MAHC GRAND ROUNDS

MRI Update and Diagnostic Imaging Q&A

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October 22, 2025

LEARNING OBJECTIVES

- Review current status of MRI at MAHC
- Address diagnostic imaging questions submitted by referring providers
- Address image-guided intervention questions submitted by referring providers

MRI AT MAHC

- Officially opened in July 2025
- Currently two full time MRI technologists
- Running M-F 7:30 AM-3:30 PM
- Currently no after-hours/weekend scanning
- Not scanning patients with pacemakers
- Currently not performing breast and prostate MRI
- Not performing cardiac MRI

https://www.mahc.ca/news/post/muskoka-s-new-mri-suite-officially-opens/

MRI AT MAHC

Feedback/requests from reviewing and protocoling many MRI requisitions

- Ordering multiple body parts or multiple spine segments
  - Limited scanning hours currently
  - Each scan/additional site takes time
- Marking cases as "urgent"

QUESTIONS & ANSWERS

MRI CONTRAST MEDIA

Question:

- Does previous reaction to IV contrast for CT mean that the patient is also likely to react to IV contrast given for an MRI? Thus, do these patients require a pre-medication protocol for an MRI just like they would for a CT?

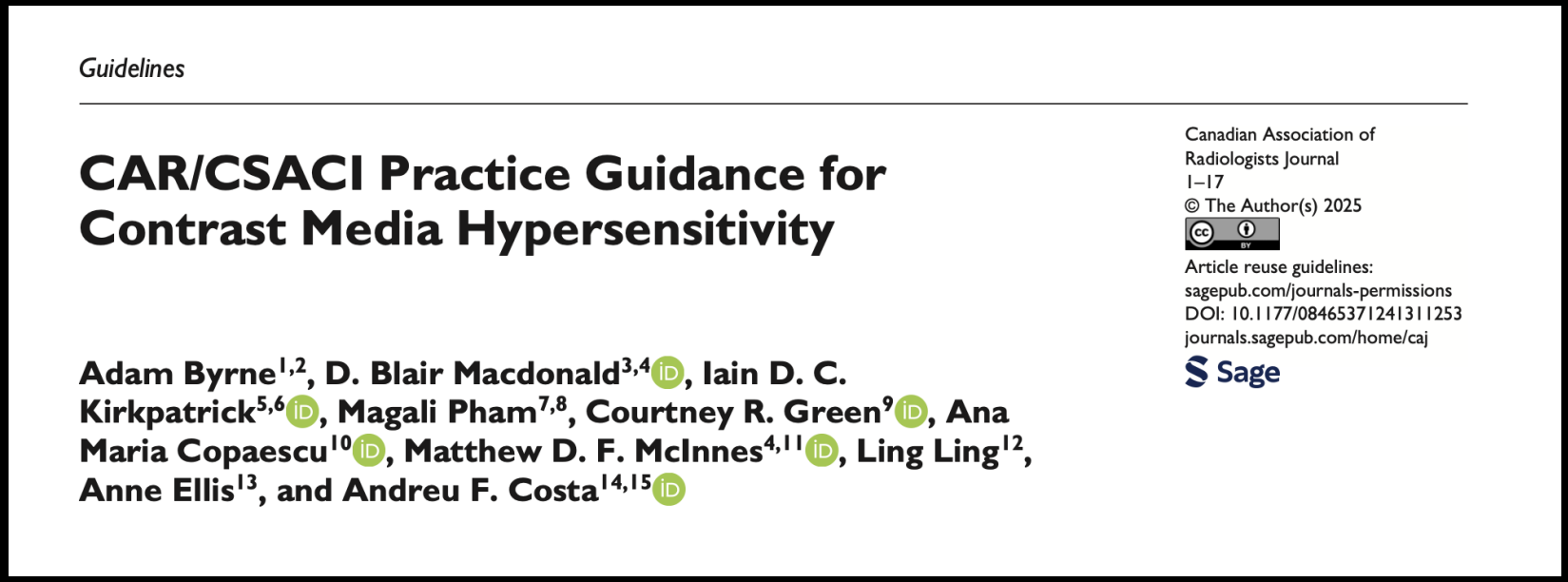
Answer:

- No
- "There is no cross-reactivity between different classes of contrast medium. For example, a prior reaction to gadolinium-based contrast medium does not predict a future reaction to iodinated contrast medium, or vice versa, more than any other unrelated allergy." (ACR manual on contrast media, 2025)

HYPERSENSITIVITY REACTION AND PREMEDICATION

JUST AN FYI:

- NEW CANADIAN GUIDELINES FOR MANAGEMENT OF CONTRAST MEDIA HYPERSENSITIVITY WERE PUBLISHED IN 2025
- SIGNIFICANT CHANGES FROM PRIOR RECOMMENDATIONS
- CHANGES WILL BE ROLLED OUT IN THE MAHC DI DEPARTMENT SHORTLY



Guidelines

CAR/CSACI Practice Guidance for Contrast Media Hypersensitivity

Adam Byrne[1,2], D. Blair Macdonald[3,4], Iain D. C. Kirkpatrick[5,6], Magali Pham[7,8], Courtney R. Green[9], Ana Maria Copaescu[10], Matthew D. F. McInnes[4,11], Ling Ling[12], Anne Ellis[13], and Andreu F. Costa[14,15]

Canadian Association of Radiologists Journal
1–17

DOI: 10.1177/08465371241311253
journals.sagepub.com/home/caj
Sage

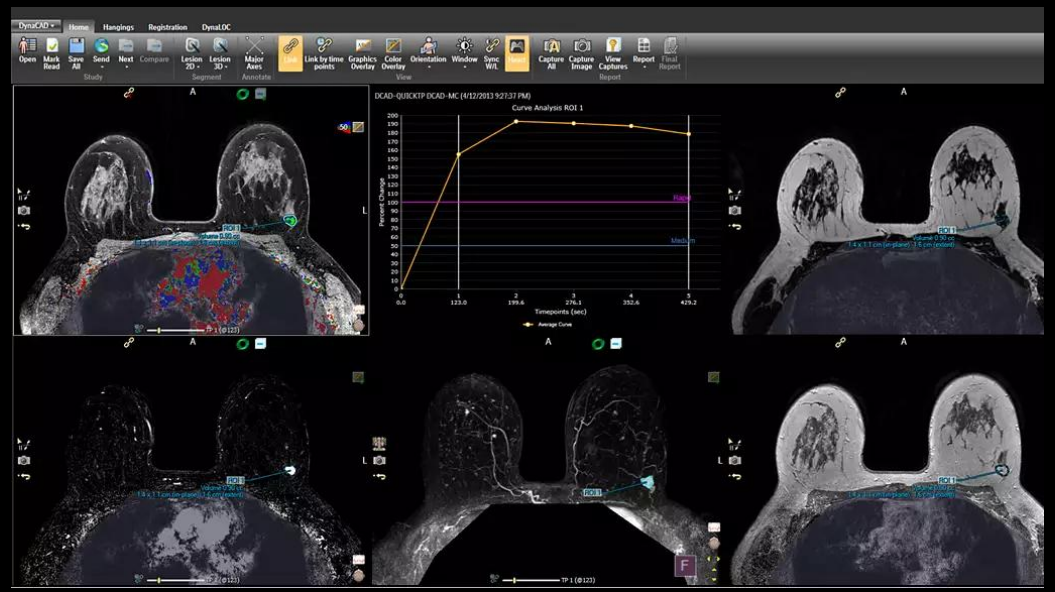
BREAST MRI

Question

- An update on when we can anticipate being able to do breast MRI at MAHC and what are the limiting factors to getting this going?

BREAST MRI

- LIMITING FACTORS
- DO NOT YET HAVE SOFTWARE PACKAGE REQUIRED FOR POST-PROCESSING/KINETIC ANALYSIS
- DO NOT HAVE SOFTWARE OR EQUIPMENT FOR MR-GUIDED BREAST BIOPSY
  - CAR PRACTICE GUIDELINES ON BREAST IMAGING AND INTERVENTIONS 2025:
    - "FACILITIES ARE STRONGLY DISCOURAGED FROM PERFORMING BREAST MRI WITHOUT THE CAPACITY TO PERFORM BREAST MRI-GUIDED BIOPSIES"



https://www.usa.philips.com/healthcare/product/HC784027/dynacad-breast

https://www.med.umich.edu/1libr/BreastImaging/MRIBreastBiopsy.pdf

BREAST IMAGING

Questions

- Getting mammogram reports with breast density category D and not being asked to come back for annual recall. Is this an error in reporting? It appears that supplementary screening is recommended for category C and D patients by OAR. Wondering if he could speak to this
- Do we currently use tomosynthesis routinely on our mammograms?
- Address the OBSP mammo recommendations for 1 yr follow up when breast density is graded as D (extremely dense)…where the OBSP report says "1 yr follow up: no" but clearly this patient SHOULD have a 1 yr follow up based on the density. I have been told by our mammo techs that the OBSP WILL recall this patient at 1 yr based on breast density, so I would really like to see alignment in the reporting, with the rad also recognizing the need for 1 yr follow up simply on the basis of density, and answering 'yes' in the OBSP template report.

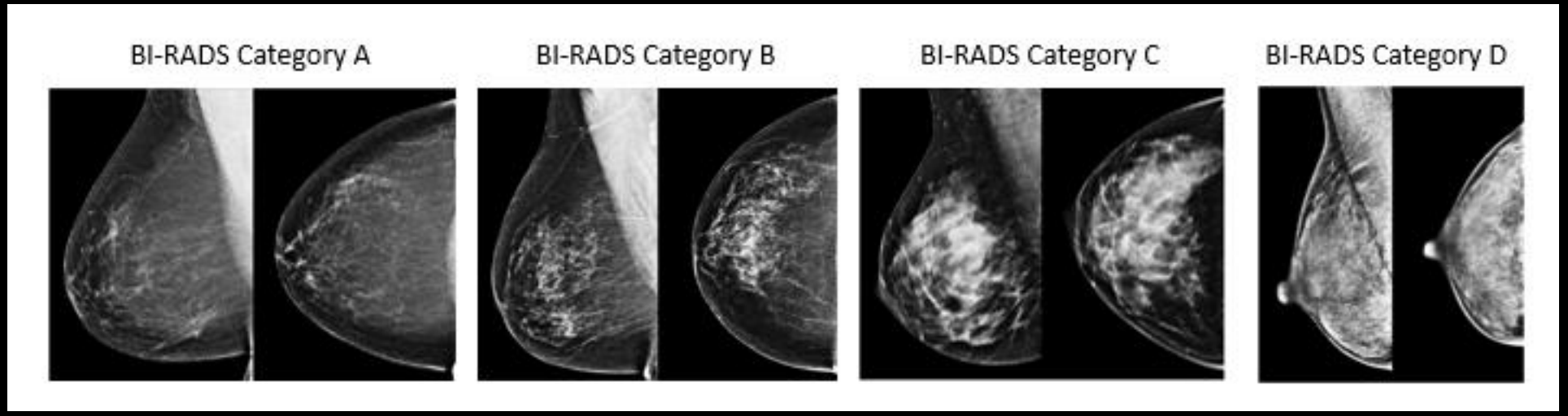
BREAST IMAGING

BACKGROUND

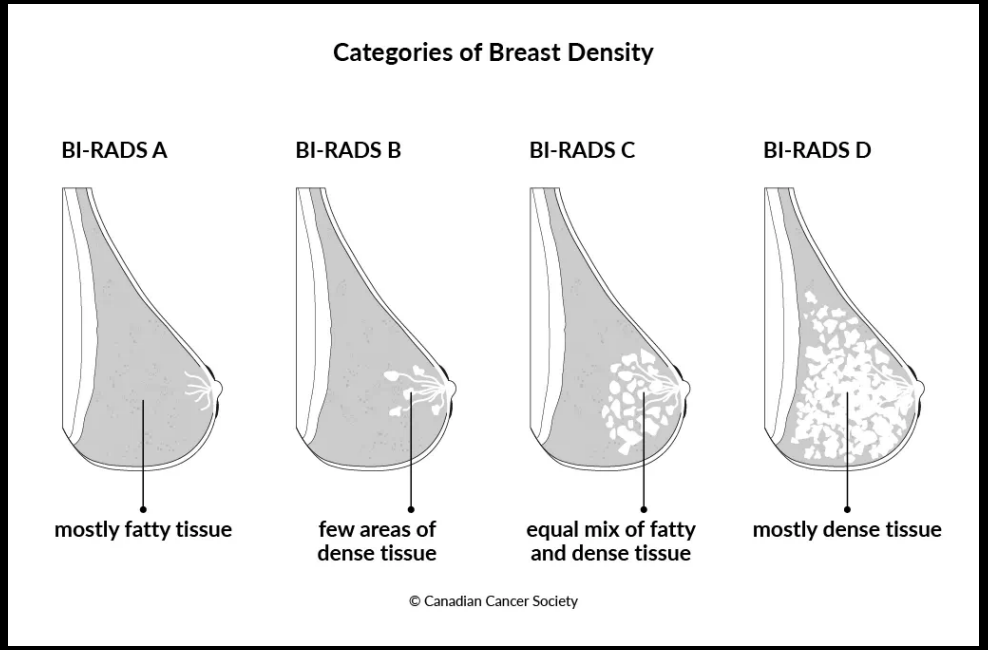
- BI-RADS (BREAST IMAGING REPORTING AND DATA SYSTEM)
  - STANDARDIZED CLASSIFICATION SYSTEM CREATED BY ACR TO REPORT FINDINGS FROM BREAST IMAGING

- CLASSIFIES BREAST DENSITY INTO 4 CATEGORIES FROM LEAST DENSE TO MOST DENSE
  - CATEGORY A: THE BREASTS ARE ALMOST ENTIRELY FATTY
  - CATEGORY B: THERE ARE SCATTERED AREAS OF FIBROGLANDULAR DENSITY
  - CATEGORY C: THE BREASTS ARE HETEROGENEOUSLY DENSE, WHICH MAY OBSCURE SMALL MASSES
  - CATEGORY D: THE BREASTS ARE EXTREMELY DENSE, WHICH LOWERS THE SENSITIVITY OF MAMMOGRAPHY

BREAST IMAGING



Breast/mammographic images on pages 128-130 of the ACR BI-RADS® Atlas, 5th edition

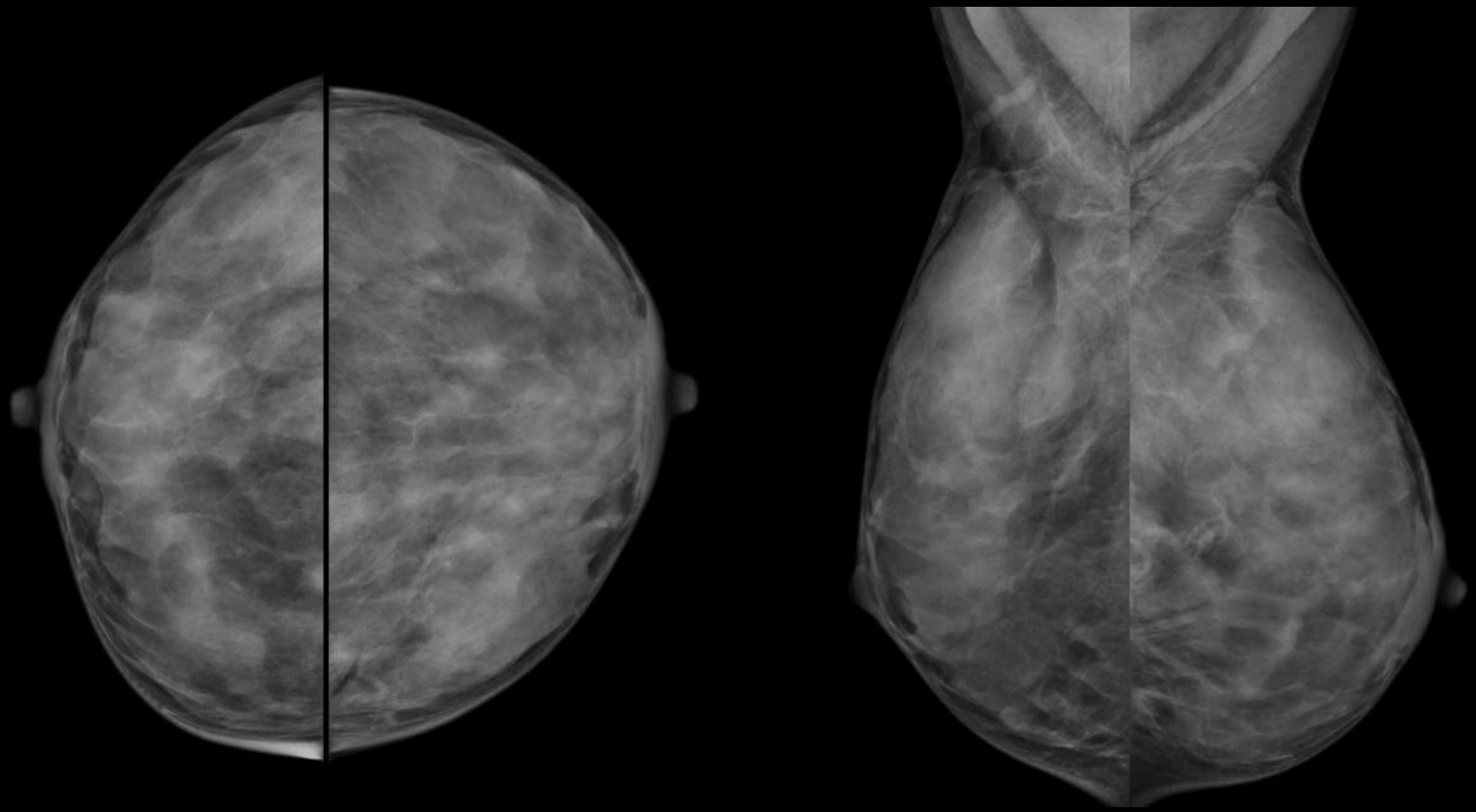


https://cancer.ca/en/treatments/tests-and-procedures/mammography/breast-density

BREAST IMAGING

So why do we care about Dense (Category D) breasts?

- Dense breast tissue makes it harder to find cancer in the breast on mammography
- Breast cancer risk increases with the amount of dense breast tissue



https://cancer.ca/en/treatments/tests-and-procedures/mammography/breast-density
https://radiopaedia.org/articles/breast-density-classification

BREAST IMAGING

OBSP (ONTARIO BREAST SCREENING PROGRAM)

- FREQUENCY OF SCREENING
  - INVITED TO GET NEXT MAMMOGRAM IN 2 YEARS IF:
    - CATEGORY A/B/C DENSITY
    - NO OTHER REASON TO COME BACK IN 1 YEAR
  - INVITED TO GET NEXT MAMMOGRAM IN 1 YEAR IF:
    - CATEGORY D BREAST DENSITY
    - OTHER REASON TO COME BACK IN 1 YEAR
      - POSITIVE FAMILY HISTORY: 2 OR MORE FIRST-DEGREE FAMILY MEMBERS WITH HISTORY OF BREAST CANCER AT ANY AGE

https://www.cancercareontario.ca/en/types-of-cancer/breast-cancer/screening/breast-density

BREAST IMAGING

To confirm, at MAHC:

- If the OBSP report describes category D (extremely dense) breasts
  - OBSP **will** automatically recall the patient for follow up screening mammogram in one year if the mammogram is reported as negative

BREAST IMAGING

REPORT CONFUSION

- MAHC OBSP REPORT TEMPLATE:

> **1 Year Recall:** [No]

- INTENDED TO STATE NO REASON FOR 1 YEAR RECALL **BESIDES** STANDARD OBSP INDICATIONS (CATEGORY D BREAST DENSITY, +FAMILY HISTORY)

BREAST IMAGING

- UPDATED MAHC OBSP REPORT TEMPLATE:

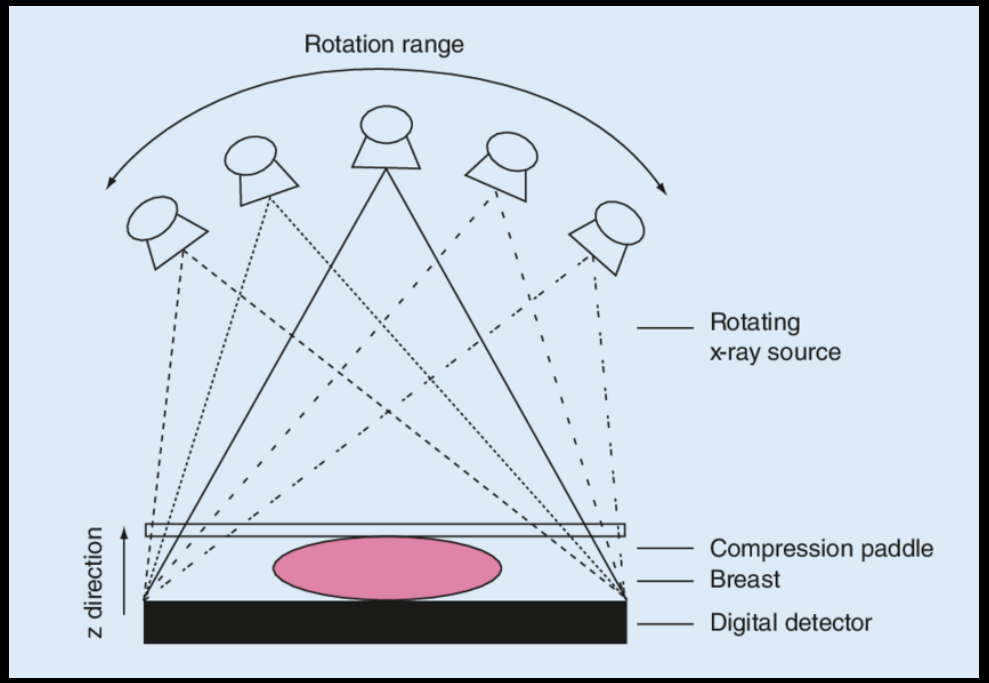
> **1 Year Recall:** [No (Other than positive family history or >75% parenchymal density which automatically have 1 year follow up)]

- ALREADY ROLLED OUT AS OF OCTOBER 21, 2025
- SHOULD SEE ON REPORTS BY LATER THIS WEEK

BREAST IMAGING

TOMOSYNTHESIS

- AKA DIGITAL BREAST TOMOSYNTHESIS (DBT) OR 3-D MAMMOGRAPHY
- USES LOW-DOSE X-RAYS AND COMPUTER RECONSTRUCTIONS TO CREATE 3-D IMAGES OF THE BREAST
- INVOLVES THE X-RAY TUBE MOVING IN AN ARC OVER THE COMPRESSED BREAST TO CAPTURE MULTIPLE IMAGES FROM DIFFERENT ANGLES, WHICH ARE RECONSTRUCTED



Kiarashi, Nooshin & Samei, Ehsan. (2013). Digital breast tomosynthesis: A concise overview. Imaging in Medicine. 5. 467-476. 10.2217/iim.13.52.

https://blog.beekley.com/radiologist-perspective-upgrade-to-3d-mammography-necessitates-reevaluation-of-skin-markers

BREAST IMAGING

Tomosynthesis

- Currently available at SMMH
- should be available at HDMH eventually
    - Applying for equipment replacement and designation for tomosynthesis

BREAST IMAGING

Current protocol/indications for tomosynthesis at MAHC (SMMH)

- All baseline screening mammograms (age 30+)
- If it has been more than 5 years since last mammogram
- All D density rescreen mammograms that have not had previous tomosynthesis
- If recommended by radiologist for next year's mammogram if the patient has D density breasts
- If radiologist requests for highly suspicious work up cases

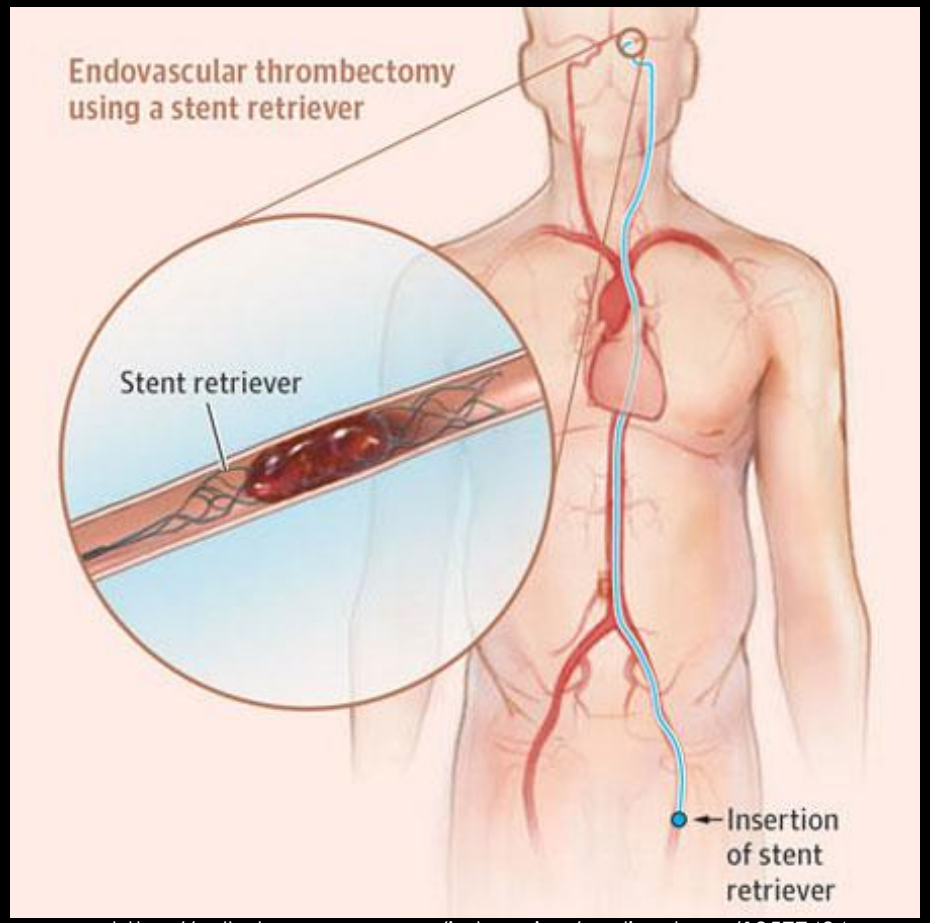
STROKE IMAGING

Question:

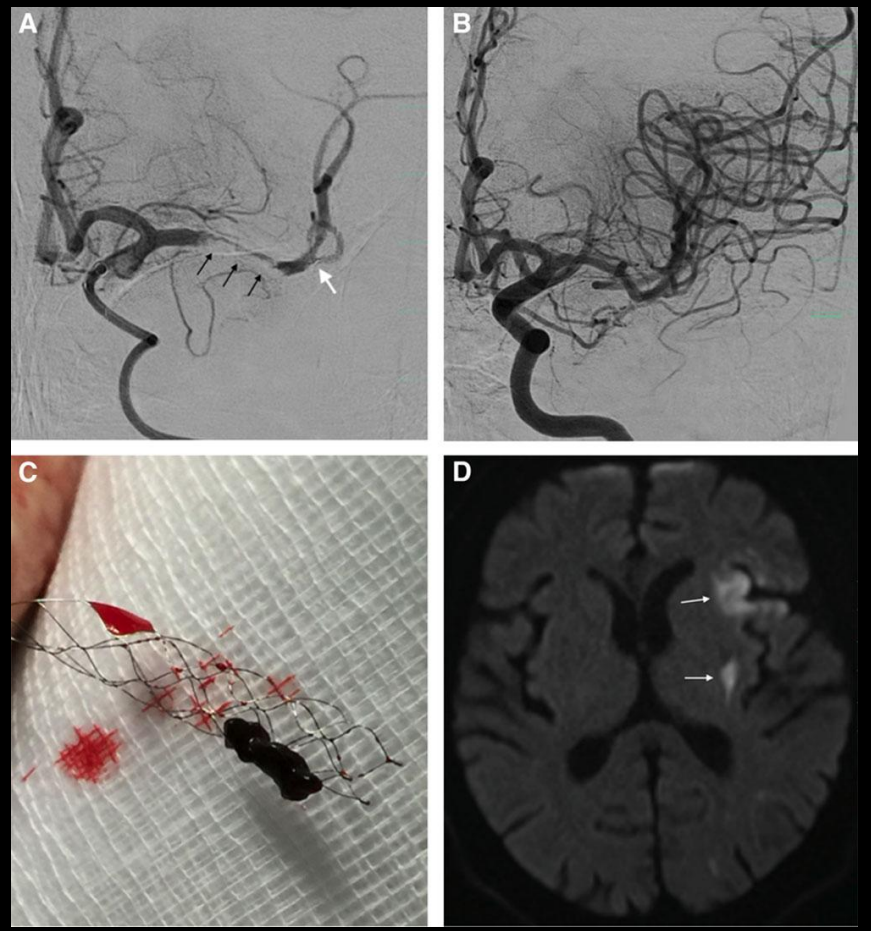
- Two tips for deciding if EVT protocol for a patient vs a "CT head and Ct angio neck" for a patient with improving stroke symptoms but not resolved?

STROKE IMAGING

- EVT
  - ENDOVASCULAR THROMBECTOMY OR ENDOVASCULAR THERAPY
  - MINIMALLY INVASIVE PROCEDURE TO REMOVE A BLOOD CLOT FROM THE BRAIN



https://edhub.ama-assn.org/jn-learning/audio-player/18577484



https://www.ahajournals.org/doi/10.1161/CIRCINTERVENTIONS.117.005362

STROKE IMAGING

- Thrombosis Canada:
  - "There is very strong evidence from multiple randomized trials demonstrating benefit of EVT in individuals with **PROXIMAL** intracranial occlusions either in the anterior circulation (internal carotid artery and proximal middle cerebral artery as well as individuals with tandem cervical carotid and intracranial occlusions) or the posterior circulation (vertebral artery and/or basilar artery) who present with **MODERATE-TO-SEVERE** neurological deficits."
  - "Two independent trials have recently suggested no benefit and increased risks with EVT for patients presenting with occlusions in **SMALLER** intracranial vessels. "

https://thrombosiscanada.ca/hcp/practice/clinical_guides?language=en-ca&guideID=THROMBOLYTICTHERAPYINACUTEISCH

STROKE IMAGING

Canadian Stroke Best Practices

Canadian stroke best practices – Neurovascular imaging

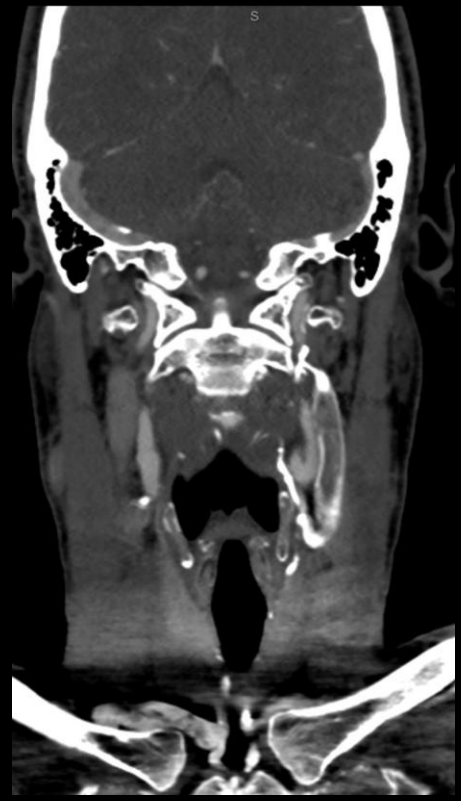
- All patients with suspected acute stroke should undergo brain and vascular imaging computerized tomography (CT) or magnetic resonance imaging (MRI) [Strong recommendation; High quality of evidence].
  - Vascular imaging should be preformed from arch-to-vertex and include the extra- and intra-cranial circulation to determine eligibility for acute treatment [Strong recommendation; High quality of evidence].
- All patients with suspected acute ischemic stroke who arrive at hospital **within 6 hours** who are potentially eligible for intravenous thrombolysis and/or EVT should undergo ***immediate non-contrast CT (NCCT)*** **combined with CT angiography (CTA) of the head and neck**, performed and interpreted without delay
- All patients with suspected ischemic stroke due to large vessel occlusion (LVO) **arriving 6 to 24 hours** after stroke symptom onset (including stroke on awakening or with unknown onset time) and who are potentially eligible for late window EVT should undergo immediate brain imaging with NCCT with CTA and CT perfusion (CTP)
- Advanced CT imaging such as CT perfusion (CTP) or multiphase CTA to assess pial collateral vessels is strongly encouraged as part of initial imaging to aid patient selection for EVT

https://www.strokebestpractices.ca/recommendations/acute-stroke-management/emergency-department-evaluation-and-management

STROKE IMAGING

CT HEAD AND CAROTID ANGIOGRAM

1. NON-CONTRAST CT HEAD
2. CT ANGIOGRAM FROM THE AORTIC ARCH TO BASE OF THE BRAIN (CENTRAL COW)



STROKE IMAGING

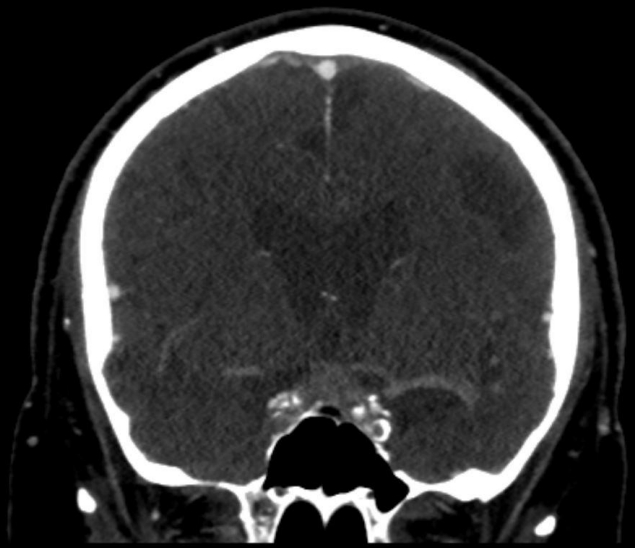
CT HEAD AND CAROTID ANGIOGRAM

1. NON-CONTRAST CT HEAD
   - LOOK FOR RECENT OR CHRONIC INFARCT, BLEED, MASS, ETC
2. CT ANGIOGRAM FROM THE AORTIC ARCH TO BASE OF THE BRAIN (CENTRAL COW)
   - LOOK FOR STENOSIS OR CHRONIC OCCLUSION OF THE EXTRACRANIAL CAROTID AND VERTEBRAL ARTERIES AND CENTRAL INTRACRANIAL ARTERIES

STROKE IMAGING

CT EVT PROTOCOL

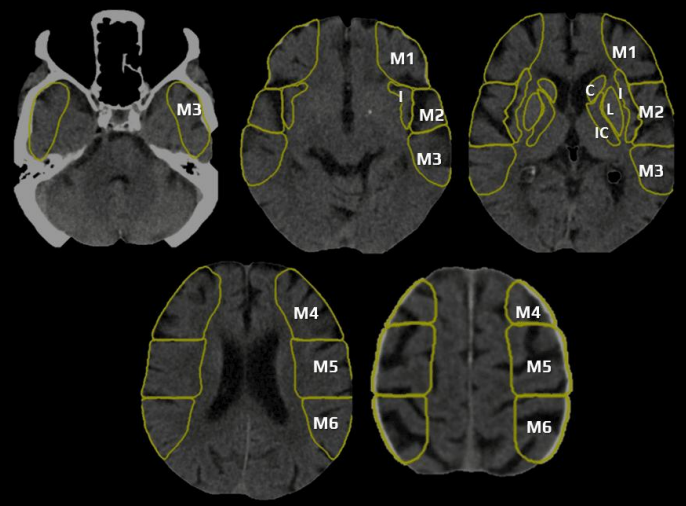
1. NON-CONTRAST CT HEAD
2. CT ANGIOGRAM FROM THE AORTIC ARCH UP TO THE VERTEX
3. VENOUS PHASE CT FROM THE AORTIC ARCH UP TO THE VERTEX/HEAD



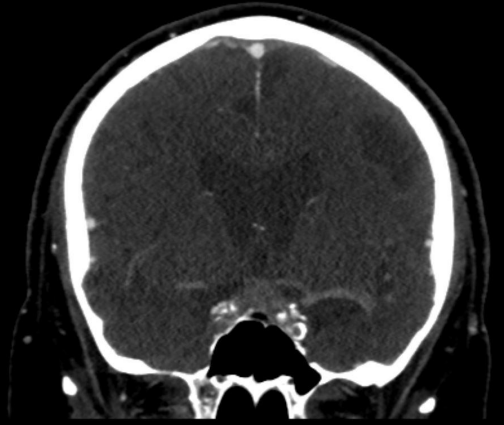
STROKE IMAGING

CT EVT protocol

1. Non-contrast CT head
   - Look for acute stroke (ASPECTS)
   - Look for contraindication to TPA or EVT
2. CT angiogram from the aortic arch up to the vertex
   - Look for occlusion of arteries in neck
   - Look for occlusion of arteries in head
3. Venous phase CT from the aortic arch up to the vertex
   - Improved detection of large-vessel occlusion
   - Improved characterization of collateral status

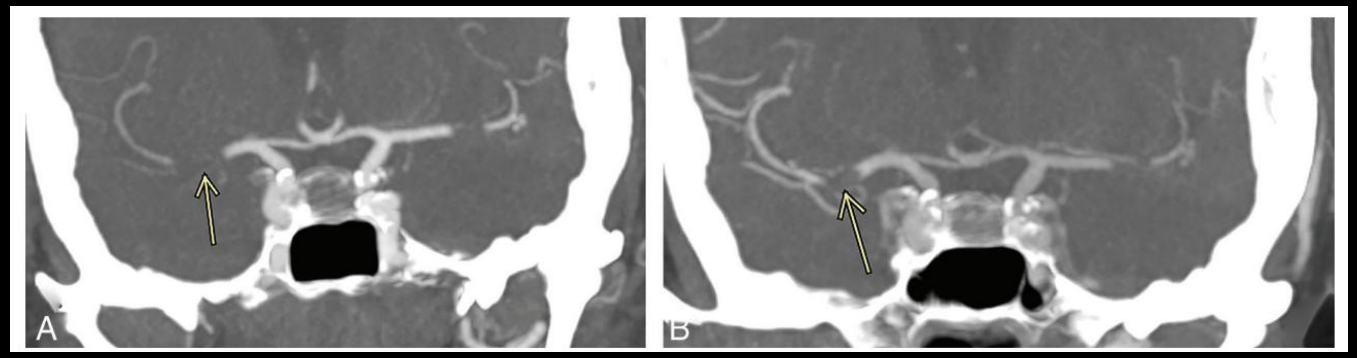


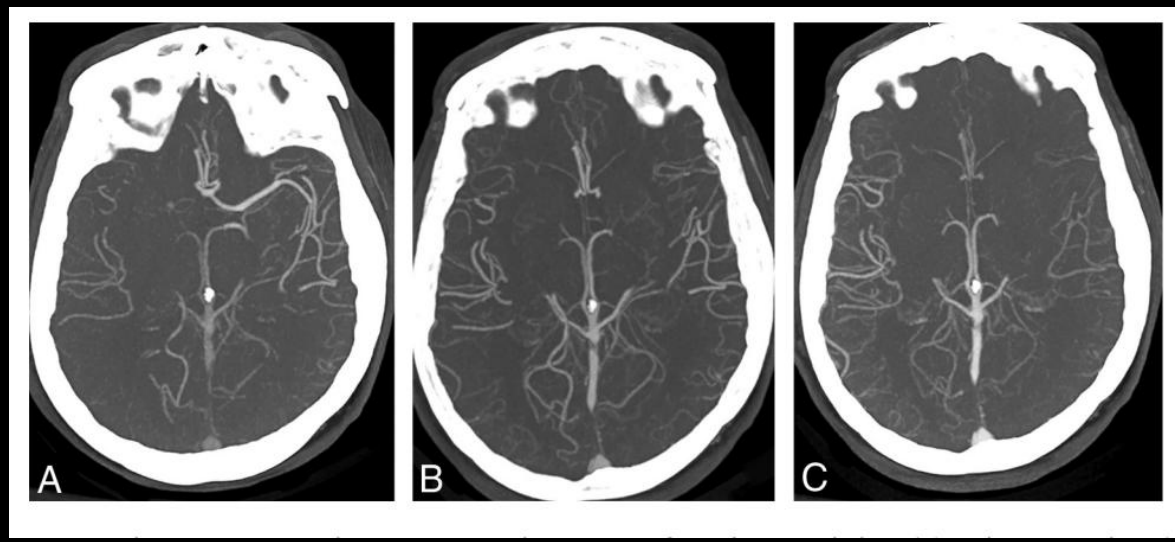
https://www.stroke-manual.com/aspect-score/



STROKE IMAGING

- VENOUS PHASE CT
  - IMPROVED DETECTION OF LARGE-VESSEL OCCLUSION
  - IMPROVED CHARACTERIZATION OF PIAL COLLATERAL STATUS
  - HELPS NEURO-INTERVENTIONALIST AND STROKE PHYSICIAN DETERMINE SUITABILITY FOR ENDOVASCULAR THERAPY





AJNR Am J Neuroradiol 42:221–27

STROKE IMAGING

Stroke CT orders

__Eligible for tNK/EVT + Full EVT/Stroke protocol (+ Aspect)
__Not eligible for tNK/EVT (choose one)
__Head CT & Carotid CTA
__Non-contrast Head
__Posterior Circulation Symptoms present (check if yes)

Symptoms

Fully resolved: Yes__ / No__ Side: Left__ / Right__
Description: _____

_____
Duration: _____

STROKE IMAGING

Box 5C Inclusion Criteria for Endovascular Thrombectomy

Refer to Section 4.2 and Boxes 4B and 4C for detailed recommendations on neuroimaging-based selection criteria.

Patients should be considered eligible for endovascular thrombectomy if they fulfill the following clinical criteria:

1. Diagnosed with an acute ischemic stroke.
2. The stroke is disabling (i.e., significantly impacting function), usually defined as National Institutes of Health Stroke Scale (NIHSS)>4.
3. There is a proven, clinically relevant (symptomatic), intra- or extracranial acute arterial occlusion that is amenable to endovascular intervention.
4. The risks and benefits of endovascular thrombectomy are within the patient's goals of care and take into consideration their functional status prior to stroke.
5. Age ≥18 years. (Refer to pediatric guidelines for treatment <18 years of age).
    a. Currently, there is no evidence for EVT in pediatric populations and the decision to treat should be based on the potential benefits and risks of the therapy, made by a physician with pediatric stroke expertise in consultation with the EVT provider and the patient and/or family or substitute decision-makers.
6. **Intravenous thrombolysis:** If intravenous thrombolysis is given in conjunction with endovascular thrombectomy, refer to Box 5B for additional inclusion criteria.
7. **Premorbid condition criteria**: In general, individuals considered eligible for EVT are those who were deemed functionally independent before their index stroke (i.e., mRS <3) and have a life expectancy >3 months. *Note: These criteria are based on major clinical trial inclusion criteria. Decisions should be based on these factors, clinical judgement, and the patient's goals of care.*
8. **Imaging:** Patients must qualify for imaging criteria in early and late windows as described in Boxes 4B and 4C.
9. **Time to treatment:** The decision to proceed with EVT should be shared by the physician with clinical stroke expertise and the neuro-interventionalist, who will use the available imaging information as is indicated.
    a. Specifically:
        i. Patients should have immediate neurovascular imaging (see above) to determine eligibility. Patients can be considered for imaging within a 24-hour window from stroke symptom onset or last known well.
        ii. For patients presenting <6 hours from stroke symptom onset or last known well to initiation of treatment (i.e., arterial puncture), all patients who meet eligibility criteria should be treated.
        iii. For patients presenting between 6 and 24 hours from last known well, selected patients may be treated if they meet clinical and imaging criteria and based on local protocols and available expertise in EVT.

STROKE IMAGING

- Back to the original question
  - Two tips for deciding if EVT protocol for a patient vs a "CT head and Ct angio neck" for a patient with improving stroke symptoms but not resolved?
- If the patient is presenting with ongoing acute stroke symptoms and last known well <24 hours ago (ie is a potential candidate for TPA or Evt therapy) → CT EVT protocol
  - Otherwise, CT head and carotids (tia workup, carotid stenosis, etc)
- If more education/information desired reach out to **Amy Gargal**
  - Manager, Stroke Rehab/Reactivation & District Stroke Coordinator

SPINE IMAGING

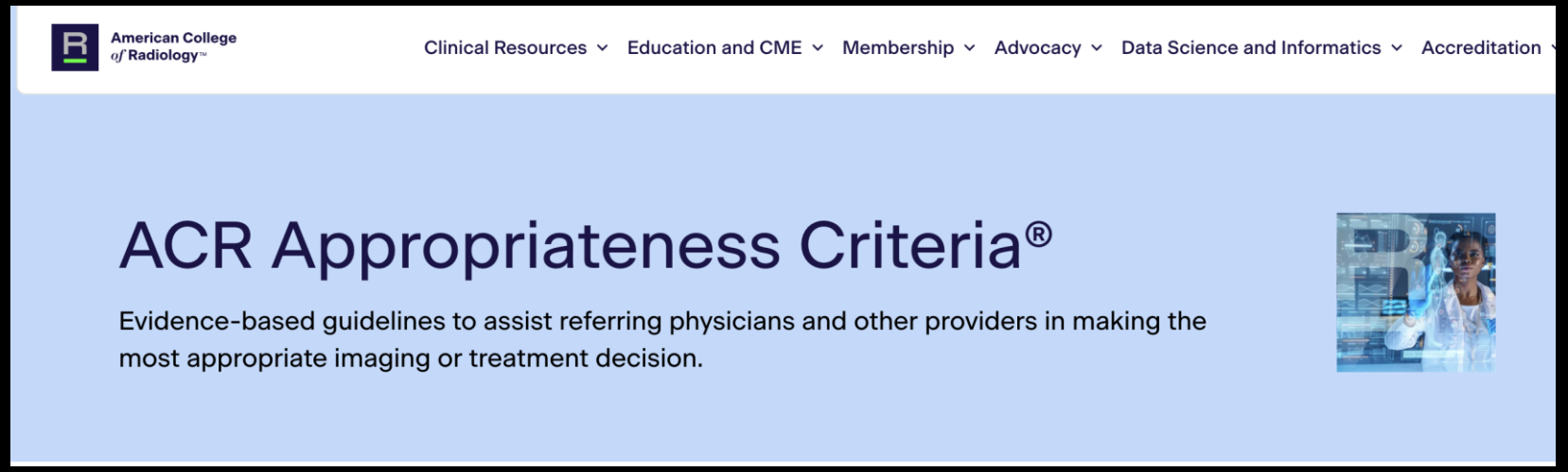
Questions:

- I would love for him to clarify the role of MRI for the family physicians and emergency physicians in non-traumatic cervical spine injuries, including those with neurological symptoms possibly stemming from cervical cord +/- nerve roots.
- And I would *love* the team to get a quickie refresher on when they should (and should not) be ordering MRIs of the spine (i.e. clinical indications for MR C or L spine vs OK to wait for EMG/NCS).

RESOURCES

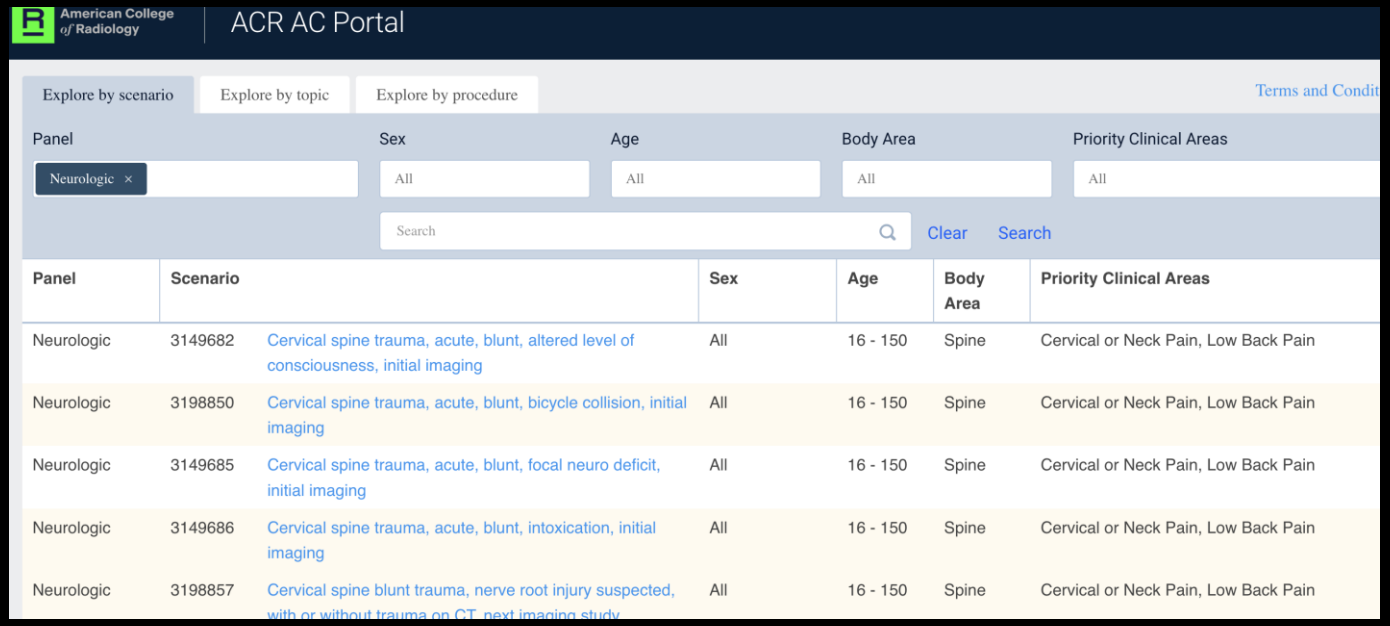
- ACR Appropriateness Criteria
- Choosing Wisely Canada

ACR APPROPRIATENESS CRITERIA



https://www.acr.org/Clinical-Resources/Clinical-Tools-and-Reference/Appropriateness-Criteria

ACR APPROPRIATENESS CRITERIA



Panel	Scenario		Sex	Age	Body Area	Priority Clinical Areas
Neurologic	3149682	Cervical spine trauma, acute, blunt, altered level of consciousness, initial imaging	All	16 - 150	Spine	Cervical or Neck Pain, Low Back Pain
Neurologic	3198850	Cervical spine trauma, acute, blunt, bicycle collision, initial imaging	All	16 - 150	Spine	Cervical or Neck Pain, Low Back Pain
Neurologic	3149685	Cervical spine trauma, acute, blunt, focal neuro deficit, initial imaging	All	16 - 150	Spine	Cervical or Neck Pain, Low Back Pain
Neurologic	3149686	Cervical spine trauma, acute, blunt, intoxication, initial imaging	All	16 - 150	Spine	Cervical or Neck Pain, Low Back Pain
Neurologic	3198857	Cervical spine blunt trauma, nerve root injury suspected, with or without trauma on CT, next imaging study	All	16 - 150	Spine	Cervical or Neck Pain, Low Back Pain
Neurologic	3149325	Cervical spine pain, acute, radiculopathy, no trauma, no red flags, initial imaging	All	18 - 150	Spine	Cervical or Neck Pain
Neurologic	3073955	Cervical spine pain, chronic, no radiculopathy, no trauma, no red flags, initial imaging	All	18 - 150	Spine	Cervical or Neck Pain
Neurologic	3073960	Cervical spine pain, chronic, radiculopathy, no trauma, no red flags, initial imaging	All	18 - 150	Spine	Cervical or Neck Pain
Neurologic	3198703	Cervical spine pain, increasing, no radiculopathy, no trauma, no red flags, initial imaging	All	18 - 150	Spine	Cervical or Neck Pain

Variant 8: **Adult. Chronic cervical pain with radiculopathy. No trauma or "red flags." Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
MRI cervical spine without IV contrast	Usually Appropriate	O
Radiography cervical spine	May Be Appropriate (Disagreement)	☢☢
CT cervical spine without IV contrast	May Be Appropriate	☢☢☢
Discography cervical spine	Usually Not Appropriate	☢☢
Radiography cervical spine flexion extension lateral views	Usually Not Appropriate	☢☢
Radiographic myelography cervical spine	Usually Not Appropriate	☢☢☢
Bone scan whole body with SPECT or SPECT/CT neck	Usually Not Appropriate	☢☢☢
MRA neck with IV contrast	Usually Not Appropriate	O
MRA neck without and with IV contrast	Usually Not Appropriate	O
MRA neck without IV contrast	Usually Not Appropriate	O
MRI cervical spine with IV contrast	Usually Not Appropriate	O
MRI cervical spine without and with IV contrast	Usually Not Appropriate	O
CT cervical spine with IV contrast	Usually Not Appropriate	☢☢☢
CT cervical spine without and with IV contrast	Usually Not Appropriate	☢☢☢
CTA neck with IV contrast	Usually Not Appropriate	☢☢☢
CT myelography cervical spine	Usually Not Appropriate	☢☢☢☢

CHOOSING WISELY CANADA

HTTPS://CHOOSINGWISELYCANADA.ORG/RECOMMENDATION/RADIOLOGY/

1 **Don't do imaging for lower-back pain unless red flags are present.**

Red flags include suspected epidural abscess or hematoma presenting with acute pain, but no neurological symptoms (urgent imaging is required); suspected cancer; suspected infection; cauda equina syndrome; severe or progressive neurologic deficit; and suspected compression fracture. In patients with suspected uncomplicated herniated disc or spinal stenosis, imaging is only indicated after at least a six-week trial of conservative management and if symptoms are severe enough that surgery is being considered.

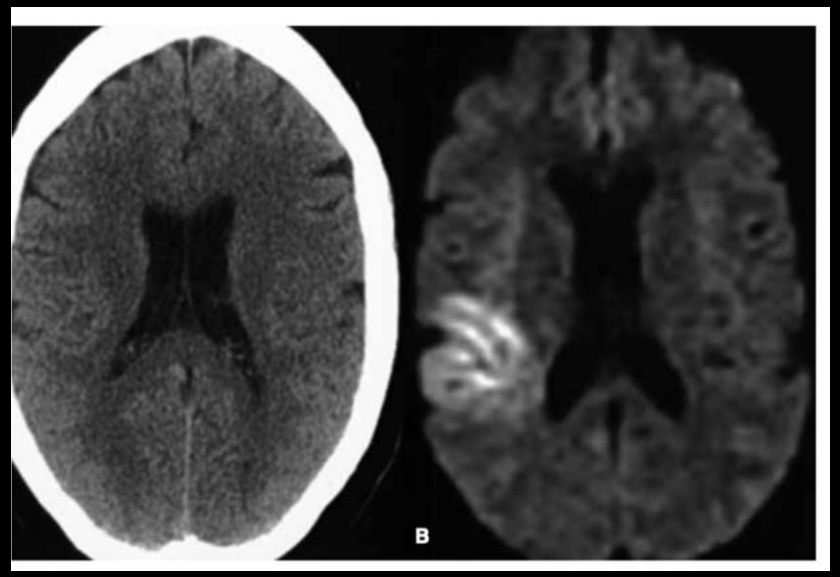
CT VERSUS MRI

Question:

- In which conditions is MRI superior to CT (and vice versa)?

CT VERSUS MRI

- MRI utility over CT – better tissue characterization
  - Detection of subtle recent stroke (DWI)
  - Assessment of the spinal cord and nerves
  - Musculoskeletal – cartilage, muscle, tendon, ligament, mass
  - Lesion characterization (ie liver mass, solid/cystic)
  - Less concern re: renal function



Ferfecka, Gabriela & Marta, Patrycja & Pawełek, Klaudia & Morawiecka, Natalia & Rosa-Bończak, Magdalena & Ossolińska, Agata & Huzarski, Filip & Stolarska, Lucyna & Kłosowicz, Weronika & Carlton, Olivier. (2025). Physical Activity and Ischemic Stroke Prevention. Journal of Education, Health and Sport. 78. 57704. 10.12775/JEHS.2025.78.57704.

https://sportsortho.co.uk/blog/the-importance-of-3t-mri-in-the-diagnosis-of-knee-injuries/

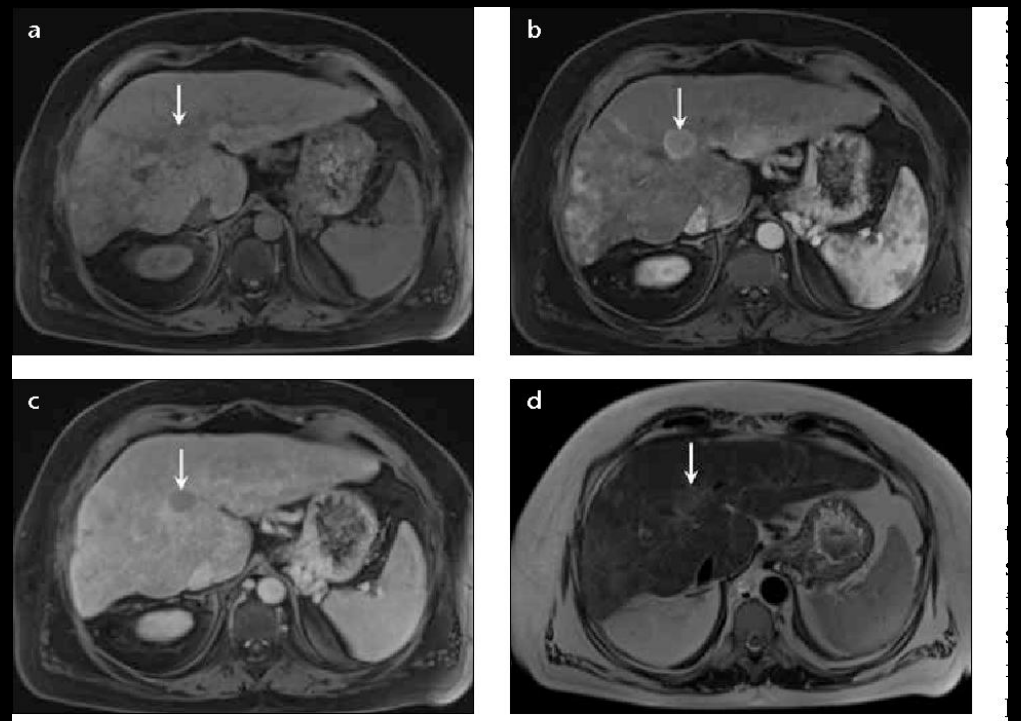


Figure 1. a–d. A 50-year-old man with hepatitis C infection and HCC, and prior negative

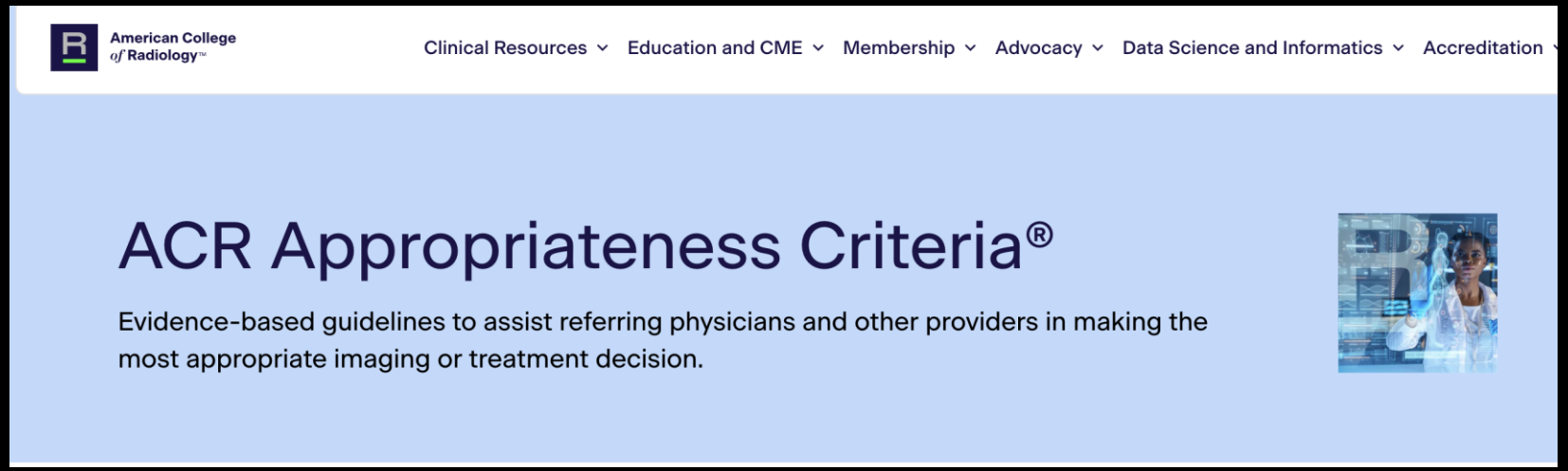
Arif-Tiwari, Hina, Bobby Kalb, Surya Chundru, Puneet S. Sharma, James R. Costello, Rainner W Guessner and Diego R. Martín. "MRI of hepatocellular carcinoma: an update of current practices." *Diagnostic and interventional radiology* 20 3 (2014): 209-21 .

CT VERSUS MRI

MRI limitations

- access
- Longer studies
- Small magnet bore → claustrophobia, pt body habitus, etc
- Contraindications – pacemaker, metal
- Lower resolution than CT
- Artifacts – metal, air, etc

CT VERSUS MRI

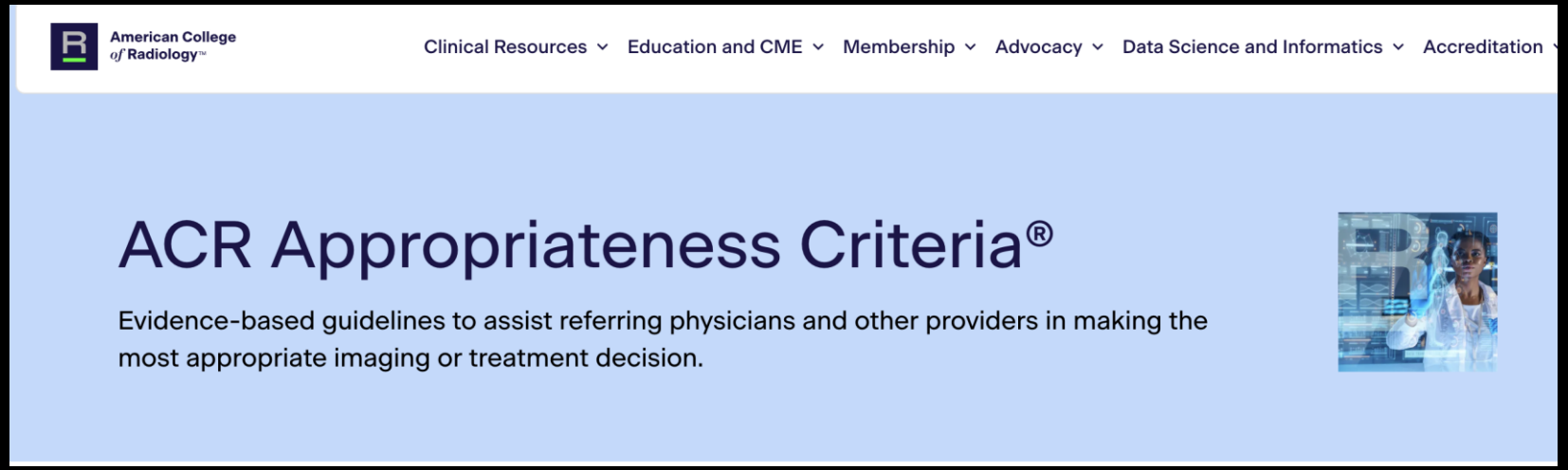


IMAGING SERVICES AT MAHC

- OUTLINE THE DIFFERENT TYPES OF IMAGING OFFERED AT MAHC AND WHAT THE INDICATIONS ARE FOR THAT IMAGING IF HE HAS NO TIME IF HE CAN JUST INCLUDE A ONE PAGE SUMMARY FOR ME TO TAKE HOME I WOULD LOVE THAT SO I CAN STOP SENDING THEM SILLY REQUESTS FOR IMAGING.

IMAGING SERVICES AT MAHC

- IMAGING OFFERED
  - X-RAY
  - ULTRASOUND
  - CT
  - MRI
  - MAMMOGRAPHY
  - FLUOROSCOPY
  - NUCLEAR MEDICINE



PAIN MANAGEMENT

QUESTIONS:

1. WHICH NEURAXIAL PROCEDURES WILL/WON'T YOU DO (SO I CAN REFER THEM APPROPRIATELY)
2. WHAT ARE THE COMMON/AVAILABLE NERVE BLOCKS AVAILABLE THROUGH IR AT MAHC? (FOR PAIN AND SYMPTOM MANAGEMENT IN PALLIATIVE CARE - IS MY MAIN CONCERN)

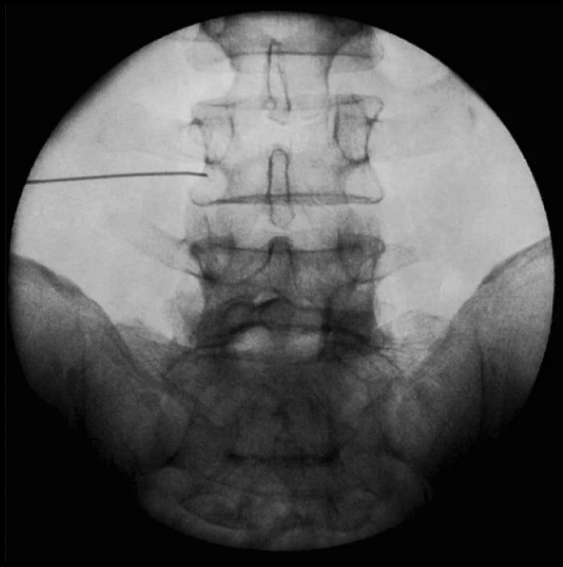
PAIN MANAGEMENT

PROCEDURES OFFERED AT MAHC

- FACET CORTICOSTEROID INJECTION IN THE CERVICAL, THORACIC AND LUMBAR SPINE
- EPIDURAL CORTICOSTEROID INJECTION IN THE LUMBAR SPINE
  - TRANSFORAMINAL
  - INTERLAMINAR
- SACROILIAC JOINT CORTICOSTEROID INJECTIONS
- SACROCOCCYGEAL JOINT INJECTION
- OCCIPITAL NERVE BLOCK

PROCEDURES NOT CURRENTLY OFFERED AT MAHC

- EPIDURAL CORTICOSTEROID INJECTION IN THE CERVICAL OR THORACIC SPINE
- MEDIAN BRANCH BLOCK
- NERVE ABLATION
- VERTEBROPLASTY

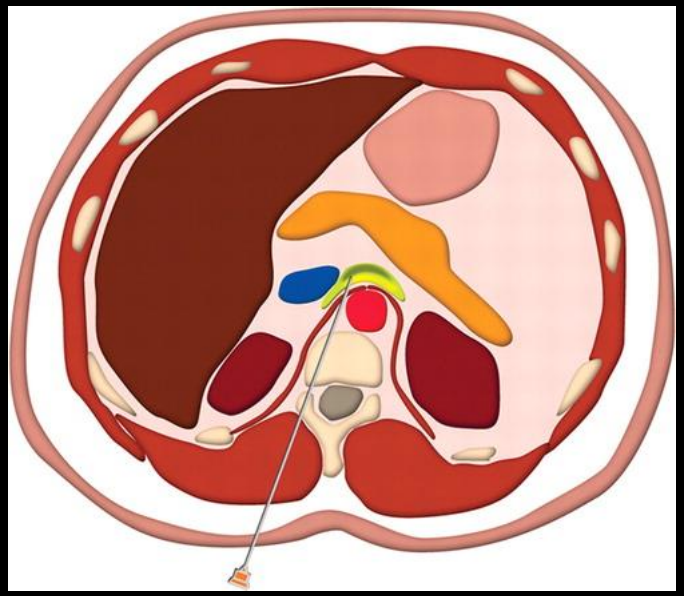


https://www.nature.com/articles/s41598-022-10021-5

PAIN MANAGEMENT

INTERVENTIONAL ONCOLOGY

- CELIAC PLEXUS BLOCK/NEUROLYSIS
  - FOR MANAGEMENT OF INTRACTABLE ABDOMINAL PAIN FROM UPPER ABDOMINAL MALIGNANCY
  - CAN BE PERFORMED BY A FEW OF OUR IR RADIOLOGISTS
  - SCHEDULING LOGISTICS POTENTIAL ISSUE – USUALLY TWO-STAGE PROCESS
    - INITIAL DIAGNOSTIC INJECTION WITH ANESTHETIC
    - SECOND INJECTION FOR ALCOHOL ABLATION
  - SEND REQUISITION AND CAN NOTIFY IF POSSIBLE AND ESTIMATED TIME FRAME



Kambadakone et al. Radiographics 2011;31(6):1599-621

PAIN MANAGEMENT

- For other injections/procedures
  - Can reach out to me regarding specific procedures

OTHER QUESTIONS?