammatory lesions in one or more organ systems. Although the pancreas is the most commonly affected organ, involvement of extra-pancreatic organs is increasingly recognized as a key manifestation of the disease. Patients are often asymptomatic and serum IgG4 concentrations may be normal. Treatment consists of the utilization of corticosteroids. Although a definitive diagnosis requires histopathology, imaging plays an essential role in guiding appropriate management.

CONCLUSION: Knowledge of the varied imaging findings of this multi-system disease is essential for radiologists to avoid misdiagnosis and assist with timely and effective treatment.

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Imaging of Advanced Prostate Carcinoma; Common and Less Common Patterns of Disease Spread

Laura Mohammed, Port of Spain General Hospital; Adrian Chan, Port of Spain General Hospital; Alexander Sinanan, Port of Spain General Hospital/University of the West Indies; Dylan Narinesingh, St. James Medical Complex, North West Regional Health Authority; Maria Gosein, Port of Spain General Hospital

LEARNING OBJECTIVES:

1. To demonstrate the different nodal pathways of prostate carcinoma spread and discuss the cross-sectional imaging criteria for diagnosing pathological lymph nodes.
2. To review the common and uncommon pathways of distant metastatic spread of prostate carcinoma.
3. To discuss the radiological monitoring of response to treatment as well as highlight the emerging imaging modalities useful in the assessment of advanced prostate carcinoma.

BACKGROUND: Imaging evaluation of advanced prostate carcinoma has significant prognostic implications and, along with clinical parameters, is a key factor in directing appropriate management. Knowledge of the various appearances of disease spread will aid the radiologist in the detection of nodal and distant metastases. Assessment of disease response is also integral in the ongoing management of these patients. Functional techniques including whole-body diffusion-weighted MRI and PET-PSMA show significant promise in improving the accuracy of staging and surveillance of advanced prostate carcinoma.

CONCLUSION: Imaging plays a key role in the management of advanced prostate carcinoma. Radiologists must be familiar with the typical and atypical nodal and distant metastatic patterns of spread, in order to optimize imaging evaluation.

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Making Podcast Production Accessible: An Evidence-Based Step-By-Step Guide for the Radiologist

Duncan Ferguson, University of British Columbia; Bruce Forster, The University of British Columbia; Kathryn Darras, University of British Columbia; Zachary Rothman, University of British Columbia

LEARNING OBJECTIVES:

1. To compare the use of podcasting in radiology to other medical disciplines for patient education
2. To review the common practices in developing successful medical education podcasts
3. To document our experience and impact of a podcast episode on ultrasound-guided prostate biopsies with MRI image fusion for patients.
4. To present a step-by-step guide for podcasting to augment radiology-specific medical education.

BACKGROUND: With the increased role of technology in patient care and education, audio podcasts have become a frequently used resource. Advancements in audio recording and editing software have made podcast creation more accessible to practicing physicians; however, there are no evidence-based guidelines on podcast production for patient education. Learning how to create a podcast enables radiologists to inform patients about their imaging studies and consequently improve patient care.

CONCLUSION: Audio podcasts are underutilized in radiology in comparison to other disciplines and radiologists should consider creating podcasts to increase visibility of their specialty and add value to patient care. The recommendations found after reviewing similarities between successful medical education podcasts were: focus on one topic; centre learning around a patient; keep episodes at less than 20 minutes long. Our review of the literature provides radiologists with an evidence-based step-by-step guide to producing podcasts that can be easily incorporated into their practice. Finally, we show how to use this guide by creating a proof-of-concept podcast episode on ultrasound-guided prostate fusion biopsies with an iPhone and MacBook.

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Acute Cerebral Pyogenic Infection: A Case Series Review of Cerebritis, Abscess and Ventriculitis

Mallory Granholm, McMaster University; Milita Ramonas, Hamilton Health Sciences

OBJECTIVES:

1. Review presentation, etiology, and stages of pyogenic cerebral abscess.
2. Illustrate CT and MRI characteristics/common imaging manifestations.
3. Highlight pearls, pitfalls, complications and the classic differential.

BACKGROUND: Pyogenic cerebral abscess is an uncommon, potentially fatal, but treatable disease. Awareness of the imaging findings and complications are important for prompt diagnosis. This case series will share examples from hematogenous dissemination and direct extension, in varying stages of disease, in both expected and unexpected patient populations. Multi-modality cross sectional imaging will be shared, reinforcing the role of MRI susceptibility weighted imaging for timely diagnostic confirmation.

CONCLUSION: Pyogenic cerebral abscess is an uncommon disease that requires prompt diagnosis. An understanding of the spectrum and complications of acute pyogenic infection will aid the radiologist to make a timely diagnosis in this acute disease that carries high mortality.

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Diagnostic Performance and Efficiency of Magnetic Resonance Imaging (Mri) in Suspected Acute Appendicitis

David Jung, University of British Columbia; Nicolas Murray, Vancouver General Hospital, University of British Columbia; Savvas Nicolaou, Vancouver General Hospital

OBJECTIVE: Evaluate the diagnostic performance and efficiency of MRI in suspected acute appendicitis compared to ultrasound (US) and computed tomography (CT).

METHODS: Single institution, IRB-approved, retrospective study of adult patients presenting to emergency department with suspected acute appendicitis from May 2017 to May 2018. Diagnostic characteristics of US, MRI, and CT were analyzed using a contingency table. Diagnostic efficiency was examined by average patient wait time, defined between times of initial imaging and final management decision.

RESULTS: 599 patients met the eligibility criteria, with 445 US (54.7%), 137 MRI (16.9%), and 231 CT scans (28.4%) performed. Sensitivity, specificity and diagnostic yield of MRI were respectively 91.7% (95%CI, 73.0%-99.0%), 85.0% (95%CI, 77.0%-91.0%), and 88.3% (95%CI, 81.9%-92.7%), not significantly different than CT with respective values of 94.3% (95%CI, 84.3%-98.8%), 88.8% (95%CI, 83.2%-93.0%) and 93.1% (95%CI, 89.0%-95.7%). Using an intention-to-diagnose approach, diagnostic properties of US were significantly lower than both MRI and CT.

CONCLUSION: Diagnostic performance of MRI is comparable to CT and superior than US. With favourable patient wait times, MRI can be considered as initial investigation modality.

Practical Diagnostic Approach to Brachium Pontis Lesions

Arvin Haghghat, Queen's University - Department of Diagnostic Radiology; Donatella Tampieri, Queen's University; Omar Islam, Queen's University; Ian Silver, Queen's University; Benjamin Kwan, Queen's University

OBJECTIVES:

- To review the normal radiology anatomy of the middle cerebellar peduncles, also known as the brachium pontis.
- To illustrate the pathophysiology and imaging findings of lesions affecting the brachium pontis.
- To develop a list of pertinent differential diagnosis in the presence of a lesion of the brachium pontis, based on the patient's clinical presentation and on the imaging findings.

BACKGROUND: The differential diagnosis of lesions affecting the brachium pontis can be complex, and the role of the neuroradiologist is paramount to help the clinician in making the appropriate diagnosis as to provide therapy and, whenever possible, to avoid biopsy in this functionally delicate area.

MATERIALS AND METHODS: A series of patient cases – obtained from the database of our institution, Kingston Health Sciences Centre – with intra-axial posterior fossa lesions located in the brachium pontis were retrospectively reviewed and compiled to be presented as an educational exhibit. The MRI findings were analyzed: – for direct finding: based on the location, morphology and appearance of the lesion; – for associated or indirect finding of mass effect or atrophy in the areas adjacent or functionally connected to the primary pathology. The clinical information available on the radiology consult for MRI and/or previous CT were also reviewed.

RESULTS: The imaging characteristics of the lesions were correlated with the provided clinical information and multiple pathologies affecting the brachium pontis are described.

CONCLUSION: The knowledge of the radiological and functional anatomy, the pattern approach to the analysis of the lesion in conjunction with the clinical data provided enable the creation of a pertinent list of differential diagnosis that will aid the radiologist in further discussion with the referring physician for optimal patient care.

fMRI Safety and Performance Characteristics in Deep Brain Stimulation Patients

Alexandre Boutet, University of Toronto; Rashid Tanweer, Albany Medical College; Gavin Elias, University of Toronto; Robert Gramer, University of Toronto; Ileana Hancu, Albany Medical College; Bryan (Ying Yi) Li, University Health Network; Jurgen Germann, University of Toronto; Ailish Coblentz, University of Toronto; Alfonso Fasano, University of Toronto; Marisa DiMarzio, Albany Medical College; Julie Pilitsis, Albany Medical College; Andres Lozano, University of Toronto; Walter Kucharczyk, University of Toronto; Vijayashankar Paramanandam, University of Toronto; Sreeram Prasad, University of Toronto; Manish Ranjan, University of Toronto; Suneil Kalra, University of Toronto; Mojgan Hodaie, University of Toronto; Eric Fiveland, University of Toronto; Derrick Soh, University of Toronto; Ricardo Maciel, University of Toronto; Clement Chow, University of Toronto; Dave Gwun, University of Toronto

OBJECTIVE: Magnetic resonance imaging (MRI) is largely prohibited in patients with deep brain stimulation (DBS). Based on our phantom safety data, this study assessed (1) the safety of performing MRI outside the vendor guidelines in patients with DBS and (2) the neurostimulator artefact-related loss of signal on functional MRI (fMRI).

METHODS: From September 2016 to November 2018, we performed 1.5T and 3T MRIs (3D SPGR and GRE-EPI) in 102 patients with fully internalized, active DBS hardware. Safety was assessed with stability of the (1) clinical exam, (2) hardware impedances, and (3) peri-electrode MRI signal (e.g. edema/hemorrhage).

A semi-automated segmentation was used to quantify the artifactual loss of fMRI (GRE-EPI) signal at the electrode contacts and wire coils. Segmented artefacts were then transformed into common space to define the shadowed brain area.

RESULTS/DISCUSSION: We performed 3T MRI in 79 patients and 1.5T MRI in 29 patients without MRI-related adverse events. This is the largest cohort reported. Although the artifact is significantly larger with 3T than with 1.5T (31 443 mm³ vs 20 891 mm³, $p < 0.001$), it remained largely limited to the parietal lobe under both fields. The mean electrode contact artefact diameter was smaller with 1.5T (8.9 mm) than with 3T (9.5 mm), however, not significantly ($p=0.12$).

CONCLUSION: Under specific conditions, MRI can be acquired safely in DBS patients. While artifact magnitude scales significantly with magnetic field strength, the location of this artefact is limited to the parietal lobe, rendering the majority of a DBS patient's brain visible with even with 3T MRI.

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Acquired and Congenital Pulmonary Artery Pathologies: Thinking Beyond the Embolism

Maryann Bushara, McMaster University ; Mallory Granholm, McMaster University; Abdullah Alabousi, McMaster University; Ehsan Haider, St. Joseph's Healthcare Hamilton, McMaster University

LEARNING OBJECTIVES:

1. To discuss the appropriateness criteria (modality selection) for imaging patients with suspected pulmonary artery pathologies (PAP).
2. To illustrate common and uncommon imaging manifestations of PAP.
3. To highlight potential pitfalls and mimics in diagnosing PAP.

BACKGROUND: While chest radiography is the initial imaging investigation for patients with suspected PAP, computed tomography (CT) has become the gold standard for making a definitive diagnosis. There are numerous congenital and acquired abnormalities that can affect the pulmonary arteries. This exhibit will explore a variety of such common and uncommon conditions, including pulmonary artery hypoplasia, hereditary hemorrhagic telangiectasia, hepatopulmonary syndrome, pulmonary arterial dissection and pulmonary artery sarcoma. Relevant imaging findings, differential diagnoses, mimics, and potential pitfalls will be reviewed.

CONCLUSION: The awareness of the radiologic manifestations of these different disease entities and their potential complications is key in ensuring a timely diagnosis. The discussed potential pitfalls and mimics will help to ensure a more accurate diagnosis.

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Ultrasound-Guided Percutaneous Liver Biopsies: Tips for Enhancing Success

Stefanie Lee, McMaster University; Devang Odedra, McMaster University

LEARNING OBJECTIVES:

1. Describe the steps of an ultrasound-guided liver biopsy, beginning with reviewing the appropriateness of the indication, and closing the loop by following up for postprocedural complications and ensuring concordance with pathology results.
2. For each step, discuss the different approaches that may be taken, the rationales for each, and what circumstances and factors may favor one approach over another.
3. Anticipate potential challenges at each stage of the procedure and take appropriate steps to enhance technical success and patient safety/experience.

BACKGROUND: Performing a successful ultrasound-guided liver biopsy requires a solid understanding of the following: appropriate indications for the procedure, special considerations for informed consent, common approaches for performing liver biopsies and pros and cons of each, biopsy devices and their strengths and weaknesses, optimal techniques for visualization of the needle track and confirmation of the needle placement, and recognition and management of post-procedural complications.

CONCLUSION: Ultrasound-guided liver biopsy is a core part of the clinical practice of both diagnostic and interventional radiologists for diagnosis of liver pathologies. Proper understanding of the factors involved in optimizing one's approach at each step is a key to ensuring technical success and patient comfort/safety.

A Case-Based Approach to the Imaging of Coronary Artery Anomalies

Anuj Dixit, Mayo Clinic; Eric Williamson, Mayo Clinic

LEARNING OBJECTIVES:

1. To review normal coronary artery anatomy and the imaging modalities that can be used to evaluate them with an emphasis on computed tomography (CT).
2. To discuss the classification scheme of anomalous coronary arteries and use a case-based approach to understand the imaging and clinical features.
3. To underscore the importance of the coronary artery anomalies that can lead to sudden death.

BACKGROUND: Anomalies of the coronary arteries occur in 1–5% of the population and comprise a broad spectrum of malformations. Some anomalies can be of little clinical significance while others are associated with significant cardiac morbidity and increased risk of cardiac sudden death. Multidetector CT (MDCT) has evolved as the diagnostic modality of choice for coronary artery assessment owing to rapid volumetric acquisition with excellent spatial and temporal resolution. High spatial and temporal resolution is critical in coronary CT due to the relatively small caliber of these vessels the fact that the heart may beat between 50 and more than 100 beats per minute. Many classification schemes of coronary artery anomalies exist. One of the more commonly used schemes is comprised of four major categories; 1. Anomalies of origin and course, 2. Anomalies of intrinsic coronary arterial anatomy, 3. Anomalies of coronary termination and 4. Anomalous collateral vessels. Alternatively, coronary artery anomalies can be classified on whether they are hemodynamically significant or insignificant. Hemodynamically significant anomalies can include atresia, origin from the pulmonary artery, interarterial course, myocardial bridging and congenital fistulae.

CONCLUSION: Most general radiologists will encounter EKG-gated cardiac CT, as it is becoming an increasingly important part of the work-up of cardiac patients. Therefore, it is important to recognize anomalies in coronary artery anatomy. In this exhibit, we have illustrated the spectrum of coronary artery anomalies using cases from our institution with traditional catheter coronary angiogram correlation when possible. Additionally, we have placed a special emphasis on the anomalies that require definitive surgical intervention and the imaging appearances following treatment.

Top-10 Applications of Dual-Energy CT

Nicolas Murray, Vancouver General Hospital, University of British Columbia

LEARNING OBJECTIVES:

1. Review the basic principles of CT and DECT imaging.
2. Review the TOP-10 most commonly used DECT post-processing applications. Demonstrate clinically added value of DECT by presenting relevant interesting cases.

BACKGROUND: CT is the cornerstone investigation for many acute and non-acute pathologies considering its availability and rapidity of acquisition. Dual-energy CT (DECT) has been clinically introduced in the last decade and has been shown to have many advantages over single energy CT imaging by allowing identification of abnormality not depicted on conventional CT and by being able to characterize the composition of body constituents. In this educational exhibit, the top 10 applications of DECT will be presented. Specifically, the participant will review the iodine specific applications, useful to assess for enhancement in case of solid organ lesions, assess ischemic changes in bowel or organ ischemia, and depict subtle areas of contrast extravasation or endoleak. The utilization of virtual non-contrast images will be discussed, specifically for lesion characterization and as way to decrease the radiation dose delivered to the patient by avoiding the acquisition of a true unenhanced acquisition during multiphasic imaging. Moreover, material specific applications in diagnosis of gout and determination or urolithiasis composition will be presented, especially important in depicting the medically treatable uric acid urolithiasis. Utilization of post-processing virtual monoenergetic imaging (VMI) application to reduce metal artifacts at high-keV level, and to optimize contrast opacification of vascular studies and increase conspicuity of solid organ injuries or lesions at low-keV level will be shown. Similarly, the use of VMI images at high and low energy level to depict gallstones isoattenuating to bile will be demonstrated. Finally, the use of virtual non-calcium images to assess for bone marrow edema in musculoskeletal trauma and depict subtle subdural hematoma on non-contrast CT of the head will be presented.

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The Right to Remain Silent: Imaging of Body Packing

Christopher Lui, Newark Beth Israel Medical Center; S M Nazmus Sakib, Newark Beth Israel Medical Center; Gagandeep Singh, Newark Beth Israel Medical Center; Michael Sadler, Newark Beth Israel Medical Center

LEARNING OBJECTIVES:

1. Understand the background of body packing and substances that are transported.
2. Review the imaging appearance of various body packings using a multimodality approach.
3. Analyze the pearls and pitfalls with accurately identifying body packings.
4. Recognize the potential adverse events associated with body packing.

BACKGROUND: In the era of high regulation of illicit substances and the ease of international travel, body packing has been a method in which these substances cross international borders. Apart from the risks these drugs pose to the public, they also carry immediate risk to the transporting individual. Radiographs are often the first line in detection of these foreign bodies, but are not sensitive in most cases, as the drug trafficking industry evolves to counter its detection. Computed tomography is typically utilized next, and it is imperative that oral contrast not be given as they can obscure findings. Body packings have variety of shapes and attenuation, ranging from oddly shaped spheres mimicking stool, to high density rods or sacks.

CONCLUSION: Technology evolves in detecting body packing, as do the efforts by drug traffickers to conceal the body packings. Radiologists must have a high index of suspicion in the right clinical context to accurately and safely identify body packing.

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Interactive Radiologic Review of State-Of-The-Art Cardiac Devices

Christopher Lui, Newark Beth Israel Medical Center; Alan True, Newark Beth Israel Medical Center; S M Nazmus Sakib, Newark Beth Israel Medical Center; Michael Sadler, Newark Beth Israel Medical Center

LEARNING OBJECTIVES:

1. Review the indication and function of the most current cardiac devices
2. Distinguish these devices based on their radiologic appearance
3. Recognize appropriate positioning as seen on radiography
4. Identify potential complications that may impact patient care or outcome

BACKGROUND: Cardiac devices have been established to improve patient outcomes for decades, and are increasingly employed in an aging and expanding population. With the rapid progression of medical technology, cardiac devices are frequently updated, as novel devices are released. Radiology has a fundamental role in device pre-procedural evaluation, placement, and subsequent follow up. The most basic method of assessing these devices are chest radiographs, which are encountered on a nearly daily basis by radiologists, especially in a facility with active cardiothoracic surgery and heart transplant services. Although each device has its distinctive characteristics, identifying the newest or recently updated devices and recognizing the appropriate positioning can be challenging. In addition, there may be more than one device which serve the same purpose, however with a different morphology.

CONCLUSION: The rapid advancement of technology in medicine has resulted in frequent updating and release of new cardiac devices. Remaining informed with the imaging appearance of the most state-of-the-art cardiac devices is crucial in order to minimize delay to treatment and thereby reduce potential complications.

Gastric Sleeve Migration: What Radiologists Should Know

Christopher Lui, Newark Beth Israel Medical Center; S M Nazmus Sakib, Newark Beth Israel Medical Center; Nicholas Lariccia, Newark Beth Israel Medical Center; Jeremy Green, Newark Beth Israel Medical Center; Alan True, Newark Beth Israel Medical Center

LEARNING OBJECTIVES:

1. Compare the conventional types bariatric surgery and their risks
2. Review the anatomy and imaging characteristics of gastric sleeve surgery
3. Describe the mechanism of gastric sleeve migration and its clinical/surgical significance.

BACKGROUND: Obesity and obesity related co-morbidities have been rapidly increasing in the past 50 years. There are multiple bariatric surgeries available to reduce weight. Sleeve gastrectomy is one of the most popular bariatric surgeries. Despite its technical ease, sleeve gastrectomy complications are increasingly reported. Intra-thoracic gastric sleeve migration is a rare complication, however with an important surgical consequence. Recent computed tomography (CT) studies have demonstrated that intra-thoracic migration could be detected, between 1 and 10 months postoperatively, in patients complaining of persistent regurgitation. The presence of staple line above the diaphragmatic crus is diagnostic. CT also allows for volumetric assessment of the herniated gastric component. Additional radiographic or fluoroscopic may be used to evaluate the staple line.

CONCLUSION: Gastric sleeve migration is a rare complication with an imperative surgical consequence. CT is the modality of choice for evaluation and provides additional information including the ability to do volumetric assessment. Radiologists should be aware this entity and know the pertinent findings to accurately diagnose migration.

Probing into the Fontanelle – Uncommon Neonatal Neurosonography Diagnoses with CT or MRI Correlation

Christopher Lui, Newark Beth Israel Medical Center; Jackie Lui, Newark Beth Israel Medical Center; Waqas Bari, Newark Beth Israel Medical Center; Tej Phatak, Newark Beth Israel Medical Center

LEARNING OBJECTIVES:

1. Identify the indications for sonography of the head in the neonate
2. Review relevant brain anatomy using an established scanning protocol
3. Recognize the sonographic appearance of various uncommon diagnoses
4. Understand the implications of the findings and recommendations for further workup

BACKGROUND: Sonography is often the initial neuroimaging modality of choice in neonates due to its accessibility, lack of need for sedation, and absence of ionizing radiation. It is proven to be reliable in the detection of germinal matrix hemorrhage and periventricular leukomalacia in the premature infant. However, there are a multitude of less common diagnoses that may not be as easily recognizable on sonography when compared to CT or MRI. These findings can have important clinical implications if not recognized early, thus rendering sonography as a valuable modality.

CONCLUSION: Head sonography is frequently employed and plays an important role in detection of germinal matrix hemorrhage and periventricular leukomalacia in premature infants. However, it is essential that radiologists recognize other uncommon entities that can be diagnosed through sonography. This in turn can provoke immediate further investigation and/or therapy which can reduce potential negative outcomes.

Blunt and Penetrating Cerebrovascular Injuries: Pearls and Pitfalls

Colbey Taylor, University of British Columbia ; Nicolas Murray, Vancouver General Hospital, University of British Columbia; Savvas Nicolaou, Vancouver General Hospital; Jacques van Heerden, University of British Columbia

LEARNING OBJECTIVES:

1. To review the classification of blunt cerebrovascular injuries
2. To discuss the appropriate use of CT angiogram (CTA) head and neck based on mechanism of injury
3. To recognize the radiological manifestations of cerebrovascular injuries and their outcomes
4. To describe normal variants that can mimic cerebrovascular injuries

BACKGROUND: Blunt and penetrating cerebrovascular injuries are rare, but potentially life threatening, with an incidence between 1-3% of trauma admission. Untreated, carotid and vertebral artery injuries have been associated with mortality rates up to 38% and 18% respectively. CTA is currently the “gold standard” for detection and classification of cerebrovascular injuries considering its availability and rapidity of acquisition. It is essential for radiologists to understand the indications for vascular imaging based on the mechanisms of injury, preliminary imaging findings and clinical features. Early and accurate injury identification, and classification, are essential for developing treatment plans aimed at reducing the incidence of post-injury ischemic stroke and mortality.

CONCLUSION: Identification and classification of blunt and penetrating cerebrovascular injuries is important for the practicing radiologist, as imaging findings often dictate the treatment plans and outcomes of the patients.

Cardiopulmonary-Liver Syndromes: Case-Based Review of the Differential Diagnosis

Kumaresh Athiyappan, The Ottawa Hospital; Joao Inacio, The Ottawa Hospital

LEARNING OBJECTIVES:

1. Identify a diverse group of conditions that characteristically affect simultaneously the lung, the heart and the liver and review their underlying pathophysiology mechanisms.
2. Describe imaging features of diseases that manifest with cardiopulmonary and liver abnormalities on imaging studies.
3. Apply the knowledge in patients with liver diseases to promptly recognise the different conditions.

BACKGROUND: There are certain diseases that characteristically affect the lung, heart and the liver. These diseases tend to manifest clinically and on imaging studies as disorders affecting both these organ systems and thus be considered part of cardiopulmonary-liver syndromes. Examples of diseases that affect the lungs, heart and the liver include hepatopulmonary syndrome, portopulmonary hypertension, hepatic hydrothorax, cardiac hepatopathy, drug induced injury, Storage disorders, auto-immune diseases, and genetic diseases such as alpha1-antitrypsin deficiency, hereditary-haemorrhagic-telangiectasia and short telomere syndrome. In hepatopulmonary syndrome vasodilatation with arteriovenous shunting occurs in lung bases causing hypoxia. Portopulmonary hypertension consists of pulmonary hypertension in patients with portal hypertension due to vasoactive mediators or also due to thromboembolic phenomenon through shunts. In hepatic hydrothorax, transudative pleural effusion occurs commonly on right side due to passage of fluid from peritoneal space through the diaphragm. Due to altered cellular immunity cirrhotic patients are prone for infections. Cardiac hepatopathy occurs secondary to increased right heart filling pressures that lead to chronic liver disease. Amiodarone toxicity can present as interstitial lung disease, organizing pneumonia, with characteristic liver iodine deposition. Storage disorders like haemochromatosis and Niemann-pick disease affect liver and heart. Auto-immune diseases can manifest as auto-immune hepatitis and interstitial lung disease. Genetic conditions like hereditary-haemorrhagic-telangiectasia can present with multiple pulmonary and liver arteriovenous malformations. Alpha1-antitrypsin deficiency can present with pan lobular emphysema in lower lobes and cirrhosis. Short telomere syndrome is a rare cause of familial idiopathic pulmonary fibrosis and cirrhosis.

CONCLUSION: Recognition of abnormal association between conditions affecting predominantly the cardiopulmonary and liver systems is important and requires multidisciplinary expertise. The differential diagnosis of these disorders are limited and the imaging characteristics may suggest specific diagnosis in the appropriate clinical setting.

Cystic Fibrosis in the 21st Century: What Every Radiologist Should Know

Florence Thibault, CHUM; Carl Chartrand-Lefebvre, CHUM; Kim-Nhien Vu, CHUM; Jean Chalaoui, CHUM; François Tremblay, CHUM

LEARNING OBJECTIVES:

1. To review the pathophysiology, genetics, demographics, diagnosis, and treatment of cystic fibrosis (CF).
2. To demonstrate the role of imaging (radiograph, CT, MR, ultrasound) in the diagnosis and management of patients with CF.
3. To learn the appropriate radiological follow-up for these patients.
4. To help improve radiology reports for patients with CF. 5. To educate about recent advances in research.

BACKGROUND: Cystic fibrosis (CF) is the most common fatal genetic disease affecting Caucasians, with an incidence of 1:3000 live births. With the advances in treatment, there has been an important improvement in life expectancy. It is important for the radiologist to recognize the multi-systemic manifestations of CF, and its complications which will likely become more common as patients live longer.

CONCLUSION: CF is a common genetic disease with which modern radiologists should be familiar, especially those working in endemic regions. Knowledge of its multi-systemic manifestations and most common complications is important to better help clinicians, and to provide appropriate patient care.

Chest Radiographs of Cardiac Devices and the Role of Radiologists

Rishi Philip Mathew, Dept. of Radiology & Diagnostic Imaging, University of Alberta; Timothy Alexander, University of Alberta; Vimal Patel, University of Alberta; Gavin Low, University of Alberta Department of Radiology

LEARNING OBJECTIVES:

1. To identify the various cardiac devices on chest radiographs (CXRs).
2. To evaluate the devices on CXRs and to look for complications.

BACKGROUND: Over the last few decades, several new cardiac devices have been introduced clinically. Almost all patients with implanted cardiac devices such as pacemakers, implantable cardioverter-defibrillators (ICDs), cardiac resynchronization therapy (CRT) devices, implantable loop recorders, prosthetic valves and ventricular assist devices undergo chest radiographs on a regular basis. Therefore, it is not uncommon for the radiologist to be presented with chest radiographs (CXRs) showing a variety of these devices on a daily basis. Chest radiographs are the initial modality for evaluating the device location, its integrity after implantation and for detecting complications including device malfunction. It is important that interpreters familiarize themselves with the cardiac devices, their components and typical and atypical appearances on chest radiographs – this can be challenging. The intention of this exhibit is to educate readers about the various cardiac devices visible radiographically, how to identify them, along with a step wise approach to evaluate them on CXRs including excluding complications.

CONCLUSION: This exhibit provides a summary of the commonly encountered cardiac devices on CXRs that radiologists are likely to encounter on a daily basis. It is important to be familiarize with these devices and to assess them appropriately.

Imaging of Splenic Lesions – Typical and Atypical Pathologies

Rishi Philip Mathew, Dept. of Radiology & Diagnostic Imaging, University of Alberta; Edward Wiebe, Department of Radiology & Diagnostic Imaging, University of Alberta; Vimal Patel, University of Alberta; Gavin Low, University of Alberta Department of Radiology

LEARNING OBJECTIVES:

1. To describe the imaging appearances with case illustrations of various commonly encountered splenic lesions.
2. To describe the imaging appearances with case illustrations of unusual splenic lesions on multi-modality imaging that can pose a dilemma to the radiologist such as infective and inflammatory processes, rare primary and secondary splenic neoplasms, splenunculi mimicking omental deposits, vascular related pathologies, splenic sequestration from sickle cell anaemia, and developmental anomalies such as the wandering spleen.

BACKGROUND: The spleen is the largest lymphoid organ in the body. It is often considered as a “forgotten organ” as it is less commonly affected by diseases when compared to other organs. It is important for the radiologist to have a list of appropriate differential diagnosis in mind when evaluating splenic lesions so as to avoid unnecessary invasive procedures such as biopsy or surgery. The main question when evaluating a splenic lesion is whether it is benign or malignant. However, the answer can be challenging as imaging features of various splenic lesions may show an overlap and the clinical examination can be unhelpful as patients may present with vague clinical symptoms.

CONCLUSION: This exhibit provides a comprehensive review of the imaging appearances of various splenic pathologies. A combination of clinical information, lesion morphology and consistency on imaging (cystic/ solid/ mixed) and the enhancement pattern can often narrow the differential diagnosis.

pancreatic Injury in Blunt Trauma: Hidden in Plain Sight

Devang Odedra, McMaster University; Michael Patlas, McMaster University; Vincent Mellnick, Mallinckrodt Institute of Radiology

LEARNING OBJECTIVES:

1. To illustrate critical imaging findings and grading system in blunt traumatic pancreatic injuries at MDCT.
2. To discuss the role of MRI and ultrasound on admission and follow-up patients with pancreatic injuries.
3. To review the management of pancreatic injuries with an emphasis on misses and misinterpretations

BACKGROUND: Blunt injuries to the pancreas are uncommon but carry a high morbidity and mortality risk. Pancreas is an organ located in the center of the abdomen but may be overshadowed by the common injuries of the surrounding organs, hence “hidden in plain sight”. There are direct and indirect signs of pancreatic injuries. Direct signs include lacerations, contusions, and hematomas. Indirect signs include peripancreatic fluid, hemorrhage or stranding. A key distinguishing factor for management of pancreatic injuries is to determine if the main pancreatic duct is involved. Lacerations deeper than 50% of gland thickness suggest ductal involvement. The American Association for Surgery of Trauma grading scheme for pancreatic trauma will be reviewed. It is a standardized tool for communication of the injuries with the surgical colleagues. The role of Magnetic Resonance Imaging and ultrasound will be briefly discussed. The radiologist should also be aware of common limitations and pitfalls of imaging in patients with pancreatic trauma including contribution from injuries to the surrounding organs, mimics such as pancreatic clefts and non-traumatic causes of parenchymal abnormalities such as pancreatic neoplasms or pancreatitis. Recognizing the evolution of complications is important in the follow-up imaging of pancreatic trauma.

CONCLUSION: This exhibit will offer an opportunity to review the imaging appearance of blunt traumatic pancreatic injuries and emphasize the role of radiologist in detection and management of these life-threatening entities.

From Big Data to Big Value: Cloud-Based, Real-Time Information Sharing Leads to Improved Critical Decision Making and Management of Acute Aortic Emergencies; Can AI Play a Role?

Michael CY Juan, Cleveland Clinic; Paul Schoenhagen, Cleveland Clinic Lerner College of Medicine; Po-Hao Chen, Cleveland Clinic

LEARNING OBJECTIVES:

1. Define acute aortic syndrome (AAS) and explain the challenges of making definitive diagnosis, timely triage, and effective surgical planning for AAS.
2. Demonstrate the effective adoption of a network-of-care model, taking advantage of the collective expertise of a team of geographically-separated specialty providers, in offering the highest level of AAS-tailored patient management.
3. Illustrate the use of centralized cloud-based technologies in allowing remote and mobile access of real-time information by geographically-dispersed specialists thereby delivering synchronized care in a time-sensitive manner.
4. Discuss the multidimensional and integrated roles AI and machine learning may play in areas of automatic detection of AAS and non-AAS mimickers (e.g., pulmonary embolism and coronary stenosis), vitals-, level of consciousness-, symptomatology-, and clinical history-based triage and risk stratification, adverse event prediction, and coordination of constrained hospital assets such as the operating rooms and CT scanners. Longitudinal cloud-based data collection and storage further provide increased opportunities in continuous practice quality improvement via immediate data-driven feedback.

BACKGROUND: Since 24/7 AAS-specific rapid response teams are less frequently available within the hospital, a network of specialists situated at various locations are recruited to orchestrate care. Cloud-based technologies with high computing powers represent the next generation of remote information sharing and access, synchronizing the expertise within any given network and minimizing ambiguity in diagnosis, patient transfer, and staff coordination. Shortened total transfer time, streamlined patient handover, and lower mortality rates have been reported consequently.

CONCLUSION: Cloud-based technologies enable geographically-dispersed specialist providers to make time-sensitive decisions by granting real-time remote access to critical patient information including past and current medical history, radiology studies, and laboratory test results. Such availability of large medical data sets has been shown to improve patient outcome and, in the near future, may provide an avenue for machine learning and AI-augmented clinical decision-making. Future studies focusing on network security especially pertaining to patient privacy and personal health information are critical to validate the continued development of sub-centralized healthcare cloud systems.

Clival Tumors: A Review of Skull Base Anatomy and Imaging Evaluation

Jane Meng, McMaster University; Ramiro Larrazabal, Hamilton Health Sciences

LEARNING OBJECTIVES:

1. Discuss the role of various imaging modalities (CT, MRI, PET-CT, bone scintigraphy, and radiographs) in the evaluation of skull base lesions.
2. Identify the clivus and its relation to critical regional structures of the central skull base on commonly used imaging modalities (CT and MRI).
3. Review the characteristic imaging features of important clival tumors and common periclival lesions on CT and MRI.
4. Recognize the correlation between imaging characteristics of clival tumors and associated patterns of clinical presentation.

BACKGROUND: Clival tumors are rare, sometimes aggressive, and often diagnosed incidentally on brain imaging. Therefore, background expertise in anatomy and embryology of the skull base is valuable for radiologists in delineating the clivus on imaging modalities and understanding its relation to regional structures in disease extension. Imaging evaluation of clival lesions requires an understanding of characteristic CT and MRI features of malignant and benign clival tumors, along with periclival lesions. Integrating clinical knowledge of patient presentation patterns strengthens diagnostic reporting.

CONCLUSION: Radiologists play an essential role in the initial assessment of clival tumors and guidance of appropriate additional imaging work-up. High morbidity can be seen with clival tumors due to the intrinsic aggressiveness of disease or the risks associated with surgical treatment. Patient management decisions depend heavily on anatomically precise and clinically relevant reporting of clival tumors.

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Traumatic Aortic Injuries: What to Look For?

David Salgado, Dalhousie University; Patrick Slipp, Dalhousie University; Michael Rivers-Bowerman, Department of Diagnostic Radiology, Dalhousie University; Robert Berry, Dalhousie; Robert Abraham, Dalhousie University; Christopher Lightfoot, Dalhousie University

LEARNING OBJECTIVES:

1. Review the relevant anatomy and important normal anatomical variants.
2. Characterize the different types of traumatic aortic injuries including minimal aortic injury, laceration, pseudoaneurysm formation, dissection, and intramural hematoma.
3. Optimize search pattern and utilize appropriate CT imaging techniques to evaluate the aorta.
4. Understand the management and implications of these various aortic injuries.
5. Review concepts in endovascular repair with case-based examples

The aorta is one of the first structures evaluated in detail on a trauma CT scan as injuries are life-threatening and must be identified immediately to guide appropriate intervention. Understanding the CT appearances of the different injuries is essential in developing an efficient search pattern and providing an accurate diagnosis. Prompt recognition of an aortic injury with involvement of the appropriate sub-specialists will ultimately improve patient outcomes. Whether you are a junior resident or a senior staff, the aorta is an important structure to properly evaluate to ensure life threatening aortic injuries are identified and managed appropriately. This review will provide an overview of CT protocol, search patterns, and CT interpretation and diagnosis of aortic injury to advance patient care.

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Imaging of Cerebral Small Vessel Disease: A Pictorial Essay

Olivia Li, London Health Sciences Centre; Manas Sharma, London Health Sciences Centre

LEARNING OBJECTIVES:

1. To review the pathophysiology of cerebral small vessel disease
2. To present the spectrum of CT/MRI appearances of cerebral small vessel disease
3. To discuss pitfalls in the imaging evaluation of brains with background of small vessel disease
4. To provide a general guideline in the quantification of degree/burden of background small vessel disease in the brain

BACKGROUND: Cerebral small vessel disease (cSVD) is a common finding on imaging studies of older patients, and is often dismissed as an incidental finding of old age during radiologic reporting. Frequently called chronic small vessel ischemic changes or ischemic microangiopathy, these generally refer to the pathology of small perforating arteries supplying the deep subcortical structures of the brain due to chronic, diffuse and subclinical ischemia. There is a spectrum of radiologic manifestations, including deep white matter changes, lacunae, cerebral microbleeds and parenchymal atrophy. Efforts should be made to differentiate cSVD from other etiologies with overlapping imaging appearances but different prognoses and treatments, such as dilated perivascular spaces, inflammatory or infectious white matter changes, and metabolic disorders. Lastly, the degree of background burden of cSVD should be routinely quantified as part of a complete radiology report as there is increased recognition of its contribution to aging and neurodegenerative disease.

CONCLUSION: With increased availability of high resolution imaging modalities and an aging population, cSVD is seen routinely during the evaluation of the brain. Thus, familiarity with the imaging appearances of cSVD is essential as an increasingly recognized disease entity, as well as not to miss other important diagnoses.

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Intravascular and Intraluminal Foreign Body Retrieval

Behnoush Mortazavi Moghadam, University of Manitoba ; Suichan Sookhoo, University of Manitoba; Brian Hardy, University of Manitoba; Jeffrey McConnell, University of Manitoba; Arman Rahimifar, University of Manitoba

LEARNING OBJECTIVES:

1. To illustrate common Intravascular/intraluminal foreign bodies including malpositioned, lost, or embolized devices.
2. To illustrate common devices used for intravascular/intraluminal foreign body retrieval.
3. To elucidate the role of interventional radiologists in the retrieval of the foreign bodies. To demonstrate the importance of radiologists utilizing timely interdisciplinary communication to facilitate treatment.

BACKGROUND: Intravascular/ intraluminal foreign bodies most commonly occur during or after minimally invasive procedures, and can potentially cause significant complications or death. As endovascular and percutaneous procedures increase in frequency, the incidence of malpositioned, lost or embolized devices has significantly increased. Radiologists increasingly encounter these circumstances during their calls and should be familiar with the imaging presentation and treatment options. Prompt intervention is crucial in many cases, therefore providing accurate information and timely interdisciplinary communication by radiologists are crucial.

CONCLUSION: Intravascular and intraluminal foreign bodies including malpositioned, lost, or embolized devices are mainly iatrogenic. Due to their potentially serious complications, timely diagnosis and appropriate intervention is imperative. Radiologists should be familiar with the imaging findings and treatment options of intravascular and intraluminal foreign bodies so that they are able to provide accurate diagnosis and timely interdisciplinary communication to ensure appropriate treatment.

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Cardiothoracic Blunt Trauma: A Comprehensive Review

Paula Patiño, Universidad de la Sabana; Alexandre Semionov, McGill University Health Center; Josephine Pressacco, Hôpital du Sacré Coeur de Montréal; John Kosiuk, MUHC; Karl Sayegh, MUHC

LEARNING OBJECTIVES:

1. To illustrate how to detect, describe, and interpret blunt traumatic injuries to the chest.
2. Understand various mechanisms of blunt traumatic injuries to the chest.
3. To recognize potential pitfalls during interpretation of patients with cardiothoracic trauma.

BACKGROUND: Cardiothoracic injuries commonly occur in the context of blunt trauma. It is the third most common injury in blunt trauma, following head and extremities injuries. The majority of cases occur in the setting of vehicle collisions. Due to the overall high fatality rate in cardiothoracic injuries (10%), rapid detection, proper interpretation and timely management of these injuries is important. Radiology plays an important role in the management of such injuries. Conventional radiography can be used initially and can direct management of several injuries of the chest wall, lungs and pleura. Computed tomography improves visualization of injuries detected by conventional radiography and is superior in the detection of mediastinal injuries. CT can show traumatic injuries, even in the setting of a normal radiograph and it can change management in up to 20% of cardiothoracic traumas in patients with an abnormal initial radiograph.

CONCLUSION: Familiarity with the various mechanisms of injury, the different types of cardiac and thoracic injuries and the ability to differentiate anatomical variants from true injuries allows better patient care in the setting of cardiothoracic blunt trauma.

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Radiology Interest Groups: A Recipe For Success

Jessica Dobson, Memorial University of Newfoundland, Faculty of Medicine; Andrew Fenwick, Memorial Faculty of Medicine; Victoria Linehan, Memorial University of Newfoundland; Angus Hartery, Memorial University of Newfoundland

LEARNING OBJECTIVES:

1. Highlight the importance of interest groups in undergraduate medical education.
2. Identify key components of a Radiology Interest Group (RIG) using specific examples from our institution.
3. Discuss how to optimize available resources to increase student engagement in radiology.

BACKGROUND: Interest groups that offer opportunities for early mentorship, clinical exposure, and career planning are a valuable complement to the undergraduate medical curriculum. We consider our local Radiology Interest Group (RIG) successful based on local awards, high attendance and formal anonymous feedback. Given our recent institutional success, we evaluate event outcomes utilizing thematic analysis and review the following key considerations:

Leadership: faculty, resident, and student representatives

Communication: social media, advertising, feedback

Collaboration: involving other organizations

Innovation: interactivity, competition

Mentorship: networking, research

CONCLUSION: An engaging RIG enhances pre-clinical medical education, fosters understanding and appreciation of the radiologist, and is a forum for the recruitment of talented trainees. In this way, our RIG promotes the future of the radiology profession and serves as a practical model for other similar organizations.

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2018 MRI Safety Updates for Radiologists: Are We Too Careful or Careless?

Kiana Lebel, Montreal Heart Institute; Stephanie Tan, Montreal Heart Institute; Donato Terrone, Montreal Heart Institute; Julie Robillard, Montreal Heart Institute; Magali Pham, Montreal Heart Institute

LEARNING OBJECTIVES:

1. To review recent evidence on the safety of magnetic resonance imaging in patients with cardiac devices.
2. To expose the risk and safety precautions for pregnant patients requiring magnetic resonance imaging.
3. To highlight the current literature and guidelines on gadolinium brain deposition and the risk of nephrogenic systemic fibrosis in the context of severe renal failure.

BACKGROUND: Magnetic resonance imaging (MRI) is a unique and powerful diagnostic tool that does not utilize ionizing radiation and may at times be the only imaging modality to properly assess and diagnose certain pathologies. Many patients are precluded from undergoing MRI due to presumed absolute contraindications, such as having a non-conditional pacemaker or implantable cardioverter-defibrillator. However, there are many recent studies demonstrating that MRI may be safely performed in these patients under specific conditions. Moreover, there are an increasing number of new cardiac devices being implanted in patients, of which radiologists must be better familiarized so as to identify those that may be safely imaged by MRI. In pregnant patients, it is always necessary to balance the risk and benefits of performing MRI with or without gadolinium. A review of recent data will allow radiologists to guide clinicians and patients in order to select the best imaging modality during pregnancy or the peripartum period. In the last few years, there has been growing concern for gadolinium brain deposition and, although it is still a developing topic, knowing current evidence is paramount. Finally, radiologist should be aware of the new Canadian guidelines on the use of intravenous gadolinium in the setting of severe renal failure which will be discussed herein.

CONCLUSION: MRI is an essential imaging modality for the diagnosis and health management of patients, with exponentially increasing clinical applications. More recent evidence suggests that current views on MRI safety will need to adapt. Therefore, radiologists and trainees should remain up to date with current MRI safety evidence to ensure proper guidance and accessibility to MRI for patients and clinicians.

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Parenchymal Pulmonary Vascular Abnormalities

Alana Kavanagh, Memorial University; Lisa Smyth, Faculty of Medicine, Memorial University of Newfoundland ; Andrew Dalton, Radiology

LEARNING OBJECTIVES:

1. Review the normal pulmonary vasculature anatomy
2. To illustrate the imaging features of normal vasculature
3. Review three interesting cases of pulmonary vasculature abnormalities:
 - I. Pulmonary Arteriovenous Malformation
 - II. Pulmonary sequestration
 - III. Scimitar syndrome

BACKGROUND: In normal pulmonary anatomy the pulmonary trunk originates at the pulmonic valve and bifurcates into the right and left pulmonary arteries. At the level of the right main bronchus, the right pulmonary artery separates into the truncus anterior and the interlobar arteries. The left pulmonary artery is shorter in comparison and branches into the left upper lobar artery and the interlobar artery. Many abnormalities of this vascular pattern, both congenital and acquired, can occur. Such anomalies include: pulmonary AVM, pulmonary sequestration and scimitar syndrome. All of which have the potential to produce unique radiographic evidence of the condition. While many of these abnormalities can be detected on plain film, their diagnosis is optimized by CT imaging.

CONCLUSION: Pulmonary vasculature abnormalities may be detected in the setting of a symptomatic patient, or as an incidental finding. Radiologists clinical suspicion and interpretation of these findings is instrumental in their discovery and treatment. Recognition of these variations and the relation of their importance to clinicians for clinical correlation is significant in optimizing patient care.

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Imaging 3.0: Resident Strategies and Implementation

Ari Damla, Saint Vincent Hospital; David Bader, Saint Vincent Hospital

LEARNING OBJECTIVES:

1. Review concepts of American College of Radiology (ACR) Imaging 3.0
2. Describe current department strategies to break down and reverse commoditization of Radiology
3. Summarize rounding resident pilot study at community-based residency program
4. Introduce future initiatives

BACKGROUND: Modern trends in the practice of radiology strive for high quality patient-centered care. Rapid technological advances over recent decades dramatically increased imaging volume and clinical reliance on radiology for diagnosis and management. Concomitantly, innovations in productivity including Picture Archive and Communication Systems (PACS) and Electronic Health Records (EHR) made images and Radiology reports more readily available to both patients and physicians. An unintended consequence of this shifted focus away from quality, safety, and appropriateness in favor of producing reports at high volume under a predominantly fee-for-service environment.

CONCLUSION: Involving senior residents as integral members of medicine rounding teams, participation in multidisciplinary team conferences, embedding workstations in close proximity to sub-specialists, and consulting patients in a clinic setting to review image findings are examples of successful steps that departments can take to practice with a service-oriented mentality. Rather than reading high volume often unnecessary studies, Radiologists should take advantage of their unique position and expertise to play a central role in patient care and advocate for appropriate imaging and management. This is a shift from the monitor to the patient behind the screen and is central to high value patient-centered care.

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A Pictorial Review of White Cord Syndrome

Christopher Lui, Newark Beth Israel Medical Center; S M Nazmus Sakib, Newark Beth Israel Medical Center; Sohaib Altaf, Newark Beth Israel Medical Center; John Matthews, Newark Beth Israel Medical Center

LEARNING OBJECTIVES:

1. Delineate cervical spine anatomy relevant to White Cord Syndrome
2. Identify the pertinent findings on MRI
3. Recognize the entity of White Cord Syndrome
4. Understand the proposed pathophysiology reported in literature
5. Consider future implications

BACKGROUND: Patients with chronic disc herniation and symptoms from cord compression often undergo decompression and fusion, which is associated with overall favorable fusion rates and good clinical outcomes. Paralysis due to hematomas is the most feared complication. “White Cord Syndrome” is described by high signal intensity on T2-weight images intrinsic to the spinal cord on post-operative MRI images without residual compression of the cord. It has been postulated that sudden cord expansion and reperfusion after ACDF may lead to a disruption in the blood brain barrier, triggering a cascade of reperfusion injury driven by free oxygen radicals, resulting in acute neurologic dysfunction. Other mechanisms described are occlusion of small vessels by reperfusion edema, intra-luminal thrombosis, and dysfunction of autoregulatory mechanisms of arteries post procedure.

CONCLUSION: “White Cord Syndrome” is a rare syndrome not widely documented in the scientific community. The precise cause for transient paralysis following ACDF is not completely clear. It is important to raise awareness of this entity to surgeons and therefore patients, as a potential rare but clinically significant consequence of ACDF. This information may yield further investigation on surgical decompression techniques and/or pharmacologic treatment options to mitigate this potential outcome.

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Post Mortem CT in Unnatural Deaths: Fundamentals for General Radiologists

Francesco Macri, Vancouver General Hospital; Matthew Orde, Vancouver General Hospital; Nicolas Murray, Vancouver General Hospital, University of British Columbia; ELINA KHASANOVA, Vancouver General Hospital; Hugue Ouellette, Vancouver General Hospital; Bruce Forster, The University of British Columbia; Savvas Nicolaou, Vancouver General Hospital; Faisal Khosa, Vancouver General Hospital

LEARNING OBJECTIVES:

1. To perform basic terminal ballistics
2. To recognize the most frequent lesion signs and patterns
3. To maximize 2D/3D post-processing information to improve the investigation

BACKGROUND: Multiple prestigious studies have recently demonstrated PMCT and traditional autopsy to be the “gold standard” for forensic purposes. There is no institutionalized forensic radiology program and many radiologists practicing forensic radiology are often self-taught. Radiology in unnatural death settings is a strong adjunct and share many commonalities with emergency and trauma radiology. On the other hands, several easy-to-recognize specific signs are inherent to human corpses. Moreover, newer CT and viewer software technology allows to masterfully portrait and/or unveil corporal lesions otherwise impossibly discoverable solely with traditional autopsy.

CONCLUSION: PMCT in unnatural death is crucial for investigation purposes. General radiologists should be familiar with the most recurrent PMCT signs and perform potential 2D/3D reconstructions in non-natural death settings to strengthen the investigation.

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Rare Case of a Bronchial Endodermal Cyst of the Cauda Equina: Literature Review and Strategic Imaging Approach

Lauren Mak, Queen's University; Donatella Tampieri, Queen's University; Benjamin Kwan, Queen's University; Ian Silver, Queen's University; Omar Islam, Queen's University; Christopher Wallace, Queen's University; John Rossiter, Queen's University; Sana Basseri

LEARNING OBJECTIVES:

1. Review the differential diagnosis of intradural cystic-like lesions at the lumbar level.
2. Establish a differential diagnostic approach based on imaging patterns.
3. Discuss neurenteric cyst of the spine.
4. Present a rare case of bronchial endodermal cyst of the cauda equina.

BACKGROUND: Neurenteric cysts are rare spinal axis tumors, only accounting for 0.7-1.3%. They usually occur in the lower cervical and upper thoracic spine. 90% are located in the intradural or extramedullary compartment. Individuals typically present in the 2nd and 3rd decade of life with a 2:1 male to female ratio. They are formed by displaced elements of the gastrointestinal or respiratory tract during embryogenesis. Histology is required to delineate the subtype of the neurenteric cyst.

MATERIAL AND METHOD: We present a rare case of a 48 years old female patient presenting with back pain. The MRI demonstrated a complex intradural cyst mass at the L1 level, located along the posterior aspect of the conus medullaris. The lesion was resected and the diagnosis of intradural bronchial endodermal cyst was made by neuropathology.

DISCUSSION AND CONCLUSIONS: Intradural cysts or mixed cystic lesion of the conus medullaris and cauda are relatively uncommon. The differential diagnoses of cystic or mixed solid and cystic lesion in this location includes: – Myxopapillary ependymoma – Epidermoid – Schwannoma – Dermoid – Dilatation of the 5th Ventricle – Neurenteric cyst. The aim of our presentation is to provide description of the various pathologies, outlining their characteristics and imaging patterns and provide a pictorial review of these entities. In particular the rare neurenteric cyst pathogenesis and imaging characteristics will be presented.

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Dedicated Cone Beam Breast CT, Why Now?

Kamila Skalski, University of Rochester Medical Center; Avice O'Connell, University of Rochester Medical Center; Patricia Melendez, University of Rochester

BACKGROUND INFORMATION/PURPOSE: Cone beam breast CT (CBCT) is a dedicated breast imaging system which utilizes cone beam computed tomography to provide true isotropic 3D images of the breast for diagnostic imaging. Currently the only CBCT approved by Health Canada (in 2014) and the FDA (in 2015) is the Koning Breast CT in West Henrietta, NY. Named cone beam due to the large cone angle x-ray beam that enables the full breast to be imaged in each acquired image. The xray tube and detector rotate around the breast and acquire 300 low dose projection images in 10 seconds. The projection images are reconstructed to create a 3D isotropic image of the breast without compression. The purpose of this education exhibit is to teach the learner the technique of CBCT and current indications. After taking part in this exhibition the learner will be able to compare the standard imaging modalities including mammogram, tomosynthesis, ultrasound and MR to CBCT. Multimodality assessment of pathology will ultimately define the benefits and drawbacks of each imaging modality used in diagnostic breast imaging.

EDUCATION GOALS/TEACHING POINTS: After participating in this educational presentation, the learner will be familiar with:

1. What cone beam breast CT (CBCT) is and how it works
2. Role of CBCT
3. Comparison of CBCT with standard imaging modality
4. CBCT correlation with pathology

CONCLUSION: Although breast CT is not a new technique its use in breast imaging is novel. Multimodality imaging is important to explore in every field of radiology as differences in modalities allow for discovering new ways to diagnose subtle pathology which can help clinicians guide management. After participating in this educational exhibit, the learner will be fully immersed in CBCT imaging understanding how it compares to standard imaging modalities and how pathology is diagnosed using CBCT.

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Ultrasound-Guided Intranodal Lipiodol Lymphangiogram – A Diagnostic and Postentially Therapeutic Technique

Caitlin Ward, Western University, London Health Sciences Centre; Lynda Chambers, London Health Sciences Centre; Daniele Wiseman, Western University, Department of Medical Imaging

LEARNING OBJECTIVES:

1. To discuss the diagnostic and therapeutic indications for lymphangiogram
2. Outline the different methods of performing a lymphangiogram
3. Detailed discussion of lymphangiogram technique
4. To highlight the diagnostic and potential therapeutic advantages of intranodal lipiodol lymphangiogram
5. Case examples

BACKGROUND: Postoperative chylothorax is a rare complication, with an incidence of 2.7-3.8%. It is potentially life threatening, leading to sepsis, electrolyte imbalance and malnutrition. A lipiodol lymphangiogram can be used to identify the site of chyle leak to assist operative planning. In a percentage of patients, it can be therapeutic. Traditional lymphangiograms were more invasive, utilizing web space cut down, and were labour intensive with potential for complication. We present ultrasound-guided intranodal lymphangiogram, an innovative technique introduced to our institution by the senior author.

CONCLUSION: Intranodal lipiodol lymphangiogram serves both a diagnostic role in radiology, as well as an emerging therapeutic role. In comparison to traditional lymphangiography, there is a decreased procedure time and it is considerably less invasive, with a high technical success rate 87-100%. Severe complications are extremely rare. Minor complications include contrast reaction and infection. Besides the diagnostic role of identifying lymphatic leaks to assist in surgical planning or to provide a target for interventional radiology thoracic duct embolization, recently published reports indicate that lipiodol lymphangiogram plays a therapeutic role for lymphatic leakage. The mechanism by which a lipiodol lymphangiogram reduces lymphatic leaks has not been fully clarified, although some authors have suggested that lipiodol, an ethiodized oil contrast agent, undergoes an inflammatory and granulomatous reaction during its extravasation. The therapeutic effect is also attributed to the embolic properties of lipiodol, as it accumulates at the point of leakage outside as well as within the lymphatics. With the preliminary technical, diagnostic and therapeutic success achieved by this reinvented procedure, further practice building may transpire to include thoracic duct embolization for appropriate refractory cases.

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Imaging Spectrum of Spinal Pathologies Mimicking Infectious Spondylodiscitis

Angela Guarnizo, The Ottawa hospital- University of Ottawa; Carlos Torres, The Ottawa Hospital; Marcos Sampaio, The Ottawa Hospital; Thanh Nguyen, The Ottawa Hospital

BACKGROUND: Imaging findings in infectious spondylodiscitis are non-specific; other clinical conditions can present with similar imaging findings such as cortical endplate erosions, bone marrow edema and enhancement, inflammatory changes in the surrounding soft tissues and disc signal abnormality. Recognizing these imaging features in the appropriate clinical context may help to avoid misdiagnosis and facilitate earlier treatment.

LEARNING OBJECTIVES:

1. In cases of spondyloarthropathy, inflammatory endplate erosions, bone marrow and disc edema may mimic spondylodiscitis. In endstage cases of spinal ankylosis, transdiscal or juxtacortical fractures may also result in a similar imaging pattern.
2. Destructive changes in the vertebral bodies with sclerosis, new bone formation, loss of disc space; vacuum phenomenon, severe facet involvement and pseudoarthrosis are imaging findings suggestive of neuropathic spondyloarthropathy (Charcot spine).
3. In patients with diabetes, several pathologies can closely mimic infectious spondyloarthritis such as dialysis-associated spondyloarthropathy, neuropathic spine, vertebral osteonecrosis and lumbar plexitis. Vertebral osteonecrosis can be associated with cord infarction and ventral cauda equine nerve root enhancement.

SUMMARY: It is important for the radiologist to be familiar with the typical imaging findings in infectious spondylodiscitis in order to differentiate this entity from other pathologies that may mimic spine infection. Although differentiating spondylo-discitis from other spine pathologies can be challenging sometimes, there are certain key imaging features of each entity that along with an appropriate clinical history may help narrow the differential diagnosis.

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Osteonecrosis: A Review for Radiologists

Muhiedean Ibrahim, University of Ottawa School of Medicine; Marcos Sampaio, The Ottawa Hospital; Paul Sathiadoss, The Ottawa Hospital, University of Ottawa

LEARNING OBJECTIVES:

1. Define osteonecrosis, discuss its pathophysiology and the different causes of osteonecrosis.
2. Discuss imaging modalities in the investigation of osteonecrosis with special emphasis on radiological manifestations and complications.
3. Incorporate this knowledge into practice to ensure timely diagnosis and treatment.

BACKGROUND: Osteonecrosis can involve any region of the body leading to significant morbidity. Imaging plays a key role in identifying the condition and in further treatment planning. Though diagnosis is usually straightforward, unusual locations and complications of osteonecrosis can lead to misdiagnosis. Sound knowledge of the underlying pathophysiology and the varied imaging appearances is essential for the radiologist to arrive at a correct diagnosis.

PATHOPHYSIOLOGY: Osteonecrosis is defined as death of cells located in the bone and marrow. Osteonecrosis occurs in a sequential process: An initial insult that decreases blood flow to the bone, resultant bone ischemia and finally bone infarction/osteonecrosis due to prolonged or severe bone ischemia. The most common causes of osteonecrosis are trauma, corticosteroids use and osteomyelitis.

IMAGING: Though other imaging modalities may be used to evaluate osteonecrosis, MRI is considered the gold standard due to its ability to detect early findings and complications. Depending on the bone/joint involved, osteonecrosis can have a variegated appearance. Common radiographic findings include subchondral lucency and peripheral sclerosis. MRI depicts a double line sign with outer sclerosis and inner granulation tissue. Osteonecrosis may be associated with pain and complications such as fractures, loss of function and range of motion of joints, among others.

CONCLUSION: Osteonecrosis is a disease process resulting in bone death. It is most commonly seen in the context of fractures and dislocations. The gold standard imaging modality is MRI which demonstrates classic imaging features that assist radiologists in the diagnosis. High morbidity may be associated with established osteonecrosis and its unusual complications. Therefore, it is of fundamental importance for radiologists to understand this condition in its different presentations.

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Out with the Old, in with the New: Clinicoserologic Classification of Inflammatory Myositis and Imaging Findings

Darra Murphy, St. Paul's Hospital; Isabelle Dupuis, St. Paul's Hospital; Kun Huang, University of British Columbia; Davis Holmes, Department of Radiology, University of British Columbia; Natasha Dehghan, Division of Rheumatology, University of British Columbia

LEARNING OBJECTIVES:

1. Understand the connection between the Bohan and Peter classification of myositis and the evolving clinicoserologic correlation of autoimmune inflammatory myositis
2. Review of inflammatory myositis based on clinicoserologic phenotypes
3. Describe the major organ systems involved and the imaging manifestations of the major clinicoserologic subtypes

BACKGROUND: Classification of inflammatory myositis has significantly changed over the last 20 years. 'Dermatomyositis/Polymyositis' is no longer a sufficient paradigm to describe inflammatory myositis. Rheumatologists and neurologists increasingly rely on clinical and laboratory findings to stratify patients into clinicoserologic phenotypes. There are now greater than 10 clinicoserologic phenotypes with very different systemic manifestations (skin, lung, cardiac) and complications that guide treatment options and prognosis.

CONCLUSION: Communication between radiologists and clinicians relies on a common understanding of disease processes. Radiologists need to know the inflammatory myositis clinicoserologic phenotypes, their systemic findings and imaging appearances to be able to improve the specificity of their radiologic diagnosis and appropriately study these conditions in the future.

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Impact of 24/7 on Site, Staff Radiologist Coverage on Image Utilization for Trauma Patients Presenting to a Tertiary Care, Level One, Trauma Centre

Sabeena Jalal, Vancouver General Hospital; Savvas Nicolaou, Vancouver General Hospital

BACKGROUND: Trauma is a serious health issue that requires immediate medical attention.

AIM: To examine changes in md to disposition time of trauma patients, before & after the implementation of on-site 24/7 Staff Emergency Radiologist coverage in a level 1 Trauma Centre. Standard: Audit Target: Policy makers, health care administrators, medical community & lay public.

MATERIALS & METHODS: A retrospective audit of 28,829 patient encounters in a level 1 trauma center, before & after implementation of onsite 24/7 staff emergency radiologist coverage.

RESULTS: We looked at 14,447 trauma patients pre 24/7 & 14,382 trauma patients post 24/7. MD to disposition time was defined as the time when the patient was first seen by a doctor in the emergency department (ED), till the time the patient was either admitted, referred or discharged. Using wilcoxon rank sum test, we noted that there was a significant decrease in MD to disposition time post 24/7 as compared to pre 24/7 for CTAS 1 ($z = -3.6$, p value = 0.02) & CTAS 2 Trauma patients ($z = -4.1$, p value = 0.001). Discussion: This initial analysis, shows that having a 24/7 staff Radiologist shows improvements in MD to disposition time, thus decreasing the acute trauma patients length of stay in ED. The system prioritizes CTAS1 & CTAS2 patients.

CONCLUSION: 24/7 on-site Staff Emergency Radiologist coverage resulted in more acute trauma patients moving faster through ED. Clinical Relevance: 24/7 on-site Staff Radiologist coverage can effectively be implemented in a level 1 Trauma center to improve access to higher level imaging for trauma patients & normalize after-hours imaging rates.

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Distinguishing Acute from Chronic Findings in Sickle Cell Disease: When to Make the Phone Call

Christopher Lui, Newark Beth Israel Medical Center; Waqas Bari, Newark Beth Israel Medical Center; Jackie Lui, Newark Beth Israel Medical Center; Tej Phatak, Newark Beth Israel Medical Center

LEARNING OBJECTIVES:

1. Review the relevant pathophysiology of hemoglobin SS disease
2. Identify the most common chronic imaging manifestations of this condition
3. Recognize potential superimposed acute findings and their differential diagnoses
4. Understand the importance of early detection and potential clinical implications

BACKGROUND: Hemoglobin SS disease is caused an autosomal recessive defect in the beta-chain of hemoglobin, resulting in sickle-shaped red blood cells, microvascular occlusion and multi-organ infarction. The condition confers significant morbidity and mortality to patients affected. The constellation of chronic imaging manifestations of sickle cell disease includes, but is not limited to: avascular necrosis, red marrow hyperplasia, extramedullary hematopoiesis, cardiomegaly, chronic lung disease, and moya moya. However, recognizing superimposed acute findings such as during a "sickle cell crisis" is crucial to prevent delay in treatment and in reducing further complications.

CONCLUSION: Hemoglobin SS disease is a debilitating condition that confers significant morbidity and mortality to affected patients. The imaging manifestations of sickle cell disease are well-established in literature. However, understanding the distinction between chronic from superimposed acute findings is essential in guiding treatment and preventing further complications associated with the condition.

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Cardiac Amyloidosis: A Basic Approach

Nida Syed, McMaster University; Amna Al-Arnawoot, McMaster University

LEARNING OBJECTIVES:

1. To present the common and uncommon imaging findings of amyloidosis with a focus on Cardiac MRI.
2. To review the differential diagnoses of cardiac amyloidosis on Cardiac MRI.
3. To discuss common pitfalls of diagnosis.

BACKGROUND: Many Cardiac imagers are provided with the common clinical history of “Rule out infiltrative cardiomyopathy” or “Rule out non-ischemic cardiomyopathy”. If cardiac amyloidosis is in the differential diagnosis, a strong knowledge of amyloidosis is helpful to narrow down an often-wide differential diagnoses. The diagnosis of amyloidosis is difficult to achieve even after biopsy due to a wide variety of imaging findings. Amyloidosis has a high annual mortality rate and an accurate diagnosis is essential. Additionally, diagnosis will help to lead to early treatment. Having an extensive knowledge of cardiac amyloidosis is an important skill that requires constant reminders and updates on the part of Radiologists. This educational exhibit will provide a pictorial review of the findings of amyloidosis.

CONCLUSION: Imaging can be essential in helping to make the difficult diagnosis of cardiac amyloidosis. This makes Radiologists an integral part of a patient’s care. This exhibit will review imaging findings of this difficult diagnosis.

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Thoracic and Abdominopelvic Vascular Injuries in Trauma: An Overview of Anatomy, Classification and Management

Jacques van Heerden, University of British Columbia; Colbey Taylor, University of British Columbia ; Nicolas Murray, Vancouver General Hospital, University of British Columbia; Savvas Nicolaou, Vancouver General Hospital

LEARNING OBJECTIVES:

1. To explore clinically relevant anatomy involved in thoracic and abdominopelvic vascular injuries in trauma
2. To recognize the importance of imaging protocol parameters in detection of vascular injuries
3. To identify the typical radiologic manifestations and classification of thoracic and abdominopelvic vascular injuries in trauma
4. To discuss various management options, namely surgical versus interventional radiologic approaches

BACKGROUND: Thoracic and abdominopelvic vascular injuries can be life-threatening and are commonly a result of high impact trauma, most often seen in motor vehicle accidents. CT imaging, considering its availability, rapidity of acquisition and precision has allowed accurate non-invasive diagnosis of these injuries. Due to the associated morbidity and mortality of these injuries, optimization of CT imaging protocols and knowledge of relevant vascular anatomy and broad spectrum of imaging presentations are critical in order to diagnose these injuries. Identification and classification of these injuries play a key role in guiding proper patient management; including both surgical or interventional procedures.

CONCLUSION: The ability to recognize and classify thoracic and abdominopelvic vascular injuries in the setting of trauma is crucial for the practicing radiologist, as radiologic findings routinely guide patient management and outcome.

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A Review of Imaging of Adverse Events Related to Cancer Immunotherapy Treatments

David Ferguson, BCCancer; Elaine Ni Mhurchu, BC Cancer; Ren Yuan, BC Cancer; Kerry Savage, BC Cancer; Barbara Melosky, BC Cancer; Christian Kollmannsberger, BC Cancer; Maura Brown, BC Cancer

LEARNING OBJECTIVES:

1. To review the mechanisms and potential side effects of immunotherapy agents.
2. To review the role of imaging in assessing the potential side effects.
3. To review the imaging findings of associated adverse events.

BACKGROUND: Immunotherapy is emerging as an effective tool in the fight against cancer. Using either a passive or active mechanism, immunotherapy aims to boost the immune system and aid a more effective response against tumour cells. In doing this, potential complications can occur secondary to associated autoimmune or inflammatory responses. These can affect multiple systems of the patient inclusive of respiratory, endocrine, gastrointestinal and musculoskeletal. Radiologist awareness of the potential complications is important to prevent misdiagnosis of disease progression, allow appropriate imaging to be performed where required in the acute setting and to aid early detection in the elective follow up setting. By detecting the potential adverse effects early, treatment can be modified to reduce the severity and related morbidity. Using a variety of imaging modalities inclusive of X-ray, Computed Tomography, MRI and PET imaging, we aim to highlight the potential adverse events associated with immunotherapy treatments at our centre.

CONCLUSION: Immunotherapy treatments can lead to potential multi-systemic adverse events. Radiologist awareness of these may lead to early diagnosis and reduced associated morbidities.

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Tuberculosis: More Than Just a Pulmonary Disease

Andrew Dalton, Radiology; Jennifer Young, MUN; Maureen Hogan, Radiology; Wesley Chan, Radiology

LEARNING OBJECTIVES:

1. Identify high risk populations for contracting tuberculosis.
2. Illustrate the imaging findings found with primary and secondary tuberculosis.
3. Highlight important imaging findings in extrapulmonary tuberculosis in the following key areas:
 - a. Gastrointestinal
 - b. Peritoneal
 - c. Hepatosplenic
 - d. Central nervous system
 - e. Musculoskeletal

BACKGROUND: In Canada, there has been an increase in the incidence of tuberculosis in recent years, particularly in specific geographical locations as well as in certain Foreign-born and Indigenous populations. While tuberculosis is an uncommon diagnosis on a daily basis, it remains an important differential consideration in high-risk populations presenting with infectious symptoms. While pulmonary manifestations are more readily encountered radiographically, it is important to recognize less commonly encountered imaging findings in the setting of tuberculosis infections.

CONCLUSION: Tuberculosis has a wide range of intra-thoracic and extra-thoracic imaging findings and is an important differential consideration in high-risk populations.

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Ulnar Sided Wrist Pain – Beyond the TFCC

Andrew van der Westhuizen, UBC; Sadia Qamar, University of British Columbia; Bruce Forster, The University of British Columbia; Gordon Andrews, The University of British Columbia

OBJECTIVES:

1. Review anatomy of the ulnar side of the wrist
2. Highlight causes of ulnar sided wrist pain in athletes with case examples
3. Discuss pros and cons of the best imaging modalities in identifying the causes of ulnar sided wrist pain.

BACKGROUND: MRI is commonly requested within the clinical context of ulnar sided wrist pain, especially to exclude ligamentous injury and injury to the TFCC. But when might a CT or ultrasound scan be the preferred modality? This poster highlights some important anatomical landmarks and exhibits some multimodality case examples of pathologies beyond TFCC tears. We have case examples will illustrate from our institution examples with multiple modalities, of ulnar abutment syndrome, Kienbock's disease, DRUJ subluxation, luno-triquetal ligament tears, ECU tears and dislocation, Guyon's canal masses and hook of hamate fracture.

CONCLUSION: Our goal is to highlight pathologies beyond the TFCC when it comes to questioning the cause of ulnar sided wrist pain. This exhibit will illuminate also emphasize the advantages examples of the pros of imaging with CT vs. MRI vs US.

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Elbow Injuries in Competitive Athletes – with Emphasis on the Anatomy, MR Imaging Techniques and MR Grading of UCL Injuries

Andrew van der Westhuizen, UBC; Sadia Qamar, University of British Columbia; Bruce Forster, The University of British Columbia; Gordon Andrews, The University of British Columbia

OBJECTIVES:

1. Review the anatomy of the ulnar collateral ligament (with original illustrations)
2. Discuss the optimal technique of evaluating the UCL with MRI.
3. Describe the MR grading of UCL injuries and how this correlates with medial joint laxity
4. Provide examples of a spectrum of UCL injuries.

BACKGROUND: Competitive athletes, especially throwing athletes place a lot of stress on their medial elbow joint. This poster highlights important anatomical stabilizers of the elbow with emphasis on the ulnar collateral ligament. We will demonstrate common as well as more unusual injuries encountered in athletes, with a spectrum of UCL injuries including partial distal ulnar collateral ligament injury with partial avulsion from the sublime tubercle (T-sign) in an international level javelin thrower, and high grade partial avulsion of the common flexor origin (football injury valgus force in hyperextended elbow) as well as full thickness tear of the triceps tendon (in a football running back).

CONCLUSION: UCL injuries are common in throwing sports. We reviewed the anatomy and grading with MRI arthrography for diagnosis and grading which help referring sports medicine physicians plan treatment.

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Simulating with Caution: Running a 24/7 on Site, Staff Radiologist Coverage in a Level 1 Trauma Centre Could Be a Cost Neutral Prerogative for Hospital Administration Due to 24/7's Impact on ED

Sabeena Jalal, Vancouver General Hospital; Savvas Nicolaou, Vancouver General Hospital

BACKGROUND: A large burden of patients present to the ED after the 8 am to 5 pm shift.

OBJECTIVE: We are simulating the impact that a 24/7 Emergency and Trauma Radiology department could arguably have on the cost of care.

STANDARD: Target: Policy makers.

METHODS: Estimating the utilization of services and thus projecting the cost of care. Results: We have audited data, which has shown that patients move faster through ED of a level 1-trauma center, if there is a 24/7 onsite, staff radiologist present.

DISCUSSION: Simulated scenario: Assuming that an ED has a budget of 26 million. We would have an acute area (20/36 nurses allocated); a treatment area with 10/36 nurses allocated and a waiting room with 6/36 nurses allocated. With the small data set we have, at any given time, we project 20% patients/day go to acute care; 40% use the treatment area and 40% are in the waiting room. Thus, $20/36 * 26 \text{ million} = 14.4 \text{ million}$ is spent on acute care of patients/year.

CONCLUSION: The ED primarily saves costs in acute area.

CLINICAL RELEVANCE: Data has shown that acute patients are moving faster through the ED post 24/7. We can extrapolate with caution, that during the initial years of setting up the department: running a 24/7 on site staff radiologist would arguably be cost neutral. Simply due to its impact on the workflow in the ED of the hospital, particularly if the ED is located in large tertiary care hospital and serving a huge population.

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How Colloquial Can You Go!!! "Brand Imaging" in Musculoskeletal Sports Injuries

Sadia Qamar, University of British Columbia; Andrew van der Westhuizen, UBC; Gordon Andrews, The University of British Columbia; Bruce Forster, The University of British Columbia

OBJECTIVES:

1. To review most frequently encountered colloquial terms in musculoskeletal sports injuries.
2. To illustrate and define the imaging spectrum of these sports injuries focussing on upper and lower extremities.

BACKGROUND: 'Brand imaging' represents more than just a description because it conveys exactly what one wants it to say (1). The use of standardized medical descriptors and application of labels, tags, and eponyms can concisely provide the detailed information required for diagnosis and helps direct patient management. Colloquial terms have been used historically to label a wide array of disease patterns in all specialties of the medicine. Accordingly, musculoskeletal sports injuries also have a diverse colloquialism originating from all across the globe and have a significant impact of branding on imaging (2). However, these colloquial terms can be used inaccurately or misunderstood (3). This exhibit aims to provide an accurate understanding of these labels in order to optimize communication and understanding between radiologist and sports physicians/ surgeon.

ILLUSTRATIONS: Upper extremity: 1. Hill-Sachs and Bankart lesions 2. ALPSA 3. SLAP tears 4. Tennis elbow 5. Golfer's wrist 6. Gymnast's wrist 7. Baseball Finger 8. Jersey Finger 9. Gamekeeper's thumb 10. Boxer fracture Lower extremity: 1. Jumpers Knee 2. Segond fracture 3. Runner fracture 4. Snowboarder fracture 5. March fracture 6. Turf toe

CONCLUSION: Colloquial terms are labels that provide imaging description of complex injuries or pathologies. This exhibit illustrates most frequently encountered colloquial terms in the musculoskeletal sports injuries and reinforces preferably using imaging descriptions to avoid miscommunication to sports physicians and trauma surgeons.

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Abdominal & Pelvic Radiographs of Various Medical Devices & Materials and The Role of Radiologists

Rishi Philip Mathew, Dept. of Radiology & Diagnostic Imaging, University of Alberta; Timothy Alexander, University of Alberta; Vimal Patel, University of Alberta; Gavin Low, University of Alberta Department of Radiology

LEARNING OBJECTIVES:

1. To identify the various tubes, medical devices and materials on abdominal and pelvic radiographs.
2. To evaluate these iatrogenic objects for their accurate placement and to look for any complications.

BACKGROUND: The tubes, medical devices and materials seen on abdominal and pelvic radiographs are less frequently encountered when compared to chest radiographs by the radiologists on a day to day basis. These objects can be broadly classified into- intestinal tubes, bowel patency devices, postoperative materials, vascular tubes and materials, genitourinary tubes and devices, and drug infusion devices. Some of these devices are common, while others are not commonly used and may even have unusual radiographic appearance confusing the imaging interpreter. The role of the radiologist extends beyond recognizing these objects, and additionally involves carefully analysing them for accurate placement, features of malfunction, damage, migration/embolization and most importantly for complications related to their placement, as most often these complications are not clinically apparent. It is incumbent upon the radiologist to recognize and immediately notify any equipment abnormality or its related complications to the treating physician or surgeon to avoid patient morbidity or even potentially fatal outcomes.

CONCLUSION: Because of the increasing number of radiographic studies being performed, it is not uncommon for the radiologist to encounter radiographs of the abdomen and pelvis with a myriad of tubes and medical apparatus, making it easy to overlook this seemingly harmless equipment. However, evaluation of these iatrogenic objects should be given equal importance when evaluating the abdomen and pelvis for visceral, solid organ or bone pathologies.

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Imaging Findings Following Percutaneous Ablation of Liver Lesions

Rohith Bhargavan, UBC Radiology; Christopher Lunt, University of British Columbia ; John Chung, Vancouver General Hospital; Alison Harris, University of British Columbia; Silvia Chang, University of British Columbia

LEARNING OBJECTIVES:

1. To review the indications, technique, and relative advantages of the contemporary ablative techniques of radiofrequency ablation (RFA) and microwave ablation (MWA) in the management of hepatic malignancy.
2. To discuss LIRADS guidelines on imaging protocols for CT and MRI at post-ablation follow-up.
3. To illustrate post-ablative radiologic appearances of expected changes and residual/recurrent disease
4. To illustrate common and rare post-procedural complications.

BACKGROUND: RFA and MWA offer minimally-invasive intervention to a widening array of patients with localized hepatocellular carcinoma (HCC) and certain metastatic liver lesions. These can represent definitive liver-directed therapy or bridging to hepatic transplant. Clinical management following ablation is dependent on diagnostic imaging to characterize expected post-ablative changes, residual disease, and disease recurrence across multiple time points. Post-procedural complications include biliary dilatation, biloma, hepatic abscess, bleeding, pseudoaneurysm, liver infarct, tract seeding, and cholecystocolonic fistula.

CONCLUSION: As percutaneous ablative techniques are more widely utilized in both monotherapy and as adjuncts to surgery, radiologists must be familiar with the sequential appearances of expected outcomes and complications. Accurate diagnostic imaging is crucial to the early recognition and timely management of the post-procedural patient.

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Post-Treatment Mri of Prostate Cancer

Christopher Lunt, University of British Columbia; Frederieke Elsinger, Vancouver General hospital; Rohith Bhargavan, UBC Radiology; David Ferguson, BC Cancer; Alison Harris, University of British Columbia; Silvia Chang, University of British Columbia

LEARNING OBJECTIVES:

1. To demonstrate the expected MR findings in patients following treatment for prostate cancer
2. To show imaging features consistent with recurrence of prostate cancer
3. To illustrate MR features of mimics of prostate cancer recurrence in the treated prostate.

BACKGROUND: Rates of recurrence of prostate cancer vary between 5-35% and is usually detected as biochemical recurrence. In patients with rising PSA, MR is indicated to assess for evidence of local tumour and to help plan salvage therapy. We review post treatment MR findings in the prostate bed following prostatectomy, within the gland of patients who have received prostate preserving treatments such as external beam radiotherapy and brachytherapy, or focal therapies including cryotherapy, high intensity focused ultrasound and photodynamic therapy.

CONCLUSION: Early detection and characterisation of localised disease recurrence is important for prognostication and treatment planning, however imaging can be challenging. Multi-parametric MR helps to distinguish disease from mimics of recurrence.

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Image-Guided Interventions for the Treatment of Renal and Hepatic Malignancies

Marshall Dunn, Dalhousie University; Michael Rivers-Bowerman, Dalhousie University; Robert Abraham, Dalhousie University; Christopher Lightfoot, Dalhousie University; Robert Berry, Dalhousie; Peter Brown, QEII

LEARNING OBJECTIVES:

For radiofrequency and microwave ablation and trans-arterial chemo- and radioembolization we will:

1. Describe the indications, pre-procedural imaging, and clinical work-up.
2. Describe procedural technique using intra-procedural fluoroscopic, ultrasound, and CT images.
3. Recognize common and significant intra- and post-procedural complications and their management.
4. Detail post-procedural follow-up and ongoing imaging surveillance to assess for disease recurrence and/or progression.
5. Describe the Interventional Radiologist's role as a member of the multidisciplinary oncology team.

BACKGROUND: Historically non-metastatic renal and hepatic malignancies were treated with surgical resection but increasingly both early stage and non-resectable lesions are being managed in part using image-guided interventions including radiofrequency ablation, microwave ablation, trans-arterial chemoembolization, and trans-arterial radioembolization. As the indications for these techniques expand, radiologists interpreting diagnostic, staging, and follow-up studies must understand which hepatic and renal tumours are amenable to these interventions, imaging findings of procedural complications, and signs of disease recurrence on post-procedural surveillance imaging.

CONCLUSION: Radiologist understanding of interventional therapies for renal and hepatic malignancies will help streamline patient referral and work-up at the diagnostic stage and ensure timely and accurate post-procedural diagnosis of complications and cancer recurrence.

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AI: The Future

Sabeena Jalal, Vancouver General Hospital; William Parker, UBC; Savvas Nicolaou, Vancouver General Hospital

LEARNING OBJECTIVES:

1. Discuss Ethics & AI;
2. Describe application of AI;
3. Discuss Utility of AI

BACKGROUND: For over 20 years, Imaging Support Analytics have played an imperative role in the progression of diagnostic medicine and imaging analysis. The concept of artificial intelligence carrying out automated image recognition has fascinated the Radiologists for quite some time. In most hospital settings, radiologists and referring physicians are unable to closely collaborate, in order to plan a patient's radiology work up. In big hospitals, the radiologists receive a large number of requests for imaging procedures. At times, the exams done may not be the best option and other more suitable option might have been available according to the patient's initial differential diagnosis, had the radiologist and the referring physicians had a chance to discuss the patient in real time. Literature suggests that a computer-based system that uses artificial intelligence techniques can help address these problems. The benefits of AI in Radiology are many folds. The major benefit of AI is that it saves time, which inherently translates into saving patient lives. In cases of trauma, stroke and cancers, this early or timely detection would be of immense value to the patient. Radiology helps the detection of disease. Whether we are talking about inpatients needing treatment; whether we are seeing how well the treatment has worked. AI would be able to assist. Moving forwards, the semantics of discourse is that the Radiologists need not to fear being replaced by AI. AI will only be a highly evolved machine, which would very likely, always need to be steered by the Radiologist. Basic challenges posed by AI are of autonomy, beneficence, justice and respect for knowledge. Presence of AI in today's day and age highlights the emphasis on patient consent and data privacy. Those are more tangible concerns.

CONCLUSION: Emphasis needs to be on addressing consent and privacy. We need to utilize the technology for the betterment of humans, rather than just fearing AI.

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Role of 24/7 Radiology on Site Staff Radiologist Coverage in Reducing the Turn Around Time (TAT) for the Head Computed Tomography Scanning

Sabeena Jalal, Vancouver General Hospital; Savvas Nicolaou, Vancouver General Hospital

BACKGROUND: 24/7 on site staff Radiologist coverage improves imaging turn around time which is crucial for CT heads in cases of Trauma, Stroke or other acute conditions.

METHODS: We have extracted CT Heads data from IDX RAD, with exam code CT head 3 parts. For the purpose of this research, TAT1 was defined as the time difference between the time when the exam was completed and when the staff radiologist transcribed the exam; TAT2 was described as the time when the exam report was transcribed and when staff radiologist finalized the report.

RESULTS: We noted that TAT1 and TAT2 were highly significantly reduced, after the implementation of 24/7 radiology on site staff radiologist coverage. Using binary logistic regression we calculated the odds ratio.

DISCUSSION: The odds for a having a significantly low turn around time Post 24/7 with an on site Staff Radiologist coverage, are 3.46 times (95% CI : 2.96 – 4.55; p value = 0.0001) higher, as compared with Pre 24/7, with no on site, staff radiologist coverage.

CONCLUSION: 24/7 Emergency & trauma on site, staff radiologist coverage has a significant impact on reducing various turn around times for head CT head scan. Since, CT Heads are indicated for severe or acute conditions, such as trauma, stroke, masses; this reduction in radiology report TAT, would arguably play a crucial role in reducing complications, reducing length of stay and saving lives. Thus, a 24/7 is predictive of improved patient outcomes. This initial analysis allows for further exploring of evidence-based approaches.

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Persistent Pulmonary Sub-solid Nodular Densities, Not In the Spectrum of Adenocarcinoma

Saly Zahra, University of Ottawa

LEARNING OBJECTIVES:

1. To define pulmonary sub-solid nodules.
2. To describe differential diagnosis of persistent sub-solid nodules.

BACKGROUND: Ground-glass opacity (GGO) is defined as an opacity that does not obscure underlying bronchial structures or pulmonary vessels at high-resolution computed tomography (CT). GGO is a rather unspecific radiologic feature seen in a number of clinical conditions involving different pathologic processes. GGO on images may represent partial alveolar filling or could be due to interstitial changes. Nodular sub-solid densities may be caused by several infectious or inflammatory entities, however most will resolve on short-term follow-up study. Persistent nodular sub-solid density is a well known appearance of primary lung adenocarcinoma and are frequently managed by surgical resection. However, not all are cancer or premalignant lesions, therefore, familiarity with other differential diagnosis is important in patient standard of care. These include lymphoproliferative disorders, IgG4-related diseases, and scar. In this educational exhibit we review the histopathology and the radiological findings of the above-mentioned causes of non-adenocarcinoma ground glass nodules.

CONCLUSION: There are several causes of pulmonary ground glass nodules, familiarity of the CT pattern is very important in patient management.

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Radiographic Appearance of Interventional Radiology Utilized Non-Vascular Devices

Baljot Chahal, University of Alberta; Murad Bandali, University of Alberta; Rahim Samji, University of Alberta; Richard Owen, University of Alberta

LEARNING OBJECTIVES:

1. Describe the various types of non-vascular devices used by interventional radiologists.
2. Recognize the normal radiographic appearance of these non-vascular devices.
3. Recognize complications associated with non-vascular devices that can be detected at radiography and the appropriate descriptions required to facilitate further management.

BACKGROUND: Interventional radiologists implant numerous non-vascular devices and materials including vertebroplasty materials, genitourinary devices such as nephrostomy tubes and ureteric stents, and gastrointestinal devices such as gastrostomy tubes. Radiography is often utilized as a first step in assessing the appropriate placement and functioning of these devices, as well as determining the presence of post procedural complications. Accurate radiographic assessment of these materials and devices can thus be of immense clinical and surgical significance.

CONCLUSION: Recognizing the normal and abnormal appearance of non-vascular implants on radiography can ensure radiologists facilitate appropriate clinical follow up or further imaging as necessary.

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Normal and Abnormal Radiographic Appearance of Interventional Radiology Utilized Intravascular Implants and Devices

Baljot Chahal, University of Alberta; Murad Bandali, University of Alberta; Richard Owen, University of Alberta; Rahim Samji, University of Alberta

LEARNING OBJECTIVES:

1. Describe the various types of intravascular implants and devices.
2. Recognize the normal radiographic appearance of intravascular devices.
3. Recognize characteristic abnormalities of intravascular devices that can be detected at radiography.

BACKGROUND: Radiologists are expected to have an understanding of the radiographic appearance of foreign devices (e.g., cardiac conduction devices). However, the radiographic appearance of intravascular implants used by interventional radiologists has not been well described. Given the proliferation of interventional radiology and its continually expanding scope, recognizing the normal and abnormal radiographic appearance of intravascular implants such as stents, IVC filters, TIPS, and embolic materials is relevant for all radiologists.

CONCLUSION: Recognizing the normal and abnormal appearance of intravascular implants can help radiologists interpreting radiographic studies add value to their reports by facilitating further imaging or appropriate clinical follow up when necessary.

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Fibrous Dysplasia: Imaging Features and Management

Ari Damla, Saint Vincent Hospital ; Priyanka Prakash, Saint Vincent Hospital

LEARNING OBJECTIVES:

1. Define Subtypes of Fibrous Dysplasia
2. Review CT and MRI features of Fibrous Dysplasia
3. Differentiate CT and MRI features of Common Craniofacial Mimickers
4. Outline Management Recommendations

BACKGROUND: Fibrous Dysplasia (FD) is an uncommon non malignant developmental anomaly characterized by replacement of medullary bone by fibrous tissue. Patients with Fibrous dysplasia are generally asymptomatic with lesions demonstrating slow indolent growth. Rapid growth is rare and may displace adjacent structures such as the optic nerve, eye/globe, nasal airway, cranial nerves, middle ear ossicles, and teeth. Involvement of long bones may predispose to pathologic fractures. Malignant transformation is rare however it is seen in 1% of lesions. Surgical resection is advocated in cases of rapid growth in order to prevent complications of blindness or hearing loss.

CONCLUSION: Fibrous Dysplasia has three subtypes; Monostotic, Polyostotic, and as part of McCune Albright syndrome. Patients are generally asymptomatic, however, lesions may be treated surgically in cases of rapid growth if there is significant mass effect on local structures. Although uncommon, Fibrous Dysplasia is a potential tumor mimicker and recognition of characteristic findings on CT and MRI is vital for the radiologist to correctly guide therapy and avoid misdiagnosis.

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A Practical Approach to Sclerotic Jaw Lesions

Davis Holmes, Department of Radiology, University of British Columbia; Monty Martin, Department of Radiology, BC Cancer Agency; Nicolas Murray, Vancouver General Hospital, University of British Columbia

LEARNING OBJECTIVES:

1. Describe the normal radiologic anatomy of the mandible
2. Outline a practical imaging feature-based approach to differential diagnosis of sclerotic mandible lesions
3. List distinguishing imaging features of common and uncommon sclerotic mandible lesions
4. Describe general components of management for common sclerotic mandible lesions

BACKGROUND: Jaw lesions are frequently encountered by radiologists during imaging for unrelated complaints of the head/neck. Providing a concise differential diagnosis and recommendations for further management is made difficult by the fact that many jaw lesions are unfamiliar to general radiologists. Three components of radiograph or CT lesion analysis are essential to narrowing the differential diagnosis: radiodensity, structure of origin, and transition zone width. Familiarity with unique features of each lesion allows a more specific diagnosis.

CONCLUSION: By achieving familiarity with sclerotic jaw lesions, applying an algorithmic approach using key imaging features and utilizing clinical information, an accurate differential diagnosis can be achieved.

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Dual Energy CT, Blood, Bones and Stones

Saba Moghimi, University of British Columbia; Shamir Rai, University of British Columbia; Savvas Nicolaou, Vancouver General Hospital

LEARNING OBJECTIVES:

1. To review the basic principles and advantages of dual energy CT (DECT) imaging
2. To review applications of DECT in abdominal and urogenital imaging
 - 2.a) Characterizing composition of renal calculi
 - 2.b) Detecting radio-opaque gallstones
 - 2.c) Assessing bowel perfusion
3. To review applications of DECT in neuroradiology
 - 3.a) Differentiating hemorrhage from contrast medium
 - 3.b) Reducing beam hardening artifact, particularly in relation to the posterior fossa, and metallic artifact
4. To review applications of DECT in cardio-thoracic imaging
 - 4.a) Assessing parenchymal perfusion in CT PE.

BACKGROUND: Dual energy CT (DECT) enables simultaneous scanning at two different energy levels, which facilitates material characterization on CT such as the composition of renal stones and detection of iodine-based contrast. Through unique three-material decomposition, we can subtract iodine or calcium from images to quantify the amount of iodine in one voxel, assess perfusion and differentiate hemorrhage from iodine. This exhibit aims to explore and highlight some applications of DECT in everyday practice across multiple subspecialties.

CONCLUSION: DECT augments what conventional single energy CT can do with a wide array of applications in abdominal, neuroradiological, and cardiothoracic imaging through material characterization and three-material decomposition as outlined in this exhibit. Ultimately, this helps improve diagnostic accuracy and expand our diagnostic capability, with the potential for positive impact on patient care.

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Dual Energy CT in Musculoskeletal Imaging, Crystals and Soft Tissue

Saba Moghimi, University of British Columbia; Shamir Rai, University of British Columbia; Savvas Nicolaou, Vancouver General Hospital

LEARNING OBJECTIVES:

1. To review the principles of dual energy CT imaging
2. To review the role of DECT in the detection of monosodium urate crystal deposition
3. To review how DECT can aid in the reducing metal artifacts
4. To review key applications of dual energy CT in assessing soft tissue tendons, ligaments and joints:
 - 4.a) Identifying bone marrow edema
 - 4.b) Using DECT for Tendon assessment.

BACKGROUND: In this exhibit, we will discuss unique applications of dual energy computer tomography (DECT) in musculoskeletal imaging including detection of uric acid deposits and reduction of metal artifact. The applications of DECT go beyond assessment of bony structures. DECT can be used to assess bone marrow edema through subtraction of calcium from cancellous bone. In addition, ligaments and tendons can be assessed using DECT by differentiating collagen, water, and soft tissue from other structures.

CONCLUSION: DECT is a technology that combines some of the capabilities of MR imaging with CT as detailed in this exhibit. Additionally, DECT extends beyond the capabilities of conventional single energy CT and MR with unique features such as the ability to identify uric acid crystals and reduce metal prosthetic artifact. Magnetic resonance imaging (MRI) remains the gold standard for visualization of soft tissue and bone marrow. However, DECT can also play a role in assessing soft tissue including tendons and bone marrow edema in settings where MRI is not promptly available with the added benefit of faster acquisition times. DECT has the potential to expand our diagnostic capabilities and accuracy in musculoskeletal imaging which ultimately has the potential to positively impact patient care.

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Hysterosalpingography: How the Experts Read It?

Romuald Ferre, MUHC; Yasmin Kerouch, Université de Montréal; Nicole Gougeon, Hôpital Maisonneuve Rosemont

TEACHING POINTS:

1. To present and discuss the HSG images
2. To describe technical challenges, and propose management tips
3. To review the spectrum of findings including normal variants

TABLE OF CONTENTS

1. Overview of the technique
2. Management tips for challenging cases
3. Radio-pathologic correlation examples with management recommendations
4. Pitfalls: how to identify and prevent them in particular normal variants
Hysterosalpingography (HSG) is the sole examination to assess tubal permeability. Although performed for decades, this is a reemerging technique due to increasing cases of infertility. However, its interpretation is sometimes considered challenging. Challenges include technical considerations as well as paucity of literature findings. Our objective is to familiarize radiologists with HSG technique and interpretation. Through various examples using other modalities correlation and pathology correlation, this exhibit will offer practical tips to the radiologists as well as propose evidence-based algorithms for the use of HSG according to the review of the literature.

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Cross-Sectional Imaging Spectrum of Common and Rare Infections Affecting the Lower Genitourinary Tract

Vijayanadh Ojili, UT Health San Antonio; Pankaj Nepal, St. Vincent's Medical Center; Arpit Nagar, Ohio State University Wexner Medical Center; Neeraj Kaur, UT Health San Antonio

LEARNING OBJECTIVES:

1. To describe the etiopathogenesis, clinical presentation and imaging manifestations of infections affecting the lower genitourinary tract.
2. To discuss the clinical implications of specific imaging findings.
3. To discuss the role of image-guided interventions and pertinent management issues.

BACKGROUND: Lower genitourinary infections range from more commonly encountered cystitis to relatively uncommon mycobacterial infections such as TB, fungal infections such as candidiasis and parasitic infections such as schistosomiasis etc. These infections may be suspected clinically or come as a surprise on imaging. Cross-sectional imaging techniques, particularly CT enables accurate detection of these infections.

CONCLUSION: A wide spectrum of lower genitourinary infections are encountered in the clinical practice of which some are relatively uncommon and may pose a challenge for the unwary radiologist. Knowledge of salient imaging features of these infections is of utmost importance because prompt recognition enables appropriate management.

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Canada Safe Imaging: A Unified Effort for Patient Radiation Safety

Sarah Afzal, McMaster University; David Koff, Hamilton Health Sciences; Jane Castelli, MIIRC@M- Hamilton Health Sciences

Although medical radiation has provided substantial benefits to patients, its use in medicine is significantly increasing, urging greater awareness and stricter safety measures. In 2012 the International Atomic Energy Agency and the World Health Organization launched an initiative titled the "Bonn Call For Action," (BCA) which outlines ten major strategies for promoting radiation protection. While guidelines and regulations are laid out, ensuring they are adhered too is essential in creating a radiation-safe experience for each individual. In the last 6 years, the extent to which the BCA priorities have been, or may be, implemented has not been widely studied in Canada. This study analyzed 19 national organizations (NO) and 41 provincial organizations (PO) that were affiliated with radiation use in medicine, in order to observe diligence in implementing BCA recommendations to evaluate how proficient Canada is in strengthening patient radiation safety. All NOs and POs were identified using an environmental scan and their goals, values, and resources were assessed. Of the 19 NO and 41 PO that were identified, it was evident that no organization was meeting all of the 10 BCA recommendations. Only 10% of NOs follow more than 5/10 BCA recommendations while less than 50% of POs were implementing the actions at all. There is a need for a cohesive, national initiative to ensure that patients across Canada are safe when exposed to radiation in medicine. As a result, Canada Safe Imaging has been formed as a NO that brings together many stakeholders to strengthen and provide contextualized guidelines and tools, for medical radiation protection. Although results have not been replicated outside the original setting, and the initiative's relatively recent implementation makes it difficult to examine improvements at this time, it is imperative that there is a governing body that focuses on establishing a cohesive approach to implementing the BCA guidelines. Future studies aim to evaluate the organizations' improvements in knowledge translation and adoption of and sustained adherence to good radiation safety practice and standards across Canada.

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Degradable Radiopaque Embolic Glass Microspheres: Pre-Clinical Evaluation on Imaging and Histology

Renato Abu Hana, CRCHUM; Gilles Soulez, Department of Radiology, Université de Montréal; Daniel Boyd, Dalhousie University; Feryel Azzi, CRCHUM; Kathleen MacDonald, Dalhousie University; Hélène Héon, CRCHUM; Dominique Trudel, CRCHUM

OBJECTIVE: Evaluate the embolization effectiveness, visibility and degradability of embolic radiopaque glass microspheres (ERGM) in swine renal artery, as well as the recanalization of the embolized vessels.

METHODS: Bilateral caudal renal artery embolization was conducted in 4 non-diseased pigs. Three of them received ERGM (100-300 µm) and one received Bead Blocks® (control). Imaging assessment was performed using Fluoroscopy Shoot, DSA, C-arm CT and histology at three different time points: 0h, 24h, 48h.

RESULTS: Visualization of glass beads was possible on all imaging methods, however use of contrast was necessary to have a better embolization monitoring on fluoroscopy. The total time of the procedure was slightly longer for the tested particles (average 84 min) compared to the control (55 min). The volume of particles injected was higher for control, 1,5g versus 0,8g for tested. The volume of remaining degradable particles was clearly smaller over the time: 0h (100%), 24h (2%) and 48h (1,9%). The CBCT was able to visualize the particles with good resolution, being possible to verify the degradation progression of the glass microspheres over the time. The DSA was able to demonstrate the onset of vessel recanalization even just 24h and 48h after the procedure, which was confirmed by histology.

CONCLUSION: the ERGM have an excellent degradable capacity in an ideal average interval of 48 hours, without any impairment in the effectiveness of the embolization. The recanalization could be visualized even after a short period of time.

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Air in the Spinal Canal: How Did It Get There?

Angela Guarnizo, The Ottawa Hospital - University of Ottawa; Carlos Torres, The Ottawa Hospital

LEARNING OBJECTIVES:

1. To describe the imaging findings associated with internal and external pneumorrhachis.
2. To review the common and infrequent pathologies leading to the presence of air within the epidural or the subarachnoid space of the spinal canal.

BACKGROUND: Pneumorrhachis is the presence of air within the epidural or the subarachnoid space of the spinal canal. The most frequent etiologies are traumatic, iatrogenic and infectious. Nontraumatic etiologies of pneumorrhachis include asthma, pneumothorax, pneumomediastinum, epidural abscess, bowel perforation, tumor invasion, and posttreatment changes. Iatrogenic causes of pneumorrhachis include chest tube placement, surgery, epidural anesthesia and lumbar puncture. Pneumorrhachis is usually asymptomatic, in some cases the patient can present pain and discomfort due to air trapped in the subcutaneous soft tissues, focal neurological deficit is less frequent. The management of pneumorrhachis is individualized. In cases of internal pneumorrhachis, which is usually associated to severe injury, it requires urgent intervention to prevent morbidity and mortality. Cases of external pneumorrhachis usually resolve spontaneously.

CONCLUSION: Pneumorrhachis is an unusual self limited finding, which could be associated with different etiologies, mostly iatrogenic. Identification of air within the spinal canal however should prompt an immediate search for a potential unexpected underlying pathology.

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Amyloid Deposition and Angiitis: Spectrum of the Main Radiological Manifestations

Eduardo Portela de Oliveira, University of Ottawa; Vignan Yogendrakumar, University of Ottawa; Carlos Torres, The Ottawa Hospital; NADER ZAKHARI, The Ottawa Hospital ; Thanh Nguyen, The Ottawa Hospital

PURPOSE: This education exhibit aims to:

1. Discuss the different nomenclature used in the literature for amyloid deposition with angiitis.
2. Provide a concise overview of prevalence and clinical relevance of amyloid deposition with angiitis.
3. Review the mechanisms and pathogenesis in order to facilitate the radiologic approach.
4. Illustrate and discuss the radiological manifestations with radiological-pathologic correlation.

APPROACH: Representative magnetic resonance and computed tomography images will be displayed in a case-based format along with pathological correlation images, illustrating the main features of amyloid deposition associated with angiitis. A brief discussion of the relevant radiological features of non-inflammatory form of cerebral amyloid angiopathy will be also presented.

FINDINGS AND DISCUSSION: Cerebral amyloid angiopathy (CAA) involves cerebrovascular amyloid deposition and is classified into several types according to the amyloid protein involved. An uncommon, but clinically striking presentation of CAA is the association with angiitis. Cerebral amyloid angiopathy related inflammation (CAA-I), has been described under various names, also called amyloid β -related (ABRA), primary angiitis of the CNS associated with CAA; amyloid angiopathy and granulomatous angiitis and cerebral amyloid inflammatory vasculopathy. Acute-onset cognitive behavioral abnormalities, focal neurological deficits, seizures, or unusual headaches are the most common clinical presentations. CAA-I shows a spectrum of radiological manifestations, more commonly demonstrating hyperintensities on T2-weighted (T2W) or fluid-attenuation inversion recovery (FLAIR) images with presence of microbleeds on susceptibility weight images (SWI).

CONCLUSION: Cerebral amyloid angiopathy related inflammation is a rare entity that causes rapid-onset CNS dysfunction in elderly patients. If properly treated with steroids and other immunosuppressant therapy, patients can respond well. After reviewing this presentation, neuroradiologists will be able to recognize the main MRI findings characteristic of the disease, understand the clinicoradiological criteria and suggest an early diagnosis, thus improving patient's outcome and avoiding unnecessary biopsies.

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Imaging Review of Inherited Neuromuscular Disorders

Paul Sathiadoss, The Ottawa Hospital, University of Ottawa; Kawan Rakhra, The Ottawa Hospital; Adnan Sheikh, Department of Medical Imaging, The Ottawa Hospital, University of Ottawa; Jodi Warman Chardon, The Ottawa Hospital, Children's Hospital of Eastern Ontario, University of Ottawa; Marcos Sampaio, The Ottawa Hospital

LEARNING OBJECTIVES:

1. Review the types of inherited neuromuscular disorders (NMDs)
2. Highlight the role of imaging in NMDs and the MRI technique employed
3. Discuss imaging findings in commonly encountered NMDs

BACKGROUND: Inherited NMDs include a heterogeneous group of neuropathies, myopathies and mitochondrial disorders with remarkable variability in genetic abnormalities and overlapping clinical phenotypes. Onset of symptoms may be early or as late as in adult life. Investigation with initial diagnostic tests like creatine kinase and electrophysiologic studies lack specificity. Neuromuscular imaging plays an important role in the evaluation of muscle dystrophy. Muscle involvement patterns may be helpful in identifying the specific type of NMD. Genetic testing remains the diagnostic gold standard. Imaging technique & findings: MRI is the primary imaging modality as it provides exquisite soft tissue detail. The NMD protocol in our institution employs whole body STIR (for changes of edema/denervation) and T1 Dixon sequences (to identify atrophy and fat infiltration). Degree of fat infiltration may be quantified using rating scales. Recognition of variable fat infiltration in the different muscles/muscle groups can be used to generate patterns which may be specific for a particular type of NMD. Key anatomic/pathophysiologic issues: Imaging is useful in identifying muscle edema (acute components of denervation or inflammation) and chronic changes of atrophy/fatty infiltration both of which are important tools for the detection and quantification of muscle dystrophy. Pattern recognition in imaging with regards to muscles groups involved may be useful in narrowing the differential diagnosis.

CONCLUSION: MRI, with its ability to identify and quantify muscle dystrophy, has become the imaging modality of choice for the evaluation of NMDs. Understanding patterns of muscle involvement is important and may help in narrowing the differential diagnosis in this heterogeneous group of diseases and may be useful in more focused use of genetic testing.

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Ischemic Bowel Revisited: Special Emphasis on Non-Occlusive Mesenteric Ischemia

Paul Sathiadoss, The Ottawa Hospital, University of Ottawa; MOHAMMAD HAROON, The Ottawa Hospital, University of Ottawa; Mitch Wilson, Department of Medical Imaging, The Ottawa Hospital; Satheesh Krishna, The Ottawa Hospital; Adnan Sheikh, Department of Medical Imaging, The Ottawa Hospital, University of Ottawa

LEARNING OBJECTIVES:

1. Review the pathophysiology and MDCT imaging appearances of the various etiologies of acute mesenteric ischemia.
2. Highlight the etiologies, clinical presentation, imaging diagnosis and treatment of non-occlusive mesenteric ischemia (NOMI).
3. Compare the key findings of the different etiologies in a tabulated format

BACKGROUND: Acute mesenteric ischemia is life threatening and associated with a high mortality rate. The underlying etiology may be arterial or venous occlusion, strangulating obstruction or hypoperfusion associated with NOMI. MDCT is the imaging modality of choice and helps in differentiating the underlying etiology using subtle findings. In particular, NOMI is a relatively understudied condition in radiology literature. This exhibit aims to summarize these findings in a quick review format to aid the radiologist in the ER.

CONCLUSION: MDCT plays a key role in the management of mesenteric ischemia by pointing to the etiology in a rapid and accurate manner. Knowledge of findings that would help in identifying the pathophysiology is essential for the radiologist to guide appropriate treatment measures.

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Breast MR Basics: What Residents Should Know

Kamila Skalski, University of Rochester Medical Center; Avice O'Connell, University of Rochester Medical Center; Patricia Melendez, University of Rochester

BACKGROUND INFORMATION/PURPOSE: Magnetic resonance imaging (MRI) of the breast is an adjunct technique to standard imaging modalities in the breast. MRI has increased sensitivity over mammography and has unique advantages over standard images, however the specificity greatly varies. Although very small lesions are detectable by MRI, it can be challenging differentiating benign from malignant lesions as both can enhance. Currently MRI is used for evaluation of extent of breast cancer, response to therapy and evaluation of recurrence, it can additionally be used in evaluation for breast implant rupture and screening in high risk patient with dense breasts. The main contraindication to breast MRI is low GFR, however with new guidelines on group II gadolinium substances with minimal risk for Nephrogenic Systemic Fibrosis, MRI will become available to more patients. This educational exhibit aims to introduce the learner to breast MRI basics, teaching residents how interpret images focusing on morphology of the breast, internal enhancement patterns, common artifacts as well as interpretation of breast pathology on MR, both benign and malignant.

EDUCATION GOALS/TEACHING POINTS: After participating in this educational presentation, the learner will be familiar with:

1. Clinical indications for breast MR
2. How Breast MR works including MR sequences, interpretation and kinetic analysis
3. Evaluation of pathology by breast MR 4) Pearls and Pitfalls of MR

CONCLUSION: MRI has had a large impact in breast imaging, more specifically the role it plays in breast cancer diagnosis and response to treatment. It is important for the radiologist to know how to interpret MRI of the breast and be able to navigate through artifacts and breast cancer mimics. This education exhibit aims to teach the beginner radiologist about MRI, its indications and interpretation.

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Emphysematous Infections of Abdomen – A Pictorial Review

Mohammad Haroon, The Ottawa Hospital, University of Ottawa; Paul Sathiadoss, The Ottawa Hospital, University of Ottawa; Yashmin Nisha, SGPGI; Satheesh Krishna, The Ottawa Hospital; Adnan Sheikh, Department of Medical Imaging, The Ottawa Hospital, University of Ottawa; Sabarish Narayanasamy, Department of Medical Imaging, The Ottawa Hospital, University of Ottawa

LEARNING OBJECTIVES:

1. To review and illustrate the imaging findings of the spectrum of commonly encountered various emphysematous infections of abdomen. This will include entities like emphysematous cholecystitis, emphysematous gastritis, emphysematous pancreatitis, emphysematous pyelonephritis, emphysematous pyelitis, emphysematous cystitis and Fournier gangrene.
2. Beside discussing clinical features and predisposing conditions, this exhibit will also focus on recognizing benign causes of gas in abdomen.
3. Various substances can mimic gas in different modalities (especially ultrasound and MRI), and a compendium of cases and algorithmic approach will be offered to arrive at the correct diagnosis.

BACKGROUND: Emphysematous abdominal infections are life-threatening conditions often requiring aggressive medical and surgical intervention. The onset of these entities may be insidious, however without urgent medical or surgical intervention, rapid clinical deterioration and sepsis may ensue. Conventional radiography and ultrasound (US) are usually the initial imaging investigations, however CT remains the investigation of choice. CT is extremely sensitive and specific as it can accurately demonstrate the location and extent of gas, furthermore it assists in recognizing the benign causes of gas.

CONCLUSION: Gas-forming abdominal infections are potentially life threatening with high mortality and morbidity. CT is the imaging modality of choice to accurately demonstrate the location and extent of gas in various infections as well as to recognize benign causes of gas, thereby playing a key role in management.

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Role of DECT in Musculoskeletal Imaging: A Review for Radiologists

Omar Metwally, University of British Columbia; Rashid Alsharhan, VGH ; Nicolas Murray, Vancouver General Hospital, University of British Columbia; Savvas Nicolaou, Vancouver General Hospital

LEARNING OBJECTIVES:

1. Describe the basic principles and physics of the dual energy CT technique.
2. Describe the limitation and artifacts related to dual energy CT.
3. Discuss the utility of different Dual energy CT applications in imaging of the musculoskeletal system.

BACKGROUND: Dual Energy CT, using different post processing techniques, has been an established valid tool for musculoskeletal imaging. Detection and analysis of gout has been already in the clinical use. Other DECT applications have been developed and have shown promising results including, but not limited to bone marrow oedema detection, infiltrative marrow lesions detection, evaluation of the intervertebral discs, ligaments and tendons, metal artifacts reduction and bone marrow density evaluation.

CONCLUSION: Understanding the DECT physics and current DECT applications would help the radiologist detects relevant information and increase the diagnostic yield in the musculoskeletal imaging.

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A Pictorial Review of Stroke Mimics for the Radiologist

Nicolas Murray, Vancouver General Hospital, University of British Columbia; Savvas Nicolaou, Vancouver General Hospital; Erik Venalainen, University of British Columbia

LEARNING OBJECTIVES:

1. Recognize important radiologic manifestations of common stroke mimics.
2. Review the incidence, presentation, and pathophysiology of various stroke mimics.
3. Discuss the differential diagnosis of stroke and highlight the necessity behind distinguishing these often similar presentations in the emergency setting.

BACKGROUND: Stroke is a leading cause of death worldwide. Prompt recognition and management is necessary to mitigate the risk of patient morbidity and mortality. Notably, approximately 20% of suspected stroke cases are due to alternate pathologies including seizures, anatomic malformations, neoplasms, vasculopathies, or metabolic disturbances. These stroke “mimics” closely resemble true stroke clinically thus impeding initial diagnosis. The mainstay modalities used for radiologic assessment of stroke are non-contrast CT, CT angiogram of the head and neck, and MR imaging. Given the time-sensitive nature of stroke, accurate radiological differentiation of ischemic or hemorrhagic mimics is of paramount importance.

CONCLUSION: Successfully differentiating the etiology of potential stroke cases significantly improves patient outcomes. Characteristic radiologic findings of various stroke mimics are often distinct allowing prompt intervention.

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Neuroimaging Findings in Infective Endocarditis

James Ian Riley Moffatt, McMaster University

LEARNING OBJECTIVES:

1. Systematically review the neuroimaging findings in infective endocarditis
2. To highlight imaging features which suggest infective endocarditis in undiagnosed patients
3. Describe appropriate neuroimaging work up for patients with infective endocarditis

BACKGROUND: Infective endocarditis is a rare cause of neurologic impairment. However, for patients with infective endocarditis who experience central nervous system complications, the consequences can be devastating. A working knowledge of the findings, potential complications and appropriate imaging work-up with use of CT, CTA, DSA and MRI is essential to prompt diagnosis and appropriate management of these patients.

CONCLUSION: Knowledge of the neurological complications and imaging findings of infective endocarditis is essential to the appropriate diagnosis and management of these complex patients.

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Imaging Spectrum of Fibromuscular Dysplasia

James Ian Riley Moffatt, McMaster University; Nida Syed, McMaster University

LEARNING OBJECTIVES:

1. Review the pattern of involvement and imaging findings in fibromuscular dysplasia
2. Discuss the potential complications of fibromuscular dysplasia 3) Discuss appropriate imaging recommendations and protocols in FMD

BACKGROUND: Fibromuscular dysplasia is a relatively common vasculopathy, which is often underdiagnosed. A disorder of smooth muscle overgrowth primarily affecting the medium to large vessels, FMD can result in a wide range of clinical complications/manifestations. Having a systematic approach to interpretation and strong grasp of the appropriate imaging workup is essential to the proper management of these complex patients.

CONCLUSION: A knowledge of the manifestations, appearance and necessary workup of patients with fibromuscular dysplasia allows the radiologist to suggest the diagnosis, recommend appropriate further imaging and appropriate referral.

Unnerving Entrapment Neuropathies of the Ankle and Foot: A Pictorial Essay on Magnetic Resonance (MR) Imaging Appearances

Sadia Qamar, University of British Columbia; Andrew van der Westhuizen, University of British Columbia; Gordon Andrews, University of British Columbia; Bruce Forster, University of British Columbia

LEARNING OBJECTIVES:

1. To describe normal anatomy of the nerves of ankle and foot at MR imaging.
2. To identify common peripheral ankle and foot neuropathies on MR imaging.
3. To illustrate common predisposing anatomic sites for nerve compressions in ankle and foot.

BACKGROUND: Entrapment neuropathies of the ankle and foot are often not diagnosed timely because of unreliable clinical examinations and electrophysiologic assessments (1). Magnetic resonance (MR) imaging allows detailed evaluation of the course and morphology of peripheral nerves besides delineating regional osseous and soft tissue details (2). Direct signs of the nerve compression including abnormal high signal, alteration in size and contours are evaluated by MR however, it can be challenging with distal nerves as they taper and decrease in size. The edematous signal in the acute muscular denervation and fatty atrophy in chronic muscular denervation are the indirect signs on MR imaging (3,4). We illustrated the common entrapment neuropathies of the ankle and foot including deep peroneal, superficial peroneal, tibial, and sural nerves.

CONCLUSION: Entrapment neuropathies of the ankle and foot are often underdiagnosed clinically. MR imaging accurately details the course and morphology of the nerve as well as superiorly delineates of the regional anatomy. Understanding the predisposing factors and imaging appearances of the direct and indirect signs of nerve injury are important to optimally diagnose entrapment neuropathies.

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Unravelling Groin Pain in Elite Athletes. MR Imaging of Sports Hernia and Beyond!!

Sadia Qamar, University of British Columbia; Andrew van der Westhuizen, UBC; Bruce Forster, TUniversity of British Columbia; Gordon Andrews, University of British Columbia

LEARNING OBJECTIVES:

1. To describe the applied anatomy of the groin in the clinical context of sports injury.
2. To discuss imaging approach in an athlete with groin pain.
3. To review the different causes of groin pain with illustrations on Magnetic resonance (MR) imaging.

BACKGROUND: Groin pain in elite athletes is a common presentation in a sports clinic and may compromise a professional athlete's career:

1. It accounts for 5-18% of all athletic injuries, however, most commonly encountered in kicking sports like soccer and football
2. The differential diagnosis is broad including insufficiency fractures of pelvis, injury to the adductor and rectus abdominis muscles, osteitis pubis, inguinal wall dysfunction and hernias
- 3,4. The complex groin and anterior pelvic anatomy and biomechanics of the pubic symphysis cause diagnostic confusion. MR imaging with a large-field-of-view and superior soft tissue resolution is an excellent diagnostic modality to assess the cause of groin pain in athletes with sports injuries.

CONCLUSION: Role of imaging is crucial in timely diagnosis of athletes with groin pain. The complex supporting structures of anterior pelvis and groin can be optimally identified on MR imaging. Furthermore, the ability to recognize imaging appearances of acute, repetitive and chronic traumatic findings help accurately diagnose the cause of the groin pain.

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Patellar Instability Revisited – A Resident Guide to Diagnosis

Sadia Qamar, University of British Columbia; Andrew van der Westhuizen, UBC; Bruce Forster, The University of British Columbia; Gordon Andrews, The University of British Columbia

LEARNING OBJECTIVES:

1. To illustrate the normal anatomy of the patellofemoral joint.
2. To describe the risk factors responsible for patellar instability.
3. To describe various measurements to diagnose patellar instability on radiographs, CT and MRI.
4. To illustrate imaging findings of the typical injuries in patellar instability/dislocation.

BACKGROUND: Patellar instability leading to patellar dislocation is widely seen in young and active individuals with higher risk in women in their second decade of life (1). Recurrent patellar dislocations are commonly seen after the initial episode of dislocation managed conservatively (2). Prompt diagnosis and treatment are advocated in patients with chronic patellar instability and recurrent dislocations to reduce early onset cartilage damage and to prevent osteoarthritis (3). Imaging modalities including radiographs, CT and MR are utilized to assess patellofemoral instability (4,5).

RISK FACTORS:

- Trochlear dysplasia
- Patella Alta
- Lateralization of the tibial tuberosity
- Muscular atrophy/hypertrophy
- Ligamentous laxity

CONCLUSION: MR imaging help promptly diagnoses and evaluate various injury patterns in patellofemoral instability. Standard measurements on appropriate imaging modalities including MR are necessary to make the diagnosis.

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Multimodal Carotid Imaging Updates and Pictorial Review of Carotid Disease and Variant Anatomy

Thien Huynh, Dalhousie University

LEARNING OBJECTIVES:

1. Review NASCET carotid stenosis measurement technique on multimodal imaging.
2. Review definitions of carotid near-occlusion and string sign.
3. Review imaging features of atherosclerotic plaque ulceration, MR intraplaque hemorrhage, free-floating thrombus and components of ECST carotid artery score.
4. Pictorial review of carotid pathology including carotid web, dissection, FMD, blunt vascular injury, carotidynia, vasculitis, Eagle syndrome.
5. Pictorial review of variant carotid anatomy including aberrant carotid artery, proatlantal intersegmental type 1 artery, persistent stapedia artery.
6. Review anatomical features ideal for carotid endarterectomy vs. carotid stenting.

BACKGROUND: Carotid artery stenosis from atherosclerotic disease accounts for 15-20% of ischemic strokes. Radiologists play a critical role in accurately characterizing carotid stenosis in order to guide appropriate management. This includes accurate quantification of stenosis and awareness of potential pitfalls in precise measurement such as carotid near-occlusion. Plaque ulceration, presence of intraluminal/free-floating thrombus, and MRI intraplaque hemorrhage may also increase the risk for future ischemic events. In the evaluation of the carotid arteries, radiologists may also encounter a variety of other pathologies including carotid webs, dissections, fibromuscular dysplasia, and other pathologies. Anatomical variants involving the carotid artery may also be identified.

CONCLUSION: Carotid vascular imaging is critical in the evaluation of patients with stroke and acute neurological symptoms. This review provides a primer on carotid vascular imaging which will enable radiologists in being able to accurately characterize carotid disease.

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Three-Dimensional Cinematic Rendering Magnetic Resonance (MR) Imaging of Knee Joint

Sadia Raheez Qamar, University of British Columbia

OBJECTIVES:

1. To explain the basic physics of three-dimensional post-processing Cinematic rendering (CR).
2. To illustrate 3D CR images of knee joint utilizing MR imaging dataset.

BACKGROUND: Multiple post-processing reconstruction techniques based on volumetric CT and MR datasets are used to generate three-dimensional (3D) images in order to better depict complex anatomical details (1). Contrary to traditional 3D post-processing techniques, CR provides visually receptive high definition images with exquisite anatomical details and has an unprecedented potential to further clinical decision making, modify surgical management and impact the patient outcome in multiple clinical applications (2). We illustrate our initial experience in displaying cinematic rendered anatomy of the knee joint using MR dataset.

CONCLUSION: Cinematic rendering (CR) is emerging as a powerful step up in clinical radiology with its true-to-life high definition. These images with enhanced dimension perception provide an altogether different visual perception and have an unprecedented potential with clinically applicable images to further to impact the patient's management.

1. Rowe.S.P., Fritz.J & Fishman.E. CT evaluation of musculoskeletal trauma: initial experience with Cinematic Rendering. *Emerg Radiol* 2018; 25:93-101.
2. Dappa.E, Higashigaito.K, Fornero.J, Leschka.S, Wildermuth.S, Alkadhi.H. Cinematic Rendering-an alternative to volume rendering for 3D computed tomography imaging. *Insights Imaging* 2016 Dec; 7(6): 849–856.

Multi-Language Patient Questionnaire for Diagnostic Imaging Examinations

Nick N. Maizlin, McMaster University

BACKGROUND: Diagnostic imaging (DI) practice utilizes patient questionnaire as an important method of gathering medical history information directly from patients. However, language barriers, particularly for non-English speaking patients, present a serious handicap to completing the questionnaires and a danger to patient safety. Interpreters are commonly employed to assist patients; however, they are not universally available, the accuracy of their translation may vary, and they may pose a breach of privacy for some patients.

OBJECTIVE: The purpose of this study was to evaluate the feasibility and practicality of a multi-language questionnaire that is displayed in a language adapted to a given patient. The questionnaire and the patient's responses are then automatically converted into the language interface of medical practice (e.g. English) to be read and reviewed by DI staff.

MATERIAL AND METHODS: The standard English-language questionnaire used for BMD examinations was professionally translated into several languages and presented to patients in electronic form. The completed questionnaire was automatically converted into English to be reviewed by DI staff.

Patients commented on the degree of comfort of using the translated questionnaire. The modified Wald method was used to establish the confidence interval (CI).

RESULTS: The results of our study demonstrate that 96.7% of patients were comfortable with the translated questionnaire, which was then automatically converted into English to be used by medical staff.

CONCLUSION: We developed a process for creating an electronic form of the BMD questionnaire in various languages with subsequent automatic conversion into English (or any other set language used by medical staff), that was then transferred to PACS. To the best of our knowledge, this approach had not been applied or tested elsewhere.



FACULTY CORPS PROFESSORAL



Bill Anderson, MD, FRCPC

Medical Imaging Consultants / American Health Services

Dr. Anderson is a practicing radiologist with Medical Imaging Consultants (MIC) in Edmonton. He is the Provincial Medical Director for Alberta Health Services (AHS) and the Zone Clinical Department Head AHS DI Edmonton Zone. Clinical Professor of Radiology at University of Alberta (UoA), CAR board member, past President of AMA (Alberta Medical Association) and ASR (Alberta Society of Radiologists). He is also a founding partner of MIC, member of the Canadian Medical Association (CMA) Board of Directors and Chair of the Political Action Committee at the CMA. His awards include the Sir Charles Tupper Award for Advocacy, the Alberta Physician of the Century Award, the Member Emeritus with Distinction Award AMA and the REACH Award of Distinction Capital Health for Clinical Leadership and Administration.



Rebecca Bromwich, PhD, LLB, LLM

Carleton University

Rebecca Bromwich is a lawyer and law teacher with interests in technology and privacy in the civil and criminal contexts.



Peter Burns, PhD

Sunnybrook Health Sciences Centre

Dr. Burns holds Ph.D. in medicine (radiodiagnosis) from the University of Bristol, UK. He has more than 20 years of experience in research in medical ultrasound imaging and blood flow measurement.



Hamid Bayanati, MD

The Ottawa Hospital, Ottawa ON

Dr. Hamid Bayanati is currently a radiologist at The Ottawa Hospital and Assistant Professor at the University of Ottawa. He graduated from the Ahvaz University of Medical Sciences and completed a radiology residency and thoracic imaging fellowship at the University of Ottawa.



Alexandre Cadrin-Chênevert, MD, FRCPC

Centres intégrés de santé et de services sociaux (CISSS)

Dr. Cadrin-Chênevert is a radiologist at CISSS Lanaudière and is affiliated with Laval University with a background in computer engineering. His current interests focus on the applications of deep learning and computer vision algorithms to improve the quality and accessibility of medical imaging services. He is a member of the CAR Artificial Intelligence Working Group.



Silvia Chang, MD, FRCPC, FSAR University of British Columbia

Dr. Chang is an Associate Professor at the University of British Columbia and an abdominal radiologist at the Vancouver General Hospital. Her area of interests includes medical education and abdominal MRI, particularly prostate and liver. She is the Abdominal Imaging Fellowship Director. She is a Fellow of the Society of Abdominal Radiology (SAR) and is a co-chair of the Educational Subcommittee of the SAR Prostate Disease Focus Panel.



Heather Chalmers GE Healthcare

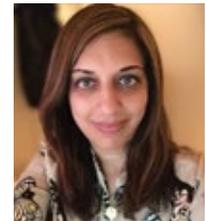
Heather Chalmers is the President and Chief Executive Officer for GE Canada, and Country Leader for GE Healthcare Canada. The world's foremost Digital Industrial company, GE Canada has produced industrial solutions for over 125 years and employs over 6500 Canadians across the Aviation, Power and Renewable Energy Sectors. She heads GE businesses that partner to reposition the Canadian economy for the future with a focus on digital, AI and Additive Manufacturing. Throughout her extensive 23-year career with GE, Heather has consistently developed and led high performing teams that are industry leaders in bringing innovative technology and digital solutions to solve complex challenges in both Canadian and global markets.



Holding a Chemical Engineering degree from Queens University and an MBA from the Rotman School of Business, Heather is an industry-leader who is Vice-Chair on the MEDEC Board, Treasurer of the St. Elizabeth Health Foundation Board, member of the C.D. Howe Institute Board, member of the Business Council of Canada and a member of the Rotman School of Management's Healthcare and Life Sciences Advisory Board.

Tanya Chawla, FRCPC, MRCP, FRCR Joint Department of Medical Imaging

Dr. Tanya Chawla graduated from the University of London, Charing Cross and Westminster Medical School UK and completed her radiology residency at the University of Southampton, UK. Dr. Chawla completed a fellowship in abdominal imaging at University Health Network (UHN) / Mount Sinai Hospital (MSH) and was a consultant radiologist in abdominal and oncology imaging in Portsmouth Hospital, UK. She is a staff abdominal radiologist and assistant professor at the Joint Department of Medical Imaging (JDMI), UHN/MSH in the division of abdominal imaging, where she is Head of GI Imaging at the JDMI. Her research interests are in both GI and gynecological imaging. Since 2017 she has been head of the Advanced Imaging and Education Centre at the JDMI and is engaged in education at the undergraduate and postgraduate level.



Leonid Chepelev, MD, PhD

University of Ottawa

Leonid Chepelev completed his Ph.D. in Biology (Bioinformatics) in 2011, developing a distributed self-organizing framework for computational metabolic fate prediction of small molecules to support toxicological and pharmacological research. After completing his MD at the University of Ottawa in 2015, he joined the laboratory of Dr. Frank Rybicki (Chair, Department of Radiology, University of Ottawa), where he pursued research in guideline development, 3D printing and recently AI-based segmentation and image quality improvement. In 2018, he became the fourth Canadian resident to date to receive the RSNA Research Resident Grant, which he will use to develop AI-based image quality improvement and segmentation assistance tools.



Derek Cool, MD, PhD, FRCPC

Western University

Dr. Cool has been an Assistant Professor within the Department of Medical Imaging, Division of Interventional Radiology at Western University since July 2016. Dr. Cool completed his BSc in computer science at the University of North Carolina, Chapel Hill. He completed a combined MD/Ph.D. program as well as diagnostic radiology residency at Western University followed by a fellowship in vascular and interventional radiology at the University Hospital Network (UHN) within the University of Toronto. Dr. Cool has clinical and research interests in genitourinary imaging and intervention, interventional oncology and medical device design.



Mauro Chies, MBA

Alberta Health Services

Mauro is the Vice President of CancerControl Alberta & Clinical Support Services and a member of the Alberta Health Services Executive Leadership Team. In his current role, Mauro has responsibility for CancerControl Alberta, diagnostic imaging, laboratory services, pharmacy, nutrition and food services, linen and environmental services and infection prevention and control. He has a master's degree in business administration and is certified NCCP Lacrosse Coach.



Matthew Davenport, MD

Michigan Medicine

Dr. Davenport is an expert on the safety and efficacy of radiographic contrast material. He has served on the U.S. Food and Drug Administration National Imaging Drugs Advisory Committee, the National Cancer Institute Clinical Imaging Steering Committee and the American College of Radiology's Committee on Drugs on Contrast Media (current chair). He has numerous national responsibilities, is a co-author on national policy statements, has published over 100 manuscripts, is chair of the Michigan Radiology Quality Collaborative and is a funded investigator. His primary clinical interests include urologic imaging and quality improvement.



Jaron Chong, MD, MHI, FRCPC

McGill University

Dr. Chong is an Assistant Professor for the Department of Radiology at McGill University. He completed radiology residency training at McGill University and an abdominal imaging fellowship at Yale New-Haven Hospital. His clinical interests include abdominal and GU/prostate oncologic imaging with research interests in the appropriate use of medical imaging and AI-assisted augmented radiology and appropriateness monitoring.



Carole Dennie, MD, FRCPC

The Ottawa Hospital / University of Ottawa

Dr. Dennie is a Professor at the University of Ottawa in the Department of Diagnostic Radiology with a cross-appointment to the Department of Medicine. She is the Head of Thoracic and Cardiac Imaging at The Ottawa Hospital and the co-director of Cardiac Radiology and MRI at the University of Ottawa Heart Institute. She is the director of Continuing Medical Education in the Department of Diagnostic Radiology, the immediate past Chair of the Diagnostic Radiology Examination Committee at the Royal College of Physicians and Surgeons of Canada and the president of the Canadian Society of Thoracic Radiology. She has published over 100 manuscripts in peer-reviewed journals and delivered over 200 invited presentations, at the CAR ASM, RSNA, Society of Thoracic Radiology, American Roentgen Ray Society, North American Society for Cardiovascular Imaging, American Thoracic Society and World Congress of Thoracic Imaging meetings.



Jonathan Chung, MD, FRCPC

Western University

Originally from Moncton, New Brunswick, Dr. Chung went to medical school at Dalhousie University in Halifax, Nova Scotia. He went on to complete his radiology residency at Western University in London then an interventional radiology fellowship at University Health Network in Toronto. He is currently an assistant professor at Western University where he works in a busy practice with a strong interventional oncology component. He is the current Western University Interventional Radiology Fellowship Director and Western University Undergraduate Medical Education Director for radiology.



Sukhvinder Dhillon,
MB, ChB, MRCP, FRCR
University of Alberta

Born and raised in the UK, Suki Dhillon moved to Edmonton, Alberta, in 2003 after completing a musculoskeletal fellowship at the University of Alberta. His research interest has included MRI of ankylosing spondylitis and aspects of spinal anatomy. Over the past three years, he has developed his main interest in medical education. His primary focus in this field is making the process of learning radiology more efficient using targeted methods. He is currently developing online educational material and has overseen the development of a radiology-learning lab. He gained experience in clinical audits at Northwick Park Hospital, UK. He instituted the departmental clinical audit program at the University of Alberta's Hospital Radiology department. He has helped to develop the CAR clinical audit competition and has judged on many occasions.



Richard Duszak, MD
Emory University School of Medicine

Richard Duszak is Professor and Vice Chair for Health Policy in the Department of Radiology at Emory University. Currently Council Vice-Speaker of the American College of Radiology (ACR), he serves as Associate Editor for Health Services Research and Policy for the Journal of the American College of Radiology. Recently recognized by Aunt Minnie as America's most influential radiology researcher, Duszak has been honoured as a fellow of the ACR and the Society of Interventional Radiology and is the first-ever physician fellow of the Radiology Business Management Association. He has authored over 300 publications and delivered over 500 invited lectures, mostly focusing on health policy and practice management. Prior to joining Emory, Duszak served as Founding CEO of the Harvey L. Neiman Health Policy Institute. He previously spent nearly two decades in private practice and served as president of a large radiology group in his home state of Pennsylvania.



Mary Jane Dykeman
DDO Health Law

Mary Jane Dykeman is Partner and Co-Founder at INQ Data Law and DDO Health Law, a boutique law practice in Toronto. She practises as a health and privacy/AI lawyer. She regularly assists hospitals, long-term care homes, research institutions and other public and private sector clients to find practical solutions to legal, clinical, risk, reputation and privacy matters. Mary Jane has extensive experience responding to privacy breaches, advising on the creation of complex shared health information systems, and training (including boards, senior teams, privacy officers and frontline staff) on legal requirements and emerging trends. She also works extensively on specialized issues in health research and data use, as well as advising on client/consumer portals, discussion boards, website content and assisting mobile app developers in the health care space. She has authored a number of significant health sector reports, including for the Law Commission of Ontario and the Ontario Mental Health Foundation. Mary Jane teaches mental health in Osgoode's Health Law LL.M. program, is Vice-Chair of the Alzheimer Society of Toronto and incoming Chair of the Canadian Blood Services Research Ethics Board.



Marco Essig, MD, PhD, FRCPC
University of Manitoba, Winnipeg,
Manitoba, Canada

Dr. Marco Essig is Professor and Chair of the University of Manitoba Radiology Department, and Medical Director of the Winnipeg Regional Health Authority Diagnostic Imaging Program. He received his medical degree and doctorate in neurological sciences from the University of Heidelberg, Germany. After completing a residency in radiology at the German Cancer Research Centre, Dr. Essig completed a fellowship in neuroradiology at the University of Iowa Hospitals and Clinics, and a second in interventional radiology at Brigham and Women's Hospital at the Harvard Medical School. Dr. Essig earned a board certification in diagnostic radiology and neuroradiology and was appointed professor at the University of Heidelberg in 2006. Dr. Essig's research focuses on the integration of functional imaging techniques into neuroimaging protocols in order to enable individualized and improved patient management with a special focus on brain cancer.



Carolyn Flegg, MD, FRCPC

Associated Radiologists LLP

Dr. Carolyn Flegg received her medical degree from the University of Saskatchewan. Following her radiology residency training at Queen's University in Kingston, Ontario, she completed a fellowship in oncology imaging through McMaster University at the Henderson Hospital site in Hamilton, Ontario. In 2007, after working at the Henderson Hospital for a year following her fellowship, Dr. Flegg returned home to Saskatchewan, where she joined Associated Radiologists in Saskatoon. While her practice encompasses all areas of general diagnostic radiology, her primary field of interest is oncology, particularly breast imaging. In 2009 and 2010, Dr. Flegg served as the Clinical Head for the Department of Medical Imaging of the Saskatoon Health Region. She is currently the Medical Director of the Breast Health Centre at Saskatoon City Hospital and the Chair of the Board of Directors for the Canadian Association of Radiologists.



Bruce Forster, MD, FRCPC

University of British Columbia

Dr. Bruce Forster is Professor, Head of the Department of Radiology and Academic Director of the Office of Education Innovation at the University of British Columbia. He was Director of Diagnostic Imaging for the Vancouver 2010 Winter Olympics / Paralympics Games. As an Associate Member of the Allan McGavin Sports Medicine Centre, he has been involved in the clinical, educational and research aspects of sports imaging for 25 years. Dr. Forster has delivered over 400 invited lectures, many internationally, and has served as a visiting professor in Canada, the United States, South-East Asia, South America and the Middle East. He is the author of over 130 peer-reviewed scientific publications and 120 educational exhibits. He has also served as President of the Pacific Northwest Radiology Society and on the Board of Directors of the Canadian Association of Radiologists. He is currently the President of the Canadian Radiologic Foundation. Dr. Forster is Lead Physician for 'Choosing Wisely Medical Imaging,' one of the most comprehensive appropriateness initiatives in British Columbia.



Wende Gibbs, MD, MA

University of Southern California

Dr. Gibbs is a neuroradiologist at the University of Southern California and Director of Spine Imaging and Intervention at Keck Hospital, the Norris Comprehensive Cancer Center and the Los Angeles County Medical Center. Dr. Gibbs has focused her research, service and education efforts on spine imaging and intervention. She is a frequently invited speaker at national radiology and multidisciplinary meetings. She has authored multiple book chapters, peer-reviewed journal articles and award-winning abstracts, scientific talks and exhibits. She holds committee and leadership positions in the American Board of Radiology, American College of Radiology, RSNA, ASNR, ASSR, ARRS and WNRS. She is also the Podcast Editor and Host for the American Journal of Neuroradiology. In addition to spine topics, her interests include patient safety, communication, ethics, education, artificial intelligence and machine learning.



Cameron Hague, MD

University of British Columbia

Dr. Hague is a cardiothoracic and body radiologist working at St. Paul's Hospital in Vancouver, BC. He is the program director for the University of British Columbia Diagnostic Radiology Residency.



Anthony Hanbidge, MB, BCh, FRCPC

Toronto Joint Department of Medical Imaging, University of Toronto

Anthony Hanbidge is Deputy-Chief of Education at the Toronto Joint Department of Medical Imaging (Sinai Health System, University Health Network and Women's College Hospital) and Chair of the Toronto Joint Department of Medical Imaging Education Committee. He is Site Director of Abdominal Imaging at Toronto Western Hospital and a Staff Radiologist in the Division of Abdominal Imaging. He is Chair of the Alumni Association and Associate Professor in the Department of Medical Imaging, Faculty of Medicine at the University of Toronto. His practice is primarily located at Toronto Western Hospital. His main clinical interests are ultrasound and CT of the abdomen and pelvis. He has a strong interest in teaching.



Alison Harris, BSc, MBChB, FRCR, FRCPC, FSAR

Vancouver General Hospital

Dr. Alison Harris is a Clinical Associate Professor at the University of British Columbia (UBC) and a staff radiologist at the Vancouver General Hospital and UBC Hospitals. She is the medical head of the Abdominal Section and is the current president of the BC Radiological Society. Dr. Harris attended medical school at the University of Leicester, England and undertook her radiology residency at St Mary's Hospital, London, England. She did a Fellowship in abdominal imaging and intervention at VGH (1999-2000). She worked at the BC Cancer Agency, Vancouver, for three years and then at the University Health Network in Toronto for one year, returning to Vancouver in 2004. She has been a staff radiologist at VGH since 2005. Her clinical and research interests are in CT and MR imaging of the abdomen, non-vascular intervention, contrast-enhanced ultrasound and non-invasive methods of assessing liver fibrosis. She is a member of the Liver Tumor Board, Pancreas Tumor Board and the Prostate Imaging group and is a speaker at local, national and international radiology meetings. Dr. Harris holds committee appointments at the Doctors of BC regarding guideline development for family physicians and is a member of the provincial negotiations forum.



Taryn Hodgdon, MD
The Ottawa Hospital

Dr. Taryn Hodgdon completed her radiology residency training at the University of Ottawa in 2016, followed by a one-year clinical fellowship at The Ottawa Hospital in musculoskeletal imaging and a two-month observership at AIRP in musculoskeletal imaging. She is an Assistant Professor at the University of Ottawa and works as a radiologist in the division of musculoskeletal radiology in the Department of Medical Imaging at The Ottawa Hospital.



Jacob Jaremko, MD, PhD
University of Alberta

Jacob Jaremko is a pediatric musculoskeletal radiologist, Associate Professor and Capital Health Endowed Chair at the University of Alberta in Edmonton. He obtained a combined MD-Ph.D. at the University of Calgary, residency training in Diagnostic Radiology at the University of Alberta in Edmonton and two clinical fellowships: pediatric radiology at the Royal Children's Hospital / University of Melbourne, Australia, and musculoskeletal radiology at Massachusetts General Hospital in Boston, USA. His main research interests are in pediatric musculoskeletal development, adult arthritis and use of artificial intelligence to automate image analysis.



Ania Kielar, MD, FRCPC
University of Toronto

Ania Kielar is a radiologist at the Joint Department of Medical Imaging and the University of Toronto. She completed her radiology residency at the University of Ottawa and a fellowship in abdominal radiology at the University of Michigan in Ann Arbor. Her area of research includes quality assurance to reduce errors in radiology reporting. She is an associate editor for Abdominal Radiology and on the steering committee for LI-RADS.



Mario Kontolemos, MD CM, MSc, FRCPC
The Ottawa Hospital, University of Ottawa,
Ottawa, Ontario, Canada

Originally from Montreal, Dr. Mario Kontolemos completed medical school training and a residency in radiology at McGill University in 2011, followed by a fellowship in diagnostic neuroradiology at the University of Ottawa, where he is practicing in a tertiary-care setting. His main clinical interests are stroke and CNS tumour imaging as well as head and neck imaging. In parallel, he maintains a strong passion for medical education with ongoing active involvement in the radiology resident training program in Ottawa.



Tae Kyoung Kim, MD, PhD
Medical Imaging, Toronto General Hospital

Dr. Tae Kyoung Kim is a radiologist and Professor at the University of Toronto. He studied medicine at Seoul National University, Korea, where he received an MD from the College of Medicine in 1991 and a Ph.D. in 1999. Since Dr. Kim moved to Toronto in 2003, he has worked as an abdominal radiologist and an active researcher in the Joint Department of Medical Imaging at the University Health Network, Mount Sinai Hospital and Women's College Hospital. Dr. Kim's major research interest is in cross-sectional imaging of hepatobiliary and pancreatic tumours. His recent research works have focused on imaging diagnosis of hepatocellular carcinoma and cirrhosis-related nodules, contrast-enhanced ultrasound and pancreatobiliary malignancies. Dr. Kim is an author and co-author of 220 scientific publications in peer-reviewed journals, and has served as a reviewer on a number of major radiology and hepatology journals.



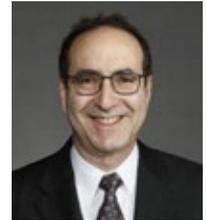
Iain Kirkpatrick, BSc (Gen), BSc (Med), MD, FRCPC, DABR, FSAR
University of Manitoba

Dr. Kirkpatrick graduated medical school and radiology residency at the University of Manitoba and then completed a subspecialty fellowship training in abdominal and pelvic imaging at Stanford University. He remained a visiting faculty member at Stanford until 2012 while working at St. Boniface Hospital in Winnipeg. Dr. Kirkpatrick is currently an Associate Professor of Radiology at the University of Manitoba and Section Head of Abdominal Imaging for Manitoba. He also practices cardiovascular CT and MRI and has research interests that span both abdominal and cardiovascular imaging.



Jeffrey Klein, MD
University of Vermont Medical Center

Dr. Jeffrey Klein is a native of Brooklyn, New York, where he attended undergraduate and medical schools. Following a residency in diagnostic radiology at the State University of New York Downstate Medical Center, he completed a fellowship in thoracic radiology at the University of California San Francisco (UCSF) Medical Center. After faculty positions at UCSF/San Francisco General Hospital and St. Joseph's Hospital and Medical Center in Phoenix, Arizona, from 1990-1995, he moved to the University of Vermont College of Medicine in 1995 where he currently serves as the A. Bradley Soule and John P. Tampas Green and Gold Professor of Radiology. He has been Editor of RadioGraphics since 2011 and is currently the RSNA Board of Directors Liaison for Publications and Communications. He continues as a clinical thoracic radiologist and educator with an interest in CT, lung nodule evaluation and scholarly publishing.



Benjamin Kwan, MD, FRCPC, DABR Queen's University

Dr. Benjamin Kwan is a neuroradiologist and Assistant Professor at Queen's University. He is the Assistant Program Director of the Diagnostic Radiology Residency Program at Queen's University and CBME Lead. Dr. Kwan is also a faculty member at the Centre for Neuroscience Studies at Queen's University and is a member of the educational committee of the American Society of Head and Neck Radiology. He received his medical education at the University of Ottawa and Diagnostic Radiology Residency at Western University. Following residency, Dr. Kwan completed a neuroradiology fellowship at the University of Toronto and was the Chief Fellow. His research interests include vessel wall imaging, giant cell arteritis and medical education.



Marie-Constance Lacasse, MD, FRCPC University of Sherbrooke

Dr. Lacasse is currently an academic neuroradiologist and assistant professor at the University of Sherbrooke. She is also an adjunct professor of neuroradiology at McGill University. Dr. Lacasse completed her medical studies at McGill University in 2010. She then pursued a diagnostic radiology residency at the University of Montreal. Upon graduation in 2015, she completed a two-year diagnostic neuroradiology fellowship at the University of Toronto, where she acted as chief fellow during her second year. Dr. Lacasse is actively involved in the regional head and neck tumour boards in Sherbrooke. She is also part of the residency program committee at the University of Sherbrooke and enjoys teaching residents and fellows, witnessing them evolve into independent practicing radiologists. Outside of medicine, Dr. Lacasse enjoys travelling around the world, photography and playing basketball.



Emil Lee, MD, FRCPC Valley Medical Imaging

Dr. Emil Lee is a community radiologist with a subspecialty in interventional radiology with the Valley Medical Imaging group in the Fraser Valley of beautiful British Columbia. Dr. Lee is the President of the Canadian Association of Radiologists and is the Regional Medical Director/Regional Department Head of Medical Imaging, Fraser Health Authority. He is Past President of the British Columbia Radiological Society and the Doctors of BC Section of Radiology, having served as President from 2010–2012. He has been a member of and continues to serve, on national, provincial, health authority and local committees. Dr. Lee attended the University of British Columbia for medical school and his diagnostic radiology residency. After completing a fellowship in interventional radiology at the University of Iowa, he returned to British Columbia where he has been practicing since. Dr. Lee's outside interests include travel, running, scuba diving, skiing and debating with his wife and two children.



Mark Levental, MD, FRCP Jewish General Hospital

Dr. Levental is an Associate Professor of Radiology at McGill University. He completed his medical school training at McGill University, Montreal in 1988. He first did a residency in family medicine and then a residency in diagnostic radiology at McGill University. In 1996, Dr. Levental completed an abdominal imaging fellowship at the University of California at San Diego. He has been an examiner with the Royal College of Physicians of Canada since 2005. Dr. Levental has special interests in abdominal imaging as well as neuro/ENT imaging.



Marcos Loreto Sampaio, MD University of Ottawa / The Ottawa Hospital

Marcos Sampaio is an MSK radiologist with special interest in MSK ultrasound and MRI techniques. He is currently the MSK fellowship program director at the University of Ottawa (uOttawa). In prior years, uOttawa students, radiology residents and fellows awarded him as best radiology teacher. He also holds a degree in electronic engineering and in his spare time he is an amateur musician.



David Lyons, MD, FRCPC

Deep and River District Hospital

Dr. David Lyons received his medical degree at Queens University and training in diagnostic imaging at Toronto General Hospital, University of Toronto. He represented the CAR/Ontario Association of Radiologists (OAR) on the Osteoporosis Canada panel leading to the CAROC 2005 recommendations, which applied the concept of 10-year absolute risk, and later was the OAR representative on the panel updating CAROC to the CAROC 2010 fracture risk assessment tool. As the medical director for the OAR's CBMD Facility Accreditation Program he has been a strong advocate for quality assurance and quality control in the performance and reporting of bone mineral densitometry. He pioneered the CBMD Facility Accreditation Program, and has played a vital role in the OAR's continuing medical education courses to support the Facility Accreditation Program. Dr. Lyons was instrumental in the development of continuing education programs for technologists performing BMD studies and was responsible for developing the Accredited Densitometry Technologist (ADT) Recognition for technologists who complete a written exam targeted to the accreditation process as well as a practicum requiring submitted scans. He has also promoted standardization in BMD reporting with the development of a report builder workstation course that has been instrumental in supporting reporting physicians in achieving quality BMD reports required for Facility Accreditation.



Daniel Margolis, MD

Weill Cornell Medical College

As an Associate Professor in the body imaging section of the Department of Radiology and Co-Director of Prostate MRI For Weill Cornell Imaging-New York Presbyterian Hospital, Dr. Margolis oversees all clinical aspects of prostate magnetic resonance imaging as they relate to the detection and characterization of prostate cancer for targeted biopsy, surgery, radiation planning, treatment follow-up and active surveillance. This has resulted in multiple publications demonstrating the effectiveness of prostate MRI for clinical management. He is part of the American College of Radiology Prostate Imaging Reporting and Data Systems steering committee and is invited to lectures at the Society of Abdominal Radiology, International Society for Magnetic Resonance in Medicine and Radiological Society of North America, as well as lectures abroad. Having completed the K30 Graduate Training Program in Translational Investigation, he provides expertise in clinical trial design incorporating medical imaging in addition to designing the imaging protocol itself.



Daria Manos, FRCPC

Dalhousie University

Dr. Manos is the head of thoracic radiology at the QEII Hospital in Halifax, Nova Scotia, and is an Associate Professor at Dalhousie University. A regular lecturer for the largest radiology CME meetings in North America, Dr. Manos has won many teaching awards for digital, interactive and print-based educational resources. Dr. Manos is a strong supporter of the CAR and a proud founding member of the Canadian Society of Thoracic Radiology.



Vincent Mellnick, MD

Mallinckrodt Institute of Radiology

Dr. Mellnick received his bachelor's and medical degrees from the University of Notre Dame and the University of Texas Health Science Center at Houston, respectively. After completing his radiology residency and an abdominal imaging fellowship at Washington University's Mallinckrodt Institute of Radiology in St. Louis, he remains on staff there and is currently an Associate Professor of Radiology, serving as the abdominal imaging section chief as well as the co-director of Emergency Radiology.



Matthew McInnes, MD, FRCPC

University of Ottawa, Ottawa, Ontario, Canada

Dr. Matthew McInnes is an Associate Professor at the University of Ottawa and Director of the Diagnostic Radiology Residency Program. He is a radiologist at The Ottawa Hospital Department of Medical Imaging, Abdominal and Chest Radiology divisions, and a clinical investigator in The Ottawa Hospital Research Institute (OHRI) Clinical Epidemiology program. He is deputy editor for the Journal of Magnetic Resonance Imaging and associate editor for Radiology, both in the area of evidence-based practice. He completed radiology training at the University of Toronto in 2006, followed by a one-year clinical fellowship in abdominal imaging at the University of Toronto University Health Network. He holds a cross appointment in the School of Epidemiology, Public Health and Preventive Medicine at the University of Ottawa. Dr. McInnes' current areas of research interest are systematic reviews and diagnostic test accuracy in imaging.



Elka Miller, MD, FRCPC

Children's Hospital of Eastern Ontario

Dr. Elka Miller is the Chief, Medical Director, and Research Director of the Medical Imaging Department at The Children's Hospital of Eastern Ontario (CHEO). She is part of the pediatric radiology team at CHEO and practices clinical pediatric imaging with a special interest in pediatric neuroradiology and fetal imaging. Dr. Miller has published 59 peer review articles and eight book chapters on different topics of pediatric radiology and pediatric neuroradiology. Dr. Miller has been awarded many research grants. She has been the recipient of the Editor Recognition Award for reviewing with distinction from the Radiology Journal (2012, 2013, 2016) and also received the RSNA Roentgen Resident/Fellow Research Award in 2008. Dr. Miller received the Anne G. Osborn ASNR International Outreach Professor Program 2018 award.



William Miller, MD, FRCPC

The Ottawa Hospital

Dr. William Miller is currently a practicing neuroradiologist at The Ottawa Hospital. He is an Assistant Professor at the University of Ottawa. He served as the acting Chief/Chair of Diagnostic Imaging at The Ottawa Hospital from September 2006 until October 2008. He is a Past-President of the Canadian Association of Radiologists and has served on the CAR Board of Directors since 2010. He is currently serving his second term on the American College of Radiology Board of Chancellors. Dr. Miller graduated from the Faculty of Medicine at the University of Manitoba. He completed a rotating internship at McGill University in Montreal then went on to practice as a family physician for 13 years before returning to complete a four-year radiology residency at the University of Missouri. He completed his training with a two-year neuroradiology fellowship at the University of Toronto. He has practiced neuroradiology in Ottawa since 1999. Dr. Miller is a proud father, an avid photographer, golfer and cottager.



Andra Morrison

CADTH

Andra Morrison currently leads the Canadian Medical Imaging Inventory at CADTH. She also has extensive experience in setting up and operationalizing horizon scanning programs, and providing advice to organizations that are setting up new programs. Andra has implemented a wide variety of stakeholder engagement initiatives for health technology-related activities. She has a background in journalism and librarianship.



Amol Mujoomdar, MD

London Health Sciences Centre/Western University

Dr. Mujoomdar is an associate professor of radiology and oncology at Western University and the Division Head of Interventional Radiology at the integrated department of Medical Imaging of the London Health Sciences Centre and St. Joseph's Health Centre in London, Ontario. His clinical and research interests include interventional oncologic treatment of liver malignancies, include ablation, TACE and Y90 along with outcomes.



Richard Mimeault, MD, FRCSC

Canadian Medical Protective Association

Dr. Mimeault completed his medical degree at McGill University in 1982. He went on to do an internship at the Wellesley Hospital in Toronto, a general surgery residency in Ottawa and a two-year transplant fellowship at the University Hospital in London, Ontario. In 1989, he returned to Ottawa where he started a practice of general and hepatobiliary surgery at the Ottawa Hospital. He was in practice for 27 years during which time he was closely involved with the residency training program and undergraduate education. He was also peer assessor for the College of Physicians and Surgeons of Ontario (CPSO) and volunteered in third-world surgery and surgical education. He joined the Canadian medical Protective Association as a physician advisor in 2017.



Mark Murphey, MD

American Institute for Radiologic Pathology

Dr. Murphey has been an academic radiologist over 30 years and has directed all his scholarly activities to his subspecialty of musculoskeletal imaging. In his early years at the University of Kansas, he published the first article on MRI of the sacroiliac joint. In 1993, Dr. Murphey moved to the Armed Forces Institute of Pathology (AFIP), which provided a unique opportunity to understand the pathologic basis of a disease's radiologic appearance. In 2010-2011, Dr. Murphey was instrumental in the transition from the AFIP to the American Institute for Radiologic Pathology (AIRP). Dr. Murphey is currently the Physician-in-Chief and the Chief of Musculoskeletal Imaging at the AIRP. Dr. Murphey has particularly emphasized research on the imaging appearance of musculoskeletal tumours and has published 146 peer-reviewed articles, 155 abstracts, 27 books/book chapters, 72 scientific exhibits and given 606 national and international presentations. Dr. Murphey's academic career has been extraordinarily fulfilling, and he hopes that his efforts have broadened our knowledge and understanding of the imaging of musculoskeletal disease.



Mohammed F. Mohammed,

MBBS, SB-RAD, CIIP

King Saud bin Abdulaziz University for Health Sciences, King Abdullah International Medical Research Center, Ministry of the National Guard

Dr. Mohammed is a consultant of abdominal imaging and Emergency/Trauma Radiology at King Abdulaziz Medical City in Riyadh, Saudi Arabia. He completed fellowships in abdominal imaging, emergency/trauma radiology and imaging informatics at the Vancouver General Hospital. His research focuses on the application of multi-energy CT in abdominal oncology and the acute abdomen.



Mike Nader
Hospital name

Details to come.



Ali Naraghi, FRCR
Toronto Joint Department of Medical Imaging,
University of Toronto

Ali Naraghi is a staff radiologist in the Division of Musculoskeletal Radiology at the Joint Department of Medical Imaging at Mount Sinai Hospital, University Health Network and Women's College Hospitals at the University of Toronto. He received his medical degree from the University of London, UK, and undertook his residency at St Bartholomew's Hospital, London. He completed his fellowship training in musculoskeletal radiology and currently holds the rank of assistant professor at the University of Toronto. His academic interests include the imaging of sports injuries, the imaging of peripheral nerves and arthritis imaging.



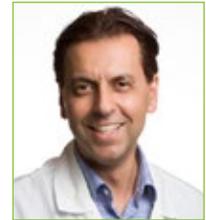
Elsie Nguyen, MD, FRCPC
Toronto General Hospital, University of Toronto

Dr. Elsie Nguyen is an Associate Professor of Radiology, in the cardiothoracic division at the Peter Munk Cardiac Centre, Toronto General Hospital. She is passionate about education and has won several teaching awards for her teaching at the undergraduate and post-graduate level. Her research interests include lung nodule localization techniques, cardiac CT optimization techniques and MR imaging of myocardial iron overload.



Savvas Nicolaou, MD, FRCPC
University of British Columbia

Dr. Nicolaou is a Professor of Radiology, Vice-Chair of the Undergraduate Education and Continuing Professional Development for the University of British Columbia (UBC) Department of Radiology, Head of the General Division of the Department of Radiology and the Director of Emergency/Trauma Radiology at Vancouver General Hospital. His outstanding research in emergency radiology has earned him 36 awards to date from professional membership societies, including 10 Certificates of Merit and the Aunt Minnie Roadie Award 2018 from the Radiological Society of North America. He has authored over 160 peer-reviewed scientific publications and over 300 educational exhibits, with current research in cardiac, musculoskeletal and emergency radiology. He is one of Canada's most experienced educators in emergency radiology, and his lectures locally, nationally and internationally reflect his dedication, expertise and outstanding collaborative skills.



Michael O'Keeffe, MD
Sunnybrook Health Sciences Centre, Toronto,
Ontario, Canada

Dr. Michael O'Keeffe is an Assistant Professor of ER/Trauma Imaging at the University of Toronto. He is a radiologist at Sunnybrook Health Sciences Centre.



Emily Pang, MD
Vancouver General Hospital, Vancouver, British
Columbia, Canada

Dr. Emily Pang is an abdominal radiologist at the Vancouver General Hospital. She completed a residency in radiology at the University of Toronto and a fellowship in abdominal imaging at the Vancouver General Hospital.



Michael Patlas, MD, FRCPC, FSAR
McMaster University

Dr. Patlas is a Professor of Radiology and Emergency/Trauma Division Chief at the McMaster University, Hamilton, Ontario. His main research interests include imaging of traumatic and non-traumatic abdominal emergencies. He has authored over 80 peer-reviewed papers and book chapters and edited two books.



Narinder Paul,
BM, MRCP (UK), FRCR (UK), FRCPC
 Western University, Schulich School of Medicine
 and Dentistry



Dr. Paul is Professor and Chair of Medical Imaging at the University of Western Ontario in London, Ontario. He is also the city-wide Chief of Medical Imaging in the London Hospitals and a scientist at both Lawson and Robarts Research Institutes. He completed his early training in England before moving to Canada in 2000, where he became the Division Head in Thoracic Imaging at the University Health Network and Mount Sinai Hospitals, Toronto. Dr. Paul has 107 peer-reviewed publications, 164 refereed abstracts and his research interests include image optimization, ultralow-dose cardiothoracic CT and lung perfusion CT. He worked with research scientists from Toshiba Medical Systems and Carestream Health for many years in Toronto, with the last few years focused on digital tomosynthesis, dual energy and dynamic imaging and lung perfusion.

Francesca Proulx,
MD, CM, FRCPC, dABR
 Jewish General Hospital



Dr. Proulx completed medical school and a residency in diagnostic radiology at McGill University. After spending a year in Boston at the Beth Israel Deaconess Medical Center to do a fellowship in Women's Imaging, she completed her post-residency training with a six-month fellowship in thoracic imaging at the Centre hospitalier de l'Université de Montreal (CHUM) in Montreal. She is now an assistant professor of diagnostic radiology at McGill University and the Breast Imaging Section Chief at the Jewish General Hospital in Montreal.

Derek Puddester, MD Med FRCPC PCC
 University of Ottawa



Dr. Puddester is an Associate Medical Director at the Ontario Medical Association's Physician Health Program, and was previously Director of Physician Health at the Canadian Medical Association. He is the Special Project Lead for Innovation/Evaluation in the Postgraduate Medical Education Office at uOttawa where he is an Associate Professor in the Department of Psychiatry.

Dr. Puddester specializes in paediatric telepsychiatry. Previously, he was the Director of the Behavioural Neurosciences and Consultation-Liaison team at the Children's Hospital of Eastern Ontario. He is a Certified (PCC) Executive Coach and exclusively coaches physicians and senior health care leaders. Finally, he teaches internationally on physician health, time management, inter professional education, conflict management and medical education. Dr. Puddester obtained his B.A., B. Med. Sc., and M.D. from Memorial University of Newfoundland. He completed a residency in Psychiatry at McMaster University, and a fellowship in child/adolescent psychiatry at University of Ottawa. In 2008, he completed a M. Ed. at uOttawa. In 2011, he completed the Graduate Program in Executive Coaching at Royal Roads University.

Dr. Puddester is the lead editor of the RCPSC's CanMEDS Physician Health Guide and co-author of the RCPSC's Time Management Guide. He also produced Carpe Diem (a physician resiliency documentary), and was the project lead for ePhysicianHealth.com and eWorkplaceHealth.com.

Alban Redheuil, MD, PhD
 Sorbonne Université Médecine, Hôpital Pitié
 Salpêtrière AP-HP



Dr. Redheuil is a cardiovascular radiologist at the Pitié Salpêtrière Hospital, Institute of Cardiology, Professor of Medicine at Sorbonne University and member of the LIB Inserm team focused on basic and applied research of morphological, functional and molecular cardiovascular imaging methods. Lead of Institute of Cardiometabolism and Nutrition Imaging Core Lab and Research MRI Platform. His research interests include: cardiovascular MRI and computed tomography, population/cohort imaging and clinical research, biomedical image processing, imaging biomarkers.

Christine Saint-Martin, MD, MSc
 Montreal Children's Hospital MUHC



Dr. Saint-Martin is a pediatric radiologist at the Children's Montreal Hospital since 2006, in charge of pediatric neuroradiology, head and neck imaging and intra-operative magnetic resonance imaging. French native, she did her training in radiology in Strasbourg and Paris, followed by three years of fellowship in Strasbourg, France and in Brussels, Belgium. She then practiced full-time pediatric radiology at the Catholic University of Louvain in Brussels for 11 years where she developed her favourite poles of neuro-oncology and neonatal neuroimaging. In 2006, she moved with her family to join the Montreal Children's Hospital (McGill University Health Center) to further develop pediatric neuroradiology. Her daily activities focus on patient care and clinical pediatric radiology, but she is inseparable from training residents, contributing to research and sharing her experience and knowledge outside and inside of the radiology community.

Jennifer Sammon, MB BCH BAO,
FFR(RCSI), FRCPC
 University of Toronto



Dr. Jennifer Sammon graduated from the University College Cork, Ireland and completed her radiology residency at Cork University and Mercy University Hospitals, Ireland. Dr. Sammon completed a fellowship in abdominal imaging and musculoskeletal imaging with the University of Toronto at University Health Network (UHN) / Mount Sinai Hospital (MSH). She is a staff abdominal radiologist and assistant professor at the Joint Department of Medical Imaging, University Health Network, Sinai Health System, Women's College Hospitals, Toronto in the division of abdominal imaging. Her research interests are in both GI and hepatobiliary imaging. She is also involved with undergraduate and postgraduate education and is a JDMI site supervisor for the University of Toronto radiology residency program.

Karl Sayegh, MD

McGill University Health Center

Dr. Sayegh is currently an Assistant Professor of radiology at McGill University and the Director of Cardiac and Thoracic Imaging at McGill University Health Center. Dr. Sayegh's main interests include assessment of coronary artery disease by cardiac CT, lung cancer and lung cancer screening and cross-sectional interventions. Dr. Sayegh completed a fellowship in abdominal imaging and intervention at the Brigham and Women Hospital. He then completed a fellowship in cardiothoracic imaging at the Massachusetts General Hospital, where he also served as a Clinical Assistant in radiology. He then completed an additional fellowship in cardiac imaging at the Baptist Cardiac and Vascular Institute.



Mariano Scaglione, MD, FASER, FESER, FESGAR

Pineta Grande Hospital

Dr. Mariano Scaglione is Head of the radiology department at Pineta Grande Hospital and Consultant Radiologist/Emergency Radiology Lead/CT Lead at Sunderland Royal Hospital, UK.



He is a renowned invited speaker at international meetings with more than 120 papers and 11 books. Dr. Scaglione was the Chairman for the Emergency Radiology Subcommittee at ECR 2012, President of the Italian College of Emergency Radiology (2010-2012, 2012-2014) and the second president of the European Society of Emergency Radiology. He was awarded the Gold Medal for ESER 2014 and an honorary member for ESER 2019.

Nicola Schieda, MD

The Ottawa Hospital

Dr. Schieda is Director of Abdominal and Pelvic MRI at The Ottawa Hospital. He is also an Associate Professor and the Junior Research Chair in Radiology at The University of Ottawa.



Robert Sevick, MD, FRCPC, FACR

University of Calgary

Dr. Sevick obtained his medical degree from the University of Alberta in 1984 and was a rotating intern at St. Michael's Hospital at the University of Toronto (1984-85), a resident in diagnostic radiology at the University of Calgary (1985-89) and a fellow in neuroradiology at the University of California, San Francisco (1989-91). He joined the Department of Radiology of the Cumming School of Medicine, at the University of Calgary in 1991. A member of the Hotchkiss Brain Institute and professor with the Departments of Radiology and Clinical Neurosciences, Dr. Sevick served two terms as Head of the University of Calgary's Department of Radiology and Zone Clinical Department Head for Alberta Health Services (Calgary Zone), from 2006-2016. Dr. Sevick is well known for his contributions to neuroradiology and MR imaging. He has served in a number of leadership roles in radiology and neuroradiology, both locally and nationally, as Chair of the Examination Board in Diagnostic Radiology and Chair of the Committee on Specialties for the Royal College of Physicians and Surgeons of Canada. He has served on the boards of the Canadian Association of Radiologists and Canadian Radiological Foundation. In 2017, Dr. Sevick was recognized for his contributions to Diagnostic Radiology and Neuroradiology and awarded fellowship in the American College of Radiology. Dr. Sevick currently practices diagnostic neuroradiology and interventional spine therapy in Calgary. He is the Medical Director of the Seaman Family MR Research Centre. He and his wife Brenda have three adult children. In his leisure, he enjoys running, downhill skiing, golf and plays trumpet in a jazz big band.



Adnan Sheikh, MD

The Ottawa Hospital

Dr. Adnan Sheikh is an Associate professor of radiology at the University of Ottawa. He is the Vice Chair of Innovation and Technology at the Department of Medical Imaging and Medical Director of 3D Printing at The Ottawa Hospital. He is also the Associate Editor of 3D Printing in Medicine. In addition, Dr. Sheikh is the Director of Advanced Musculoskeletal Interventions and Section head and fellowship Director of Emergency Radiology at the Ottawa Hospital. Dr. Sheikh received his medical school and radiology specialist training in India and completed fellowships in musculoskeletal imaging and emergency trauma imaging from the University of British Columbia before coming on staff at The Ottawa Hospital in 2005. His clinical interests are patient-specific 3D printing, marrow imaging, functional musculoskeletal imaging, bone and soft tissue tumour imaging, MSK intervention and emergency/trauma imaging. Dr. Sheikh is actively involved in multimodality imaging based multidisciplinary research projects in collaboration with researchers from the Division of Orthopedic Surgery and Department of Physical Medicine and Rehabilitation at the University of Ottawa. Dr. Sheikh is the radiology lead for the marrow study on astronauts at the International Space Agency, sponsored by Canada Space Agency and NASA.



Jason Shewchuk, MD University of British Columbia

Dr. Shewchuk is a Clinical Associate Professor at the University of British Columbia (UBC) and Medical Director of Neuroradiology. He's the regional representative on the Royal College Neuroradiology Subspecialty Committee.



Lisa Smyth, BSc, MD, FRCPC, ABR St. Clare's Mercy Hospital, St. John's, Newfoundland and Labrador, Canada

Dr. Lisa Smyth is a diagnostic radiologist at St. Clare's Mercy Hospital and practices general radiology, with subspecialties in thoracic and breast imaging, being the Chief of service of Thoracic Imaging. She completed a fellowship at The Ottawa Hospital, University of Ottawa. With a keen interest in imaging-guided procedures, Dr. Smyth teaches at the Memorial University Medical School, as well as in the Diagnostic Radiology residency program.



Carolyn Thomson, MD, CCFP, FCFP Dalhousie University

Dr. Thomson graduated from Dalhousie University in 1989 and finished her residency in family medicine in 1991. For 18 years, she practiced obstetrics, emergency medicine and inpatient care. In 2009, she joined the Department of Family Medicine at Dalhousie University as an Assistant Professor where she continues to be heavily involved in teaching and clinical care. Dr. Thomson was Chief of the Department of Family Medicine at the IWK Health Centre from 2006-2012. She was the Director of the Professional Support Program at Doctors Nova Scotia from 2010-2017. In 2017, she became the first Assistant Dean of Resident Affairs at Dalhousie University. She is passionate about promoting and supporting wellness among physicians, residents and medical students.



Carlos H. Torres, MD, FRCPC University of Ottawa

Dr. Carlos Torres is an Associate Professor of Radiology at the University of Ottawa and a staff neuroradiologist at The Ottawa Hospital. He completed a two-year neuroradiology fellowship at McGill University before joining the Department of Medical Imaging at The Ottawa Hospital. He has been the director and co-director of CME courses in Europe, North America and Latin America. Dr. Torres has given 270 national and international invited lectures and is regularly invited to speak at major North American Radiology and Neuroradiology meetings. He has been a visiting professor in several academic centres in the US and Canada as well as in Asia and Latin America. Dr. Torres is actively involved in medical education and research. He has multiple peer-reviewed publications and has written 15 book chapters. He has received numerous departmental, national and international awards for his teaching and research. Recently, he received the 2018 Anne G. Osborn ASNR Outreach Professor Award to represent the American Society of Neuroradiology in Myanmar and was selected as Outreach International VP to represent the ARRS in Spain in 2019.



Vivek Virmani, MD, DABR Dr. Everett Chalmers Regional Hospital (DECH), Fredericton, New Brunswick, Canada

Dr. Vivek Virmani is a consultant radiologist at Dr. Everett Chalmers Regional Hospital (DECH). He completed fellowships in abdominal imaging and emergency radiology in Ottawa. He has an active interest in teaching and research, with more than fifty publications in peer-reviewed journals.



Jeffrey Weinreb, MD

Yale School of Medicine

Dr. Jeffrey C. Weinreb is the Director of MRI Services at Yale-New Haven Hospital and Professor of Radiology and Biomedical Imaging at the Yale School of Medicine. For more than three decades, He has been a leading authority on MRI contrast agents, MRI safety issues and clinical applications of body MRI. He has authored/co-authored three textbooks and more than 200 published manuscripts, served on the editorial boards of numerous medical journals and presented almost 1000 invited lectures. Dr. Weinreb has served as Vice President of the American College of Radiology (ACR), Chair of the ACR Commission on Quality & Safety, Chair of the PI-RADS Steering Committee, Chair of the ACR Forum, President of the New York Roentgen Society and President of the Society of Computed Body Tomography & Magnetic Resonance (SCBT-MR). In 2017, he received the ACR Gold Medal Award for Distinguished and Extraordinary Service to the Discipline of Radiology.



Eugene Yu, MD, RCPSC, ABR

University of Toronto

Dr. Yu is a Neuroradiologist at the Princess Margaret Cancer Centre, University of Toronto. He is a Radiology Residency and Neuroradiology Fellowship Site Supervisor for head and neck imaging rotation at the University Health Network. Dr. Yu was President of the Eastern Neuroradiological Society. He is also a member of CancerCare Ontario Head and Neck Cancer Advisory Committee and American Society of Neuroradiology (ASNR) Specialty/Regional Societies Committee.



Stephanie Wilson, MD, FRCPC

University of Calgary

Stephanie Wilson is a practicing radiologist in Calgary and is the co-president of the International Contrast Ultrasound Society (ICUS). She has invested her research, academic and practice pursuits to imaging of the gastrointestinal tract and liver with contrast-enhanced ultrasound. She is the recipient of many prestigious teaching awards, including the Joseph Holmes Pioneer Award from the American Institute of Ultrasound in Medicine (AIUM) and the Lifetime Achievement Award from the Society of Radiologists in Ultrasound (SRU). Dr. Wilson was co-editor of the well weathered two-volume reference textbook entitled Diagnostic Ultrasound, with four printings since 1992. This successful textbook has served as a worldwide reference for ultrasound practitioners globally. Dr. Wilson named the first and only, woman President of the Canadian Association of Radiologists in 1993, and was later awarded the Canadian Association of Radiologists Gold Medal in 2001 for her contributions to Canadian Radiology. She has written over 150 peer-reviewed publications and has over 500 international presentations. Dr. Wilson runs one of the most advanced and well-known clinical and research facilities for the investigation of microbubble contrast agents for medical imaging in North America, recognized for its accomplishments throughout the world. She is a recognized expert in the evaluation of inflammatory bowel disease and hepatocellular carcinoma with CEUS.



Nader Zakhari, MD, FRCPC

The University of Ottawa/The Ottawa Hospital

Dr. Nader Zakhari has been an Assistant Professor of radiology at The University of Ottawa and a staff neuroradiologist at The Ottawa Hospital since 2016. Dr. Zakhari completed his residency training in diagnostic radiology at the University of Ottawa in 2014, followed by a two-year neuroradiology clinical fellowship at the University of Ottawa. Since 2018, Dr. Zakhari has been the Director of the Royal College Accredited Neuroradiology Fellowship Program. He is actively involved in medical education and research. His special interests are in advanced MR imaging of brain tumours and spine imaging and interventions.



Charlotte Yong-Hing, MD

University of British Columbia, Vancouver, British Columbia, Canada

Dr. Charlotte Yong-Hing is Co-Director of Breast Imaging at BC Cancer and Clinical Assistant Professor of Radiology at UBC. She has held executive positions for the BC Radiological Society since 2014 and has been Medical Practice Lead, General Radiography, for Lower Mainland Medical Imaging since 2012.



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