
Body MRI Fellowship – Goals & Objectives

The goal of the Body MRI Fellowship is to provide the structure, framework, experience, and education a fellow will need to correctly prescribe, perform, and interpret MRI examinations of the abdomen and pelvis, and care for the patients having these exams. A key factor in successful interpretation is an understanding of the fundamentals of MR imaging physics and technique, reformatting methods, and the ability to tailor imaging methods and protocols to address specific clinical questions. Fellows will be able to assimilate clinical information with imaging findings in the diagnosis of common and uncommon diseases, with common and uncommon presentations.

Fellows will gain experience presenting complicated imaging studies at multi-disciplinary conferences and engaging with the referring clinicians. All fellows will manage contrast reactions, allergies and extravasations, and actively participate in medical student and resident education.

At the end of the fellowship, the trainee will be proficient at each of the following:

1. Timely and accurate interpretation of all abdominal/pelvic MRI/ CT exams
2. Prescribing, tailoring, and creating CT and MRI protocols
3. Reformatting & post processing of CT and MR exams on an independent, 3D workstation
4. Describing MRI scan acquisition techniques, coil selection, techniques for addressing multiple types of motion artifact, sequences used for body MRI and MRA studies, and 3D reformatting techniques
5. Selecting contrast agents, premedication regimes, and nephrotoxicity precautions & prevention
6. Management of allergic reactions and contrast extravasations
7. Teaching residents body imaging topics in multiple teaching settings (at the workstation, small group, didactics)
8. Presenting patients at multidisciplinary settings, including conferences and tumor boards

BODY IMAGING CORE LEARNING CURRICULUM LIST BY REGION

LIVER

- Normal anatomy and variants, imaging methods and protocols
- Diffuse disease-fatty infiltration, cirrhosis, portal hypertension, hemochromatosis
- Focal benign masses-hemangioma, focal nodular hyperplasia, adenoma, abscess, focal fat
- Focal malignant masses- reporting, hepatocellular carcinoma, metastases, fibrolamellar hepatocellular carcinoma, lymphoma
- Trauma

SPLEEN

- Normal anatomy and variants, Imaging methods and protocols
- Splenomegaly, asplenia, polysplenia
- Focal lesions-cyst, hemangioma, lymphangioma, abscess, fungus, neoplasm

- Infarcts & Trauma

PANCREAS

- Normal anatomy and variants, Imaging methods and protocols
- Pancreatitis-types, categorization and grading, nomenclature of fluid collections
- Neoplasm-adenocarcinoma, cystic neoplasms, IPMN, neuroendocrine tumors, solid epithelial stromal tumor
- Trauma & ductal disruption
- Assessment of exocrine function
- Post-surgical findings and complications
- Incidental findings algorithms

ADRENAL GLANDS

- Normal anatomy and function, Imaging methods and protocols
- Hyperplasia, benign and malignant neoplasms
- Inflammatory disease, infection, trauma
- Biochemical testing, incidental findings, biopsies

KIDNEYS

- Normal anatomy and variants, Imaging methods and protocols
- Inflammatory conditions-pyelonephritis, abscess, xanthogranulomatous pyelonephritis
- Benign and malignant masses; staging, classification schemes
- Renal artery disorders; stenosis, aneurysms FMD
- Stone disease
- Trauma
- Post -surgical and post intervention findings

GALLBLADDER AND BILIARY TREE

- Normal anatomy and variants, Imaging methods and protocols
- Inflammatory & stone disease
- Infections & inflammatory diseases – PSC, PBC, cholangitis
- Neoplasm
- Congenital abnormalities-choledochal cysts, Caroli's disease

PERITONEUM & MESENTERY

- Normal anatomy & embryology-compartments and spaces, spread of disease
- Inflammatory processes-peritonitis, sclerosing mesenteritis
- Neoplasms- benign and malignant

RETROPERITONEUM

- Normal anatomy and embryology, retroperitoneal and extraperitoneal spaces and spread of disease
- Inflammatory & infectious disease-fibrosis, abscess
- Neoplasm- benign and malignant, abdomen and pelvis

LUMINAL GASTROINTESTINAL TRACT

- Normal anatomy and embryology, methods of imaging and protocols
- Anatomic variants-malrotation, Meckel's diverticulum, duplications
- Inflammatory and infectious conditions, ulcerative disease
- Neoplasms- benign and malignant, staging, categorization
- Post-surgical findings and complications
- Bowel obstruction-closed loop, internal hernias
- Ischemia & vascular disorders of arteries and veins
- Trauma & perforations
- Pelvic floor disorders

LYMPHATIC SYSTEM

- Anatomy, patterns of organ drainage
- Congenital and postsurgical alterations

- Inflammatory processes
- Neoplastic processes

VASCULAR SYSTEM (AORTOILIAC, IVC, and BRANCH VESSELS)

- Normal anatomy and variants, imaging methods and protocols
- Acute aortic syndromes, trauma and rupture
- Atherosclerosis, aneurysm, ulcerating plaque
- Inflammatory and non-inflammatory disease (e.g. FMD)
- Stents, grafts, normal and abnormal post intervention findings
- Major artery and vein thrombosis and stenosis
- Pelvic congestion syndrome

URETERS AND BLADDER

- Normal anatomy and variants, Imaging methods and protocols
- Benign & inflammatory processes-cystitis, atony, neurogenic bladder, stones, diverticulae
- Neoplasm
- Trauma-intra- and extraperitoneal rupture

PROSTATE AND SEMINAL VESICLES

- Normal anatomy and variants, imaging methods and protocols
- Benign disease
- Post-surgical findings and complications
- Infection & Abscess
- Neoplasms- diagnosis, surveillance, staging, reporting

UTERUS AND ADNEXAE

- Normal anatomy and variants, Imaging methods and protocols
- Benign and malignant ovarian lesions, reporting
- Inflammatory processes-pelvic inflammatory disease
- Benign uterine conditions-fibroids, adenomyosis
- Cervical and endometrial malignancy evaluation and staging
- Imaging of acute pelvic pain

SOFT TISSUE PATHOLOGY:

- Malignancy- sarcomas
- Infections – Abscess, necrotizing fasciitis, cellulitis
- Hemorrhage
- Benign masses -Lipoma, leiomyoma

MULTIREGIONAL

- Syndromes – genetic, sporadic, inheritance patterns, organs of impact, screening and surveillance

MANAGEMENT OF CONTRAST REACTIONS

- Manage the spectrum of contrast reactions using appropriate support equipment, personnel, and pharmacologic agents
- Discuss the significance of contrast reaction with a patient
- Prescribe steroid prep regimens which can be used for prophylaxis
- Maintain BLS (ACLS certification is optional)

SCAN ACQUISITION AND PRESCRIBING

- Techniques used to time scan acquisition with respect to IV contrast
- Indications for various gadolinium contrast agents
- Indications for positive and negative oral contrast
- Appropriate MR coil selection
- Altering scan techniques to address artifacts

Goals and Objectives: General Competencies

Patient Care

Fellows must be able to provide patient care that is compassionate, appropriate, and effective for the diagnosis and treatment of health problems. Fellows are expected to:

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and families
- Reliably recognize abnormalities on imaging studies, including pathologic and artifactual
- Assimilate essential and accurate medical and radiologic history, signs and symptoms from patients, clinicians and the medical record
- Work with all health care professionals to provide patient-focused care
- Consult on the indications, contraindications, risks, benefits, and alternatives of common abdominal imaging studies with referring providers and patients
- Discuss the indications, contraindications, risks, benefits, and alternatives of intravenous and oral contrast agents
- Recommend appropriate prophylaxis for contrast reactions
- Recognize and treat mild contrast reactions and IV contrast extravasations

Medical Knowledge

Fellow must demonstrate knowledge about established and evolving biomedical, clinical, and cognitive sciences and the application of this knowledge to patient care. By the end of fellowship, they are expected to:

- Describe the method of image acquisition for MRIs of the abdomen and pelvis, coil and machine selection, methods used to reduce artifacts from motion, breathing, and beam hardening.
- Apply existing protocols appropriately, modify protocols as needed per clinical scenario
- Apply principles of ACR white papers for incidental findings, ACR derived reporting standards for liver and prostate tumor imaging, etc.
- Identify & characterize pathology of the abdomen, pelvis & recommend appropriate further management.

Practice-Based Learning and Improvement

Fellows must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices. Fellows are expected to:

- Apply knowledge of study designs and statistical methods to the appraisal of clinical studies and other information on the diagnostic effectiveness of CT/MRI and their role in patient care
- Demonstrate knowledge and use of medical informatics in patient care and to investigate, access on-line medical information, and support their own education
 - Read the GI/GU sections of Radiology, Radiographics, or AJR monthly
 - Perform literature search to support impressions and plans
 - Identify the electronic sites which are accurate and peer reviewed
- Facilitate the learning of students and other health care professionals
- Maintain willingness to learn from errors

Interpersonal and Communication Skills

Fellows must demonstrate interpersonal and communication skills that result in effective information exchange with technologists, referring physicians, residents, students and other medical personnel.

Fellows are expected to:

- Generate high quality imaging reports in a timely fashion with clear conclusions, differential diagnoses and guiding suggestions where appropriate; proofread and remove errors
- Interact professionally and effectively with other health care professionals and support staff
- Interact effectively and sensitively with patients and family including
 - Greeting them appropriately & Introducing yourself and your role
 - Professional behavior, including attire, name badge and/or white coat
 - Explain imaging exams clearly, answer questions, and discussing results if indicated
- Communicate urgent and important findings effectively with the referring clinicians. Document the communication of critical findings with medical personnel in a timely fashion.
- Lead multidisciplinary conferences

Professionalism

Fellows must demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient and professional population. Fellows are expected to:

- Demonstrate respect, compassion, and integrity & maintain an appropriate professional demeanor and bearing
- Serve as role models for residents and medical students
- Be punctual & work diligently
- Demonstrate personal responsibility for:
 - Completing the daily workload
 - Running the body imaging service comprehensively
 - Education-addressing deficits in knowledge
- Discuss and adhere to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, and business practices
- Receive feedback and respond constructively
- Demonstrate sensitivity and responsiveness to patients' culture, age, gender, and disabilities
- Work with healthcare professionals to provide the best patient-focused care
 - Assess appropriateness of requested study. If not appropriate, suggest a viable alternative procedure to the referring physician with a logical explanation.

Systems-Based Practice

Fellows must demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value. Fellow are expected to:

- Describe how their professional practice affects patients, other health care professionals, the health care organization, and the larger society, and how these elements affect their own practice.
- Practice cost-effective health care and resource allocation that does not compromise quality of care. When appropriate, suggest alternative, less costly imaging tests which could answer the clinical question.
- Evaluate each request for imaging as regards cost, effectiveness, and appropriateness, and to facilitate performance of an alternative study if indicated.