

# **Radical Views...**

from the Department of Radiology

# Volume 10, Number 6 JANUARY 2018

Beth Israel Deaconess



### A TIMELY REMINDER FOR 2018

### Happy New Year!

In response to numerous queries about our 2<sup>nd</sup> Opionion Reading Policy, I thought it best to reprint it here for further clarification.

Donna Hallett, BSc **Chief Administration** Officer

While this column higlights departmental policies, procedures, guidelines and directives (PPGD) that have been added,

edited or reviewed with no change to ensure that you are up-to-date on the newest, most current information, please click on the link below to view the specific PPGD: https://apps.bidmc.org/cms/display.asp?c=73 (Under PACS/

Image Archive)

### **Congratulations Dr. Pisano**



Pisano, MD, our Vice Chair of Research and ACR Chief Scientific Officer has been nominated and accepted as a Fellow into the American Association for Women Radiologists (AAWR).

For more than a guarter of a century, the American Association for Women Radiologists has been one of the most respected, professional organizations in the field of radiology. The AAWR was founded to provide a forum for issues unique to women in radiology, radiation oncology, and related professions. As a leader, the Association sponsors programs that promote opportunities for women, facilitate networking among members and other professionals, and provides mentorship opportunities for the next generation of women radiologists.

Congratulations, Dr. Pisano on this wonderful achievement and we look forward to seeing the wonderful contributions you will bring to AAWR. For more information, please visit: http://www.aawr.org

Jonathan Kruskal, MD, PhD, FACR Maria Kelly, MB, BCh, FACR - AAWR President M. Elizabeth Oates, MD - AAWR Fellowship Committee Chair

### Beth Israel Deaconess Medical Center Radiology Policy Manual

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Title: RAD-111 BIDMC Radiology 2<sup>nd</sup> Opinion Reading Policy Policy#: RAD-111

Purpose: BIDMC Radiology will provide 2nd opinion reading for BIDMC Referring Providers upon request

### **Policy Statement:**

The image quality of the exam must be deemed adequate by the Reading BIDMC Radiologist. If the Radiologist upon review of the image deems the quality insufficient to provide an interpretation they will decline or recommend a repeat study.

### **Procedure for 2nd Opinion Reading Request:**

- 1. Images must be delivered to the Image Archive department on East SCC401 or West CC341via a CD or secure image transfer via Lifelmage. A copy of the radiology report MUST accompany the images.
- 2. An order for this request is required via OMR or paper request
  - In OMR: Type "second" into the "Other Exam" field. o Choose SECOND OPINION REOUEST or ED REOUEST FOR SECOND OPINION READ
  - In the "Questions to be Answered/Reason for Exam" field include:
    - o Name of exam to be read.
    - o Clinical indication for interpretation.
    - o Authorization Number pre-authorization is required for CT and MR exams (depending upon insurance plan) and must be obtained by requesting provider. If pre-authorization is not required, this information must be included.

Radiologist approval is required for **CR** and **U/S** requests. For questions about this policy please contact Image Archive at (617) 667-2519 and press #2

Vice President Sponsor:	Robert Cherry
Approved by:	Donna Hallett Sr. Operations Director, Radiology
Original Date Approved:	11/2011
Revised:	3/2014, 12/2014, 6/2015, 9/2016
Next Review Date:	9/2019

#### Reference:

Rad# Radiology Procedure for Image Archive processing 2nd opinion read Rad # Radiology Procedure for Radiologist interoretina 2nd opinion read

RAD-111 BIDMC Radiology 2nd Opinion Reading Policy page 1 of 1

# Radiology Calendar JANUARY 2018

Check for the most up-to-date schedule at: https://apps.bidmc.org/departments/radiology/residency/conferences/displayMonth.asp

Mon	Tues	Wed	Thurs	Fri
Weekly <b>Mon</b> Section Meetings: 3:00-4:00 ED section meeting [ED annex, WCC]		Weekly <b>Wed</b> Section Meetings: 11:00-12:00 MSK clinical conference 12:00-1:00 CardioThoracic, Gl/GU Oncology 3:00-4:00 Mammo [TCC-484]	Weekly <b>Thurs</b> Section Meetings: 12:00 - 1:30 Abd [WCC-354] 12:00-1:00 MSK	Note that as our 12 noon Friday Grand Rounds are held in the Rabkin Board Room, Shapiro-10, East Campus (except when noted otherwise, i.e., Sherman Auditorium)
<b>1</b> Happy New Year!	2	3	4 4:00-5:00 West Med Rads-Senior Resident on West Body CT [Clouse]s	<b>5</b> 8:00 - 9:00 Near-Miss Conference (Alexei Kudla) 12:00 - 1:00 Grand Rounds: The Post- Operative Chest (Jo-Anne Shepard) Sherman Auditorium
8 12:00-1:00 MRI meeting [Ansin 2]	9 10:30-11:30 NMMI meeting [GZ-103]	10 7:15-8:00 Ultrasound meeting [West Campus Gallery 304A] 7:30 -9:00 Neuro Lecture (TBD)	11	12 7:30 - 9:00 Faculty Evaluation Session (Program Directors) 12:00 - 1:00 Grand Rounds: Ultrasound elastography of muscles (Jim Wu)
<b>15</b> Martin Luther King Jr. Day	<b>16</b> 8:00 - 9:00 Fluoroscopy Physics (Matthew Palmer) 8:00-9:00 IR Meeting [West Recovery]	<b>17</b> 8:00 - 9:00 CT Physics I (Da Zhang)	<b>18</b> 8:00 - 9:00 CT Physics I (Da Zhang	<b>19</b> 7:30 - 8:15 Values & Empowerment (Michael Fishman) <b>12:00 - 1:00 Grand Rounds?</b>
<b>22</b> 7:30 - 8:15 Gastric Motility Scans (Kevin Donohoe) 8:15 - 9:00 Hepatobiliary Scans (Kevin Donohoe)	23 7:30 - 8:15 Thyroid Imaging (J. Anthony Parker) 8:15 - 9:00 Thyroid Therapy (J. Anthony Parker) 10:30-11:30 NMMI meeting [GZ-103]	<b>24</b> 7:30 - 9:00 Neuro Lecture (TBD)	25 7:30 - 8:15 Infection/Inflammation Imaging (J. Anthony Parker) 8:15 - 9:00 Neuroendocrine Tumors (J. Anthony Parker)	26 7:30 - 8:15 Values & Empowerment (Michael Fishman) 12:00 - 1:00 Grand Rounds: CT and MRI of cardiac neoplasms (Diana Litmanovich)
29	<b>30</b> 10:30-11:30 NMMI meeting [GZ-103]	31		

Dec 2017 - Jan 2018

The Gallery presents photos by Carl Nickerson Safari Enthusiast & Business Manager, HMFP Radiology South Africa & a taste of Dubai







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#### January 2018 GRAND ROUNDS:



Friday, Janueary 5th, 2018 12 noon - 1:00 PM **Sherman Auditorium** 

**The Post-operative Chest** 

Please welcome Jo-Anne Shepard, MD, **Director of Thoracic and Interventional** 

Imaging at MGH and Professor of Radiology, HMS who will be delivering our first grand rounds lecture of 2018.

Learning objectives for "The Post-operative Chest" are to:

- understand the expected appearance of common and uncommon thoracic procedures
- describe the complications of post-operative procedures and understand when they occur
- illustrate the complications of post-operative procedure on imaging studies

Dr. Shepard received her medical training at Boston University School of Medicine. She completed residency training in radiology at Massachusetts General Hospital and a fellowship in ultrasound and computerized body tomography at Boston VA Medical Center. In 2001, she was appointed Director of Thoracic and Interventional Imaging at MGH and she has also served as an examiner in cardiothoracic radiology on the American Board of Radiology since 2001.

Lectures and publications relevant to her Grand Rounds topic include:

Post-operative complications of thoracic surgery Aspiration biopsy of the thorax Radiology of lung transplantation - Visiting Professor, Armed Forces Institute of Pathology Bethesda, MD

Refresher Course, RSNA 2012: The Postoperative Chest: Pitfalls and Pearls. RSNA 2012

"Post-operative chest: Expected Findings and Complications" - Visiting Professor, Buenos Aires, Argentina 2017

Nachiappan AC, Digumarthy SR, Sharma A, Muse V, Lanuti M. Shepard JO. An Overview of Lung Surgeries: Postoperative CT Findings and Complications. Internet Journal of Radiology. 2010; 12(1).

Rotman JA, Plodkowski AJ, Hayes SA, de Groot PM, Shepard JA, Munden RF, Ginsberg MS. Postoperative complications after thoracic surgery for lung cancer. Clin Imaging, 2015 Sep-Oct;39(5):735-49. Review. PMID: 26117564.

Sharma A, McDermott S, Mathisen DJ, Shepard JO. Preoperative Localization of Lung Nodules With Fiducial Markers: Feasibility and Technical Considerations. Ann Thorac Surg. 2017 Apr;103(4):1114-1120. PMID: 28131426.

#### **Welcome CeeJay Powell Francis**



Please welcome **CeeJay Powell** Francis who joins Moselye Pierre, Robert Shaw and Chrissy Koehler as our newest **Residency** &



**Education Program** Manager, Radiology Fellowships Program Coordinator under our Medical Education Programs. CeeJay holds a BA in Cultural Anthropology with a minor in Women Studies and most recently comes to Radiology from the Carl J.

Shapiro Department of Orthopaedics Surgery & Spine Center where she worked as a Referral Specialist since 2013. Her hobbies include crafting and making lotions and salves -- and she loves cats! CeeJay can be found in the Medical Education Programs office, Sherman-231 and can be reached at cpowell@bidmc.harvard.edu or x 7-3514.



# Radiology RESEARCH

If you are interested in submitting an application for either internal/external research funding or hiring a student, fellow, or other, please contact Bridget Russo for assistance.



**Bridget Russo Research Administrator** Ansin 249 / P: 617-667-7427 bkrusso@bidmc.harvard.edu



Photo by Juergen Roth

#### **Radiology Residents' Perspective on RSNA 2017**





Stella Lam and Cathy Wei



Ron Eisenberg, Residency Program Assoc. Director and Cathy Wei

**Bonny Lee**, 3rd yr resident and RSNA Student Travel Awardee, **Priscilla Slanetz**, Residency Program Director, **Jason Song**, 4th yr resident, **Stella Lam**, 4th yr resident, **Brian Zhao**, 2nd yr resident, and **Cathy Wei**, 4th yr resident and RSNA Student Travel Awardee top off their RSNA experience at the Girl and the Goat restaurant

RSNA 2017 was an amazing experience and opportunity. Among the 50,000+ attendees from all over the world flooding the halls of McCormick Place, it might seem easy to get lost in the hustle. Yet, we oftentimes found ourselves running into our attendings and other people we knew in the sky bridge. It was clear that BIDMC Radiology had a presence at RSNA – we have so many attendings who are at the forefront of radiology leadership, education, innovation, and research. Just incredible. RSNA was great because it had something for everyone, and with a little planning, the meeting was easily molded to fit each of our individual goals and interests. RSNA was an excellent opportunity to meet new people and BIDMC alumni, catch up with former

colleagues and friends, discuss current and future projects, and develop new research collaborations. We also had the chance to hear from experts in the field, learn more about the hot topics in radiology such as deep learning and big data, check out a case of the day, attend educational lectures in all sections of radiology, and participate in Diagnosis Live, if we chose. To enhance the trainee experience, RSNA also had a resident lounge and trainee-specific events including a resident and fellow reception and forums focused on career building (among which our one and only **Dr. Eisenberg** was a speaker), interviewing skills, and the different types of jobs for radiologists. The vendor exhibits provided an opportunity for us to explore new and current technologies as well as the future directions of vendors attempting to produce products that focus on improving the radiologist's



Imaging as art - painted live at RSNA

workflow. Lastly, we had the chance, thanks to the residency program and **Dr. Slanetz**, to experience the real Chicago culinary experience by having a delicious meal at Girl and the Goat with great company. Thank you for this opportunity to attend RSNA this year. I highly recommend other residents to consider going once before graduating.

- Carhy Wei, 4th year resident and 2018 RSNA Student Travel Awardee

This was my first time at RSNA as a radiology resident, and it was truly an amazing experience. There is so much to learn and I enjoyed the opportunity to meet people from all over the world! I am so grateful that I had the opportunity to attend this year. – **Stella Lam**, 4th year resident



Aideen Snell, MSW, CPXP Manager, Service Excellence Program x72570 asnell@bidmc.harvard.edu

### AIDEEN SNELL: SERVICE EXCELLENCE & ACTION PLANNING (SEAP) COMMITTEE Radiology Action Planning Committee on Patient Engagement

## JANUARY TIP of the Month:

# By working together as a team we can accomplish great things

As we start a new year it's time to refresh our focus of the SEAP (Service Excellence & Action Planning) Committee. By working together as a team we can accomplish great things. Here are our 2018 goals:

ent Sign II

### Radiology SEAP COMMITTEE GOALS FOR FY18

### **Consistency with Service Standards**

How they are being communicated to new hires How they are being communicated to current staff Accountability

### **Improved Communication**

- Rounding waiting rooms and sub-waiting rooms
- Educating patients on what to expect / prep / timeframes, videos, patientsite, etc.
- Improved knowledge of patient appointments in other areas of medical center
- Modality specific focus groups / sharing of lessons learned to other modalities
- Interdepartmental communication (e.g., Nursing on the floor)
- Improved Teamwork support across modalities
- Appreciation, feedback from physicians on a job well done
- Service Recovery

### **Improved Tools and Resources**

- Better response from EVS and Service Response (First Impression, Environment, Way finding)
- **Interpreter Services**
- More knowledge for patients with visable and invisable disabilities
- More available training



### **RADIOLOGY's TALK TO ME**

As introduced in the June 2017 issue of Radical Views, **Talk to Me** is a department wide initiative encouraging staff to commit to speaking up if they have a safety concern and to commit to listening when a safety concern is raised. To keep the momentum going for this initiative each month we review all safety concerns called out and while we realize staff do not need incentives to do the right thing, we

want you all to know that we are seriously committed to this initiative and therefore the department will reward with a bonus payment. Each month we will highlight here in Radical





Suzanne Swedeen, RN MSN CNIV, Quality Improvement Specialist

Bettina Siewert, MD Executive Vice Chair & Vice Chair of Quality

Views the safety concern raised with the biggest impact and award the staff member a bonus.

Congratulations to IR Cross-trained Tech II **Kali Wilson**, November's Radiology Safety Excellence Award recipient who recognized a deviation in a long standing Y90 safety practice. She spoke up about her concern with the available "expert" at the time. Feeling still unsettled she called out her concern for further review just in case she could prevent a safety hazard down the road. This act of speaking up about a safety concern in order to prevent a possible adverse event down the road demonstrates Kalie's commitment to safety and prevention of harm to both patients and staff.

# **How to report a Concern**, *i.e.*, any situation that has potential to cause harm to patient, staff or families.

An imminent concern for patient or staff safety needs to be called out in the moment. If no patients are present you should say "I have a safety concern".

To alert the team of a safety concern when a patient is present, say "Can we review the images on the larger screen outside the room."

Staff can also use the hospital-wide incident reporting system (call RL 6) or the Radiology online QA database which has been upgraded to include a near-miss category. Staff can also email Suzanne Swedeen with any questions or concerns.

**Stay in touch:** Check out our **BIDMC Radiology Alumni Society page** and access our monthly Radical Views

Also contact Radical Views Editor Donna Wolfe at **dwolfe**@ **bidmc.harvard.edu** with updates, especially after completion of your residency or fellowship!



http://radnet.bidmc.harvard.edu/education/newsletters.asp





Residents & Fellows	CT Techs	Chelsea Community
Administrations	Dx Techs	Chestnut Hill Community
Informatics	IR/INR Techs	Lexington Community
Nursing	MRI Techs	Needham Community
Support Services	Nuc Techs	
	US/VASC Techs	

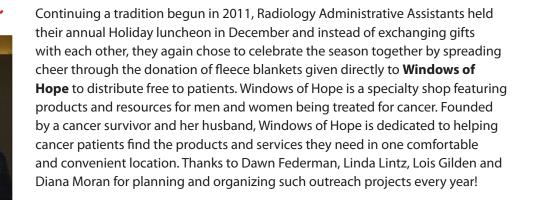
Updated Radiology Staff, Trainee & Technologist Posters are available on InfoRadiology in pdf format for viewing, downloading, and printing.

Log in to the portal:

https://inforad.bidmc.harvard.edu/Logon.asp Click on Staff Posters

### **Radiology Administrative Assistants' Holiday Lunch and Outreach Effort**

Tis the season ...



Thanks also to Diana Moran (left) for making the event even merrier with her gifts of chocolate snowmen for her colleagues!

Dawn Federman, Lois Gilden, and Linda Lintz delivered all the lovely lap quilts that the Administrative Assistants bought for those fighting Cancer to the Windows of Hope Gift shop (Shapiro Clinical Center, 9th flr).

"The giftshop appreciates this ongoing 2-year project & told us how deeply touched and surprised people were by these gifts." – Linda



**2017 & 2018 BIDMC Radiology Publications** - A PubMed search for new BIDMC publications is made each month; however, if we miss your paper, please send the reference to dwolfe@bidmc.harvard.edu. Note that 1) Epub dates are included only in publications where the Epub and paper publication dates occur in different years, i.e., Epub in 2017 and paper publication in 2018; and 2) doi addresses are only included until citations are updated with print citations; and 3) <u>Underlined names</u> = relatively current trainees/alumni; **BOLD** names = Faculty/Staff

# 2017 was quite a productive year for Radiology Faculty, Trainees and Staff who produced a total of 181 publications (compared to 126 in 2016); however, the 2017 total will decrease as the Epubs that acquire print data are moved to 2018.

#### Bibliography Updates for your CVs:

#### The following appeared in 2017 as EPubs but are now listed in 2018 with their print data:

Boos J, **Brook OR**, Fang J, **Brook A**, **Levine D**. Ovarian Cancer: Prevalence in Incidental Simple Adnexal Cysts Initially Identified in CT Examinations of the Abdomen and Pelvis. Radiology. 2018 Jan;286(1):196-204. Epub 2017 Sept 14. PMID: 28914598.

Boos J, Yoo RJ, Steinkeler J, Ayata G, **Ahmed M**, **Sarwar A**, **Weinstein** J, **Faintuch S**, **Brook OR**. Fluoroscopic percutaneous brush cytology, forceps biopsy and both in tandem for diagnosis of malignant biliary obstruction. Eur Radiol. 2018 Feb;28(2):522-529. Epub 2017 Aug 4. PMID: 28779396.

Kasper EM, Ippen FM, Maragkos GA, Anderson MP, **Rojas R**, Mahadevan A. Tanycytic ependymoma of the brain stem, presentations of rare cystic disease variants and review of literature. J Neurosurg Sci. 2018 Feb;62(1):78-88. Epub 2017 Sep 7. PMID: 28884561.

<u>Khatami D</u>, Kasper EM, **Bhadelia R**, **Rojas R**. Radiologic characteristics of ependymomas: a case-based approach. J Neurosurg Sci. 2018 Feb;62(1):38-45. Epub 2017 Sep 22. PMID: 28945051.

Nemec U, Heidinger BH, Anderson KR, Westmore MS, VanderLaan PA, **Bankier AA**. Software-based risk stratification of pulmonary adenocarcinomas manifesting as pure ground glass nodules on computed tomography. Eur Radiol. 2018 Jan;28(1):235-242. Epub 2017 Jul 14. PMID: 28710575; PMCID: PMC5717124.

Shif Y, **Kung JW, McMahon CJ, Mhuircheartaigh JN**, Lin YC, Anderson ME, **Wu JS**. Safety of omitting routine bleeding tests prior to imageguided musculoskeletal core needle biopsy. Skeletal Radiol. 2018 Feb;47(2):215-221. Epub 2017 Oct 6. PMID: 28983679.

#### 2017 Epubs recently updated with paper data during 2017, or 2017 pubs (in blue) missed in the Dec issue of Radical Views:

Austin DC, **Wu JS**, Spentzos D, Goldsmith JD, Anderson ME. A Collision Tumor Involving a Primary Leiomyosarcoma of the Lower Extremity and a Metastatic Medullary Thyroid Carcinoma: A Case Report. JBJS Case Connect. 2017 Oct-Dec;7(4):e90. doi: 10.2106/JBJS.CC.17.00041. PMID: 29286973.

Boos J, **Raptopoulos V**, Brook A, Brook OR. Split-bolus intravenous contrast material injection vs. single-bolus injection in patients following endovascular abdominal aortic repair (EVAR). Abdom Radiol (NY). 2017 Oct;42(10):2551-2561. PMID: 28447108.

Chang CD, Wu JS, Mhuircheartaigh JN, Hochman MG, Rodriguez EK, Appleton PT, Mcmahon CJ. Effect of sarcopenia on clinical and surgical outcome in elderly patients with proximal femur fractures. Skeletal Radiol. 2017 Dec 15. doi: 10.1007/s00256-017-2848-6. PMID: 29247259.

<u>Franconeri A, Fang J,</u> Carney B, Justaniah A, Miller L, Hur HC, King LP, Alammari R, **Faintuch S, Mortele KJ, Brook OR**. Structured vs narrative reporting of pelvic MRI for fibroids: clarity and impact on treatment planning. Eur Radiol. 2017 Dec 15. doi: 10.1007/s00330-017-5161-9. PMID: 29247353.

<u>Heidinger BH</u>, Anderson KR, <u>Nemec U</u>, Costa DB, Gangadharan SP, VanderLaan PA, **Bankier AA**. Lung Adenocarcinoma Manifesting as Pure Ground-Glass Nodules: Correlating CT Size, Volume, Density, and Roundness with Histopathologic Invasion and Size. J Thorac Oncol. 2017 Aug;12(8):1288-1298. PMID: 28576745.

Johnson SC, Yegul NT, **Balcacer P**. Sonovaginography: A Useful Technique in the Assessment of the Lower Genital Tract. J Ultrasound Med. 2017 Sep;36(9):1917-1933. PMID: 28516503.

Korevaar DA, Hooft L, Askie LM, Barbour V, Faure H, Gatsonis CA, Hunter KE, **Kressel HY**, Lippman H, McInnes MDF, Moher D, Rifai N, Cohen JF, Bossuyt PMM. Facilitating Prospective Registration of Diagnostic Accuracy Studies: A STARD Initiative. Clin Chem. 2017 Aug;63(8):1331-1341. PMID: 28630237.

Leitner BP, Huang S, Brychta RJ, Duckworth CJ, Baskin AS, McGehee S, Tal I, Dieckmann W, Gupta G, **Kolodny GM**, Pacak K, Herscovitch P, Cypess AM, Chen KY. Mapping of human brown adipose tissue in lean and obese young men. Proc Natl Acad Sci U S A. 2017 Aug 8;114(32):8649-8654. PMID: 28739898; PMCID: PMC5559032.

Lefebvre G, Chamard E, Proulx S, Tremblay S, Halko M, **Soman S**, de Guise E, Pascual-Leone A, Theoret H. Increased myo-inositol in primary motor cortex of contact sport athletes without a history of concussion. J Neurotrauma. 2017 Dec 26. PMID: 29279021.

Lewis S, Besa C, Wagner M, Jhaveri K, Kihira S, Zhu H, Sadoughi N, Fischer S, Srivastava A, Yee E, **Mortele K**, Babb J, Thung S, Taouli B. Prediction of the histopathologic findings of intrahepatic cholangiocarcinoma: qualitative and quantitative assessment of diffusion-weighted imaging. Eur Radiol. 2017 Dec 12. doi: 10.1007/s00330-017-5156-6. PMID: 29234913.

Lourenco AP, DiFlorio-Alexander RM, **Slanetz PJ**. Breast Density Legislation in New England: A Survey Study of Practicing Radiologists. Acad Radiol. 2017 Oct;24(10):1265-1267. PMID: 28495213.

<u>Nemec U</u>, <u>Heidinger B</u>, Sokas C, Chu L, **Eisenberg RL**. Diagnosing Sarcopenia on Thoracic Computed Tomography: Quantitative Assessment of Skeletal Muscle Mass in Patients Undergoing Transcatheter Aortic Valve Replacement. Acad Radiol. 2017 Sep;24(9):1154-1161. PMID: 28365235.

Nguyen Q, Mehta SV, Fang J, Sheiman R, **Kane R**, **Ahmed M**, **Sarwar A**, **Siewert B**, **Brook OR**. Thirty-day emergency room visits and hospital admissions after outpatient non-vascular image-guided procedures. Abdom Radiol (NY). 2017 Oct;42(10):2538-2543. PMID: 28466184.

Wieschhoff GG, Mandell JC, Czuczman GJ, Nikac V, Shah N, Smith SE. Acute non-contact anterior cruciate ligament tears are associated with relatively increased vastus medialis to semimembranosus cross-sectional area ratio: a case-control retrospective MR study. Skeletal Radiol. 2017 Nov;46(11):1469-1475. PMID: 28710543.

Zhao L, Vidorreta M, **Soman S**, Detre JA, **Alsop DC**. Improving the robustness of pseudo-continuous arterial spin labeling to off-resonance and pulsatile flow velocity. Magn Reson Med. 2017 Oct;78(4):1342-1351. Epub 2016 Oct 23. PMID: 27774656.