BODY IMAGING:
Fluoroscopy
GI and GU

GASTROINTESTINAL RADIOLOGY CURRICULUM

(Including Abdominal Imaging, Genitourinary follows)

I. Pharynx
- A. Technique of examination
- B. Normal anatomy
- C. Benign diseases
  1. Zenkers Diverticulum
  2. Foreign bodies
  3. Trauma
- D. Motility disorders
  1. Normal pharyngeal motion
  2. The modified barium swallow

II. Esophagus
- A. Technique of examination
- B. Normal anatomy
- C. Benign diseases
  1. Diverticula
  2. Trauma
  3. Esophagitis
     a. Reflux
     b. Infectious
     c. Caustic
     d. Drug-induced
  4. Barrett's esophagus
  5. Rings, webs, strictures
  6. Varices
  7. Benign tumors and tumor-like conditions
  8. Extrinsic processes affecting the esophagus
     a. Mediastinal structures
  9. Hiatal hernia
- D. Malignant tumors
  1. Squamous
  2. Adenocarcinomas
  3. Other malignant tumors
- E. Motility disorders
  1. Normal esophageal motility
  2. Primary motility disorders

- 3. Secondary motility disorders
- F. The postoperative esophagus

III. Stomach
- A. Normal anatomy and variations
- B. Technique of examination
- C. Benign diseases
  - 1. Diverticula
  - 2. Gastritis
    - a. Erosive
    - b. Atrophic
    - c. Infectious
    - d. other
      - i. Sarcoidosis
      - ii. Crohn's
  - 3. Peptic ulcer disease
  - 4. Hypertrophic gastropathy
  - 5. Varices
  - 6. Motility disturbances
  - 7. Volvulus
- D. Malignant diseases
  - 1. Primary
    - a. Adenocarcinoma
    - b. Lymphoma
    - c. GI stromal tumors
    - d. Carcinoid
  - 2. Metastatic
- E. The postoperative stomach
  - 1. Technique of examination
  - 2. Expected surgical appearance
    - a. Bariatric
    - b. Nissen
    - c. Whipple
  - 3. Complications

IV. Duodenum
- A. Benign diseases
  - 1. Congenital abnormalities
  - 2. Diverticula
  - 3. Hernia
  - 4. Trauma
  - 5. Inflammation
    - a. Duodenitis
    - b. Duodenal ulcers
    - c. Crohn's
  - 6. Aortoduodenal fistula

7. Benign tumors

B. Malignant diseases

1. Adenocarcinoma
2. Lymphoma
3. Metastatic disease

V. Small Intestine

A. Technique of examination

B. Normal anatomy and variants

C. Benign diseases

1. Congenital disorders
2. Diverticula
3. Trauma
4. Vascular diseases
    a. Intestinal ischemia and infarction
    b. Radiation enteritis
    c. Scleroderma
    d. Vasculitides
        i. Henoch-Schonlein purpura
        ii. Polyarteritis nodosa
        iii. Systemic lupus erythematosis
5. Malabsorption
    a. Sprue
    b. Lymphangiectasia
6. Inflammatory diseases
    a. Crohn's
    b. Infectious and parasitic diseases
7. Benign tumors
    a. Sporadic
    b. Associated with polyposis syndromes
8. Malrotation/Volvulus
9. Obstruction
10. Hemorrhage
11. Other
    a. s/p Bone Marrow Transplant
    b. Drug effects
        i. NSAIDS enteritis
        ii. ACE inhibitors

D. Malignant tumors

1. Adenocarcinoma
2. Lymphoma
3. Carcinoid
4. GI stromal tumors
5. Metastases

VI. Colon and Appendix

A. Technique of examination
B. Normal anatomy
C. Benign diseases
    1. Congenital abnormalities
    2. Diverticular disease
    3. Inflammatory diseases
        a. Crohn's
        b. Ulcerative colitis
        c. Infectious colitis
            i. Pseudomembranous
            ii. Viral
            iii. Bacterial
            iv. Colitis in AIDS
        d. Appendicitis
    4. Ischemic colitis
    5. Benign neoplasms
        a. Adenoma
        b. Mesenchymal tumors
        c. Polyposis syndromes
D. Malignant diseases
    1. Adenocarcinoma
    2. Other malignant tumors
        a. Lymphoma
        b. Carcinoid
        c. Melanoma
        d. Squamous (anal)
        e. Metastases

VII. Pancreas
A. Normal anatomy
B. Congenital abnormalities and variants
C. Pancreatitis
D. Pancreatic neoplasms
    1. Duct cell adenocarcinoma
    2. Cystic pancreatic neoplasms
        a. IPMN
    3. Islet cell tumors
    4. Lymphoma
    5. Metastases

VIII. Liver
A. Normal anatomy
    1. Classical gross anatomy
    2. Couinaud segmentation
B. Diffuse diseases of the liver
    1. Cirrhosis

2. Diseases associated with infiltration
    a. Fatty infiltration/NASH/Steatohepatitis
    b. Hemochromatosis
    c. Storage diseases
3. Vascular diseases
    a. Portal hypertension
    b. Portal vein occlusion
    c. Hepatic venous hypertension/Budd Chiari, Nutmeg liver

C. Focal diseases of the liver
1. Benign
    b. Cavernous hemangioma
    c. Liver cell adenoma
    d. Focal nodular hyperplasia
2. Malignant
    a. Hepatocellular carcinoma
    b. Metastases
    c. Other malignant liver lesions

D. Liver transplantation
1. Surgical candidates
2. Expected postoperative appearance
3. Complications

X. Spleen
A. Normal anatomy and variants
B. Congenital abnormalities
C. Splenomegaly
D. Focal lesions
1. Cysts
2. Hemangioma
3. Infarction
4. Abscess/microabsesses
5. Granulomatous disease

E. Trauma

XI. Bile Ducts and Gallbladder
A. Normal anatomy and variants
B. Techniques of examination
C. Congenital abnormalities
1. Choledochal cysts
2. Caroli's disease

D. Inflammatory diseases
1. Gallbladder
    a. cholecystitis
2. Biliary ducts
    a. Primary sclerosing cholangitis
    b. Ascending cholangitis

c. Recurrent pyogenic cholangitis
d. AIDS cholangiopathy
e. Ischemic injury
f. Surgical injury
g. Stone disease

E. Tumors
1. Gall Bladder Cancer
2. Cholangiocarcinoma
3. Metastases

XII. Peritoneal Spaces
A. Normal anatomy and embryology
B. Fluid collections
C. Diseases of the peritoneum
1. Inflammatory diseases
a. Bacterial peritonitis
b. TB
c. Other
2. Primary tumors
3. Metastatic tumors
D. Mesenteries
1. Normal anatomy and embryology
2. Relationship to retroperitoneum
3. Pathologic conditions
a. Sclerosing Mesenteritis/misty mesentery
b. Mesenteric Fibromatosis
E. Retroperitoneum
A. Normal anatomy and embryology
B. Retroperitoneal spaces
C. Benign diseases
a. Fibrosis
b. Inflammatory diseases
D. Malignant tumors

XVI. Multisystem Disorders
A. Acute abdomen
B. Trauma to the abdomen
C. Syndromes involving the Gastrointestinal Tract
D. Hernias
E. All Obstruction

Adapted from a document developed by the Society of Gastrointestinal Radiology
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GENITOURINARY RADIOLOGY CURRICULUM

I. Imaging Studies/Procedures (does not include all possible procedures)

A. Plain radiographs of the abdomen and pelvis
- tomography of the kidney
- Urography
- intravenous urography
- retrograde pyelography
- Lower tract radiography
- cystography
- Voiding cystourethrography (including pediatrics)
- Retrograde urethrography
- ileal conduit/continent reservoir studies
- Genital radiography
- Hysterosalpingography

B. Ultrasonography
- abdominal-adrenal, renal, ureter, bladder
- scrotum and contents
- female genital, obstetrical (including transvaginal)

C. Computed tomography of the genitourinary tract

D. Nuclear medicine of the urinary tract

E. Interventional procedures: Diagnostic and Therapeutic
- angiography and venography of the kidney
- percutaneous nephrostomy
- percutaneous biopsy
- percutaneous abscess drainage

CURRICULUM SYLLABUS

II. ANATOMY AND EMBRYOLOGY OF THE GU TRACT

A. EMBRYOLOGY of the genitourinary system, adrenal

B. CONGENITAL ANOMALIES

Renal
- Anomalies of number
- agenesis
- s*upernumerary kidney*
- Fusion anomalies
- Horseshoe kidney
- Crossed fused ectopia
- Position anomaly
- malrotation
- pelvic, inferior ectopia
- intrathoracic kidney

Ureteral
- Blind ureter
- Duplication: partial, complete and with ectopia
- Ectopic ureterocele

- Ectopic insertion
- Obstructions
  - UPJ obstruction
  - Obstructive megaureter
  - Ureteral stricture

Bladder
- exstrophy
- urachal anomalies
- duplication
- congenital diverticula

Urethra
- epispadias
- hypospadias
- duplications
- urethral obstructions
- posterior valves
- anterior valves
- meatal stenosis
- diverticulum

Male Genital
- cryptorchidism
- agenesis seminal vesicles
- utricular cysts

Female Genital
- vaginal agenesis
- uterine anomalies
  - agenesis
  - unicornuate uterus
  - fusion anomalies
  - septate uterus
  - bicornuate uterus
  - uterus didelphys
- Intersex States

C. NORMAL ANATOMY
- renal
- ureter
- bladder
- urethre
- genital, male and female
- adrenal
- retroperitoneum

D. CONTRAST (pharmaceuticals)
- History
- Principles, physiology
- ionic contrast
- nonionic contrast

MRI contrast media
Radiopharmaceuticals for urinary tract evaluation
Contrast for hysterosalpingography
oil-based
water soluble
Pathophysiology, incidence, classification, treatment of contrast reactions

E. KIDNEY
Normal anatomy and physiology
Normal variants, pseudotumors (Col. Bertin)
Normal renal size, growth—radiographic, US
Cystic disease
Isolated cysts
simple and complex cortical cysts
milk of calcium cysts
Perinephric cysts
Autosomal dominant cystic disease
Autosomal recessive cystic disease
Multicystic dysplastic kidney
Medullary sponge kidney
Medullary cystic disease
Cysts of renal sinus
Pyelocalyceal diverticulum
Cysts associated with other diseases
acquired cystic disease (dialysis)
vanHippel Lindau
tuberous sclerosis
Renal neoplasm
Benign
Malignant neoplasms
Pathology, diagnostic imaging features, and staging
Secondary (metastatic) neoplasms of kidney
Inflammatory disease of the kidney
Acute infection—pyelonephritis
emphysema pyelonephritis
Reflux nephropathy
Renal abscess
acute
chronic
Chronic renal infections
Chronic pyelonephritis
tuberculosis
XGP
Malacoplakia
Pyonephrosis
Nonbacterial

- fungal
- parasitic
- HIV

Vascular disease
- Normal vasculature and variants
- Renal hypertension, stenosis
  - atherosclerotic disease
- fibromuscular dysplasia
- Aneurysms
  - AVMs, AVFs
- Vasculitis
- Venous anatomy and anomalies
- Venous occlusion
  - renal vein thrombosis
  - renal vein varices

Stone disease and complication, treatment
- Incidence, physiology, stone diseases
- Nephrocalcinosis, types and causes
  - cortical
  - medullary
- Nephrolithiasis
  - Types of stones
  - urography, sonography, computed tomography of acute obstruction and stones
  - complications
- Treatment of stones

Renal failure, medical nephropathies
- Pathologic physiology acute, chronic RF
- Imaging investigation
  - ARF, CRF
  - EXU, US, CT, retrograde, nuclear, and MRI methods
- Specific disorders
  - chronic obstructive uropathy
  - nephrosclerosis
  - glomerulopathies
  - renal papillary necrosis (analgesic nephropathy, etc.)
  - other nephritides, include drug-induced, SLE

Obstructive uropathy
- Acute ureteral obstruction
  - physiology
  - imaging features
  - pyelosinus backflow
- Chronic ureteral obstruction
  - imaging features
  - obstructive atrophy of kidney

Renal transplantation and complications

- Selection of donors, surgical technique, anatomy of transplants
- Evaluation rejection, ATN
- Urologic complications
  - ureteral obstruction
  - urinary leak
- Vascular complications
  - vascular thrombosis
  - arterial stenosis
  - AV fistula
- Peritransplant fluid collections
  - urinoma
  - lymphocele
  - abscess
  - hematoma

F. URETER

- Normal anatomy
- Variants, herniation,
- simple ureterocele
- Ureteral dilation
- Congenital obstruction
  - UPJ
  - Primary megaureter
  - Congenital stricture
- Vesicoureteral reflux
- Nonobstructive dilatation
- Hydronephrosis of pregnancy
- Acquired stricture
- Ureteral neoplasms
  - Benign
  - Malignant
  - Secondary tumors of ureter
  - Intrinsic ureteral inflammation
  - Extrinsic diseases

G. BLADDER

- Normal physiology and function
  - Urodynamic techniques
- Variants and abnormal position
  - herniation
  - prolapse
  - displacement by extrinsic mass
- Functional disorder
  - Incontinence
  - stress incontinence
  - urge, other incontinence
- Neurogenic bladder

- Outlet obstruction
- Compensatory hypertrophy, radiography
- Diverticula
- Intraluminal filling defects
    - Clot
    - Calculi
    - Foreign body
    - Fungus ball
- Neoplasms
    - Benign
        - fibroepithelial polyp
        - leiomyoma
        - papilloma
        - neurofibroma
    - Malignant
        - transitional
        - squamous
        - adenocarcinoma
        - urachal carcinoma
- Secondary neoplasms of bladder
    - metastases
        - extrinsic invasion
        - lymphoma
- Inflammation
    - Bacterial infections
    - cystitis
        - acute
        - emphysematous cystitis
        - chronic
        - cystitis glandularis
    - tuberculosis
- Infections
    - fungal
    - TB
    - Schistosomiasis
    - Malakoplakia
- Noninfectious cystitis
- interstitial cystitis
    - radiation, chemical cystitis
    - eosinophilic cystitis
    - cystitis cystica, glandularis
- Involvement by extrinsic inflammation
    - endometriosis
    - inflammatory bowel disease
- Bladder fistulas
- Extrinsic diseases involving bladder

- Pelvic lipomatosis
- Retroperitoneal fibrosis
- Prostatic enlargement
- Uterine and adnexal masses

Urinary diversion and replacement techniques
- Ileal conduit
- Colonic diversions
- Continent diversions
  - Ileocecal
  - Kock pouch

H. Urethra

Normal structure and function
- Male
- Female
- Intersex states
- congenital deformities and strictures

Neoplasms and masses
- Benign
- Malignant

Inflammation
- Urethritis
- Female urethral syndrome
  - female urethral diverticulum

Strictures, fistula
- Inflammatory
- Post-traumatic
- Iatrogenic
- Surgical treatments

Artificial urethral sphincters

I. Male genital tract

Prostate
- Normal structure and function
- Prostatic calcification
- Benign prostatic hypertrophy
- Malignant neoplasms
- Prostatitis
- Prostatic abscess

Seminal vesicles
- Normal structure and function
- Congenital and acquired cysts
- Neoplasms
  - primary
  - invasion by prostatic cancer
- Duct obstruction (obstructive azoospermia)

Testicles
- Normal structure and function

undescended testis
testicular failure
Testicular cysts
Neoplasms
benign
malignant
microlithiasis
Inflammation
orchitis
abscess
Fournier's gangrene
Testicular torsion
Scrotum
Normal structure and function
Hydrocele
Epididymitis
Varicocele
Penis and corpora
Normal structure and function
Impotence
Peyronie's disease
Priapism
Penile implants

J. Female genital tract
Uterus and tubes
Normal anatomy and function
Infertility due to anomalies
Neoplasms
benign
malignant
Pelvic inflammatory disease
Ovaries
Normal structure and function
Ovarian failure
Ovarian neoplasms
Inflammatory disease
Endometriosis
Adrenal glands
Normal anatomy and function
Endocrine disorders
Cushing's syndrome
Hyperaldosteronism
Virilization
Catecholamine excess
Adrenal insufficiency
Hyperplasia

Congenital hyperplasia, adrenogenital syndrome
Secondary
Primary acquired hyperplasia
Neoplasms
Cortical adenoma
Adrenal carcinoma
Secondary neoplasia of adrenal
Myelolipoma
Inflammatory disease
Non-neoplastic masses

K. Retroperitoneum
Normal anatomy, compartments
Retroperitoneal fibrosis
Retroperitoneal neoplasms
Trauma of the urinary tract
Modification of procedures in trauma setting
Renal, ureteral, bladder, urethral, penile, scrotal, adrenal
Iatrogenic injury

Fluoroscopy Rotation 1 Behavioral Objectives

Knowledge Based Objectives: At the end of the rotation the resident should be able to:

1. Discuss the proper clinical and radiologic indications for the following studies:
   a) Barium swallow
   b) Upper GI series
   c) BE
   d) ACBE
   e) SBFT
   f) Enteroclysis
   g) ERCP
   h) Fistulograms
   i) IVU
   j) Cystogram
   k) Voiding cystourethrogram
   1) HSG
2. State the pertinent properties, proper concentrations and proper indications for the use of the following contrast media:
   a) Barium
   b) Water soluble contrast media (Oral Hypaque or Gastrografin)
   c) Ionic intravenous contrast media
   d) Non-ionic intravenous contrast media
3. Discuss the following information about Glucagon: Proper indications and dosages used in GI radiology, Physiologic effects, Side effects and Contraindications
4. List the risk factors for allergic reaction to intravenous contrast media.
5. State the proper assessment and treatment for allergic reactions to contrast media.

6. Recognize the normal radiographic appearance of structures of the abdomen, and GI/GU tract.
7. Given an appropriate radiograph, demonstrate a basic knowledge of radiographic abnormalities of the GI/GU tract.
8. Assist with preparation and presentation of the GI/GU conferences.

Technical Skills: At the end of the rotation the resident should be able to:

1. Demonstrate basic knowledge of the equipment to be used during fluoroscopy, including proper KV techniques for the various procedures, radiation safety features of the machines, and proper radiation safety techniques.
2. Demonstrate fluoroscopy techniques for performing the following procedures:
    Gastrointestinal
    a) Barium swallow
    b) Upper GI series
    c) Contrast Enema
    d) ACBE
    e) SBFT
  Genitourinary
    f) IVU
    g) Cystogram
    h) Urethrogram
    h) Voiding cystourethrogram
    i) HSG
  Other
    j) Fistulograms
3. Demonstrate knowledge of proper KV techniques, patient positioning, and type of after-films that should be taken for the procedures listed in # 2 above.
4. Demonstrate initial development of fluoroscopic skills by identifying the more common abnormalities during the performance of the studies.

Decision Making and Value Judgment Skills: At the end of the rotation, the resident should be able to:

1. Review the history of the patient for whom a procedure has been ordered and determine the appropriateness of the study requested.
2. Communicate with the referring physician about any recommendations for change in the type of procedure to be performed.
3. Communicate with the technologist about any special or additional views that should be obtained to demonstrate the pathology identified.
4. Read and dictate the studies performed, with the supervision of the faculty radiologist.
5. Communicate to the referring physician on the day of the exam any significant abnormalities identified on the examination.

General Competencies
The resident will be able to:

Patient Care

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

- communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- gather essential and accurate medical and radiologic history pertinent to the procedure for which the patient is scheduled or for the examination that the patient has had
- Learn to perform fluoroscopic procedures
- Work with health care professionals, including those from other disciplines to provide patient focused care
- Begin to become familiar with the indications, contraindications, risks, benefits, and alternatives of types of contrast and route of administration
- Learn about the issues involved in emergency, post traumatic and post-op studies
- Begin to become proficient in recognizing, classifying, and treating contrast reactions

Assessment

- Global ratings by faculty
- 360 degree evaluation
- ACR In-service examination
- Evidence of accomplishments in the learning portfolio

Medical Knowledge

Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate sciences and the application of this knowledge to patient care. During this rotation, residents are expected to:

- learn the normal chest and abdominal plain film anatomy
- learn to interpret plain radiographs of the abdomen
- learn to interpret GI/GU fluoroscopic studies and intravenous urography
- learn the radiographic manifestations of common disease entities seen in the above studies
- Attend GI conference and be prepared to discuss recent cases, as well as using the information from conference to tailor patient exams.
- understand the indications and uses of intravenous iodinated contrast material
- discuss the concepts and specific measures indicated in the treatment of contrast reactions

Assessment

- Global ratings by faculty
- 360 degree evaluation

• Pre-call Fluoroscopic skills checklist
• Pre-call exam
• ACR In-service examination
• Evidence of accomplishments in the learning portfolio

Practice Based Learning and Improvement

Residents must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices. Residents 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 plain films, fluoroscopic procedures and intravenous urography and their role in the clinical care of the patient
- use information technology to manage information, access on-line medical information; and support their own education
- Facilitate the learning of students and other health care professionals. Medical students, residents from other disciplines and college students will periodically rotate through Fluoroscopy.
- locate, appraise and assimilate evidence from scientific studies
- maintain a personal procedure log
- demonstrate knowledge and use of medical informatics in patient care and education

Assessment

• Global ratings by faculty
• 360 degree evaluation
• Procedure log
• ACR In-service examination
• Medical Student evaluations
• Evidence of accomplishments in the learning portfolio

Interpersonal and Communication Skills

Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange with technologists, referring physicians and other medical personnel. Residents are expected to

- work professionally and effectively with other health care professionals, including technologists, secretaries, schedulers, speech pathologists, nurses, students, residents and physicians
- interact effectively and sensitively with patients, and with family members of patients, by greeting them appropriately, introducing yourself and your role, explaining the procedure to be performed, allowing them an opportunity to ask questions, obtaining informed consent when indicated, and discussing results as indicated

- communicate findings effectively with the referring clinicians
- communicate and document the communication of critical findings with the appropriate medical personnel in a timely fashion
- Learn to obtain informed consent, including a discussion of risks, benefits, and alternatives of a particular study
- Learn how to create a concise and informative radiology report
- Learn to document in the report to whom and when results are communicated, including read back when applicable

Assessment

- Global ratings by faculty
- 360 degree evaluation
- ACR In-service examination
- Dictation assessment
- Evidence of accomplishments in the learning portfolio

Professionalism

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

- demonstrate respect, compassion and integrity
- display appropriate grooming and dress habits
- maintain an appropriate professional demeanor and bearing
- demonstrate a commitment to excellence and on-going educational and professional development
- demonstrate a commitment to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, and business practices
- demonstrate sensitivity and responsiveness to patients' culture, age, gender and disabilities
- Be conscious of being a role model for fellow residents and medical students

Assessment

- Global ratings by faculty
- 360 degree evaluation
- ACR In-service examination
- Evidence of accomplishments in the learning portfolio

Systems Based Practice

Residents 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 are that is of optimal value. Residents are expected to

- understand how their professional practice affects other health care professionals, the health care organization and the larger society, and how these elements affect their own practice
- assist referring clinicians in providing cost effective healthcare
- practice cost effective health care and resource allocation that does not compromise quality of care
- be prepared to evaluate the request for imaging as regards cost, effectiveness, and appropriateness, and to facilitate performance of an alternative study if indicated (e.g. non-contrast CT in lieu of IVP for stones)
- Become familiar with the ACR Appropriateness Criteria

Assessment

• Global ratings by faculty
• 360 degree evaluation
• ACR In-service examination
• Evidence of accomplishments in the learning portfolio

Fluoroscopy Rotation 2
Behavioral Objectives

Knowledge Based Objectives: At the end of the rotation the resident should be able to:

1. Demonstrate review and/or retention of knowledge requirements set forth for the first rotation.
2. Describe and/or discuss GI/GU tract pathology in specific detail.
3. Assist with preparation and presentation of GI/GU conferences.
4. Supervise the learning activities of rotating students and residents.

Technical Skills: At the end of the rotation the resident should be able to:

1. Demonstrate further development of the technical skills of performing the GI/GU studies listed in the first rotation.
2. Demonstrate knowledge of tube placement, technical performance, and interpretation of enteroclysis procedures.
3. Demonstrate the ability to identify an abnormality at fluoroscopy and modify the technique or change the patient's position to take diagnostic fluoroscopic spot films.
4. Demonstrate the ability to perform efficiently through decreasing fluoroscopic time needed to perform a study without compromising diagnostic acumen.

Decision-Making and Value Judgment Skills: At the end of the rotation the resident should be able to:

1. Demonstrate an enhanced ability to perform decision making and value judgment skills listed under rotation 1.
2. Evaluate and integrate data from other studies imaging studies of the GI/GU tract, with clinical information to make recommendations to the referring physician about more appropriate or additional diagnostic studies needed for evaluation of the patient's abnormality.

3. Show progression in the ability to interpret studies with supervision from the faculty radiologist.
4. Demonstrate the ability to communicate findings, and make recommendations through succinct dictations.

General Competencies:
The resident will be able to:

Patient Care

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

- communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- gather essential and accurate medical and radio logic history pertinent to the procedure for which the patient is scheduled or for the examination that the patient has had
- Learn to tailor GI/GU fluoroscopic procedures to the needs of the patient
- Learn to optimize the study for patient safety
- Learn to minimize radiation exposure for the patient, the technologist, the resident and any learners
- work with health care professionals, including those from other disciplines to provide patient focused care
- Help organize the schedule

Assessment

- Global ratings by faculty
- 360 degree evaluation
- ACR In-service examination
- Evidence of accomplishments in the learning portfolio

Medical Knowledge

Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate sciences and the application of this knowledge to patient care. During this rotation, residents are expected to:

- learn the normal anatomy and common variants
- learn to interpret plain radiographs of the abdomen
- Be able to perform commonly ordered fluoroscopic studies
- learn to interpret GI/GU fluoroscopic studies and intravenous urography
- learn the radiographic manifestations of common disease entities seen in the above studies
- Be able to quickly recognizes emergent and pertinent findings
- Be able to provide a good basic differential diagnosis for findings
- Learn to decide when a pathologic finding is unusual, unexpected,

and/or important enough to be communicated immediately and directly to the attending physician as per ACR Communication Standards
- Attend GI conference and be prepared to discuss recently performed cases, as well as using the information from conference to tailor patient exams.
- understand the indications and uses of intravenous iodinated contrast material
- discuss the concepts and specific measures indicated in the treatment of contrast reactions

Assessment

- Global ratings by faculty
- 360 degree evaluation
- ACR In-service examination
- Evidence of accomplishments in the learning portfolio

Practice Based Learning and Improvement

Residents must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices. Residents 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 plain films, fluoroscopic procedures and intravenous urography and their role in the clinical care of the patient
- use information technology to manage information, access on-line medical information; and support their own education
- Facilitate the learning of students and other health care professionals. Medical students, residents from other disciplines and college students will periodically rotate through Fluoroscopy.
- locate, appraise and assimilate evidence from scientific studies
- maintain a personal procedure log
- demonstrate knowledge and use of medical informatics in patient care and education

Assessment

- Global ratings by faculty
- 360 degree evaluation
- ACR In-service examination
- Medical Student evaluations
- Evidence of accomplishments in the learning portfolio

Interpersonal and Communication Skills

Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange with technologists, referring physicians and other medical personnel. Residents are expected to

- work professionally and effectively with other health care professionals, including technologists, secretaries, schedulers, speech pathologists, nurses, students, residents and physicians
- interact effectively and sensitively with patients, and with family members of patients, by greeting them appropriately, introducing yourself and your role, explaining the procedure to be performed, allowing them an opportunity to ask questions, obtaining informed consent when indicated, and discussing results as indicated
- Produce a concise but thorough dictated report
- communicate findings effectively with the referring clinicians
- communicate and document the communication of critical findings with the appropriate medical personnel in a timely fashion

Assessment

• Global ratings by faculty
• 360 degree evaluation
• ACR In-service examination
• Dictation evaluation
• Evidence of accomplishments in the learning portfolio

Professionalism

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

- demonstrate respect, compassion and integrity
- display appropriate grooming and dress habits
- maintain an appropriate professional demeanor and bearing
- demonstrate a commitment to excellence and on-going educational and professional development
- demonstrate a commitment to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, informed consent, documentation and business practices
- demonstrate sensitivity and responsiveness to patients' culture, age, gender and disabilities

Assessment

• Global ratings by faculty
• 360 degree evaluation
• ACR In-service examination
• Conference attendance
• Evidence of accomplishments in the learning portfolio

Systems Based Practice

Residents 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 are that is of optimal value. Residents are expected to

- understand how their professional practice affects other health care professionals, the health care organization and the larger society, and how these elements affect their own practice
- assist referring clinicians in providing cost effective healthcare
- practice cost effective health care and resource allocation that does not compromise quality of care
- be prepared to evaluate the request for imaging as regards cost, effectiveness, and appropriateness, and to facilitate performance of an alternative study if indicated (e.g. non-contrast CT in lieu of IVP for stones)
- Demonstrate knowledge of the ACR Appropriateness Criteria

Assessment

- Global ratings by faculty
- 360 degree evaluation
- ACR In-service examination
- Evidence of accomplishments in the learning portfolio

Fluoroscopy Rotation 3 Behavioral Objectives

Knowledge Based Objectives: At the end of the rotation the resident should be able to:

1. Demonstrate GI/GU knowledge base.
2. Describe and/or discuss GI/GU tract pathology in specific detail.
3. Assist with preparation and presentation of GI/GU conferences.
4. Teach and supervise the learning activities of rotating students and residents.

Technical Skills: At the end of the rotation the resident should be able to:

1. Demonstrate further development of the technical skills of performing the GI/GU studies.
2. Demonstrate the ability to identify an abnormality at fluoroscopy and modify the technique or change the patient's position to take diagnostic fluoroscopic spot films.
3. Demonstrate the ability to perform efficiently through decreasing fluoroscopic time needed to perform a study without compromising diagnostic acumen.

Decision-Making and Value Judgment Skills: At the end of the rotation the resident should be able to:

1. Demonstrate an enhanced ability to perform decision making and value judgment skills.
2. Evaluate and integrate data from other studies imaging studies of the GI/GU tract, with clinical information to make decisions about how to best perform the appropriate study, and to make recommendations to the referring physician about appropriate or additional diagnostic studies needed for evaluation of the patient's abnormality.

3. Show progression in the ability to interpret studies with supervision from the faculty radiologist.
4. Demonstrate the ability to communicate findings, and make recommendations through succinct dictations.

General Competencies:
The resident will be able to:

Patient Care

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

- communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- gather essential and accurate medical and radiologic history pertinent to the procedure for which the patient is scheduled or for the examination that the patient has had
- Confirm that the requested imaging study is appropriate and if not, suggest a viable alternative procedure to the referring physician with a logical explanation
- Be able to manage a contrast reaction
- Perform GI/GU fluoroscopic procedures, as well as other procedures routinely done under fluoroscopic guidance.
- work with health care professionals, including those from other disciplines to provide patient focused care
- Supervise daily imaging schedule and assure adequate patient throughput
-

Assessment

- Global ratings by faculty
- 360 degree evaluation
- ACR In-service examination
- Evidence of accomplishments in the learning portfolio

Medical Knowledge

Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate sciences and the application of this knowledge to patient care. During this rotation, residents are expected to:

- Demonstrate knowledge of abdominal plain film anatomy
- Interpret plain radiographs of the abdomen
- Perform and interpret fluoroscopic studies and intravenous urography
- learn the radiographic manifestations of common disease entities seen in the above studies

- Be able to provide a differential diagnosis in order of probability for abdominal and pelvic pathology
- Attend GI conference and be prepared to discuss recently performed cases, as well as using the information from conference to tailor patient exams.
- understand the indications and uses of intravenous iodinated contrast material
- discuss the concepts and specific measures indicated in the treatment of contrast reactions
- Be familiar with the post operative anatomy for fluoroscopic studies performed

Assessment

- Global ratings by faculty
- 360 degree evaluation
- ACR In-service examination
- Mock Boards
- Evidence of accomplishments in the learning portfolio

Practice Based Learning and Improvement

Residents must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices. Residents 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 plain films, fluoroscopic procedures and intravenous urography and their role in the clinical care of the patient
- use information technology to manage information, access on-line medical information; and support their own education
- Facilitate the learning of students and other health care professionals. Medical students, residents from other disciplines and college students will periodically rotate through Fluoroscopy.
- locate, appraise and assimilate evidence from scientific studies
- maintain a personal procedure log
- demonstrate knowledge and use of medical informatics in patient care and education

Assessment

- Global ratings by faculty
- 360 degree evaluation
- ACR In-service examination
- Medical Student evaluations
- PQI project if appropriate
- Evidence of accomplishments in the learning portfolio

Interpersonal and Communication Skills

Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange with technologists, referring physicians and other medical personnel. Residents are expected to

- work professionally and effectively with other health care professionals, including technologists, secretaries, schedulers, speech pathologists, nurses, students, residents and physicians
- interact effectively and sensitively with patients, and with family members of patients, by greeting them appropriately, introducing yourself and your role, explaining the procedure to be performed, allowing them an opportunity to ask questions, obtaining informed consent when indicated, and discussing results as indicated
- Obtain informed consent including a discussion of the benefits, risks, and alternatives of the gastrointestinal or genitourinary imaging study.
- Be able to present a concise, clear summary of patient history, physical findings, lab parameters, and previous diagnostic workup relevant to the imaging study before it is interpreted
- Create a clear, concise radiology report.
- Adhere to the ACR Communication Standards by direct communication of significant unexpected or urgent results to the referring physician and documenting that communication in the report
- Communicate findings effectively with the referring clinicians
- Communicate and document the communication of critical findings with the appropriate medical personnel in a timely fashion

Assessment

- Global ratings by faculty
- 360 degree evaluation
- ACR In-service examination
- Dictation evaluation
- Evidence of accomplishments in the learning portfolio

Professionalism

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

- demonstrate respect, compassion and integrity
- display appropriate grooming and dress habits
- maintain an appropriate professional demeanor and bearing
- demonstrate a commitment to excellence and on-going educational and professional development
- demonstrate a commitment to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, and business practices

- demonstrate sensitivity and responsiveness to patients' culture, age, gender and disabilities
- Serve as a role model for learners

Assessment

- Global ratings by faculty
- 360 degree evaluation
- ACR In-service examination
- Medical Student evaluations
- Evidence of accomplishments in the learning portfolio

Systems Based Practice

Residents 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 are that is of optimal value. Residents are expected to

- understand how their professional practice affects other health care professionals, the health care organization and the larger society, and how these elements affect their own practice
- assist referring clinicians in providing cost effective healthcare
- practice cost effective health care and resource allocation that does not compromise quality of care
- be prepared to evaluate the request for imaging as regards cost, effectiveness, and appropriateness, and to facilitate performance of an alternative study if indicated
- Understand the ACR Appropriateness Criteria

Assessment

- Global ratings by faculty
- 360 degree evaluation
- ACR In-service examination
- Evidence of accomplishments in the learning portfolio

Fluoroscopy Rotation 4
Behavioral Objectives

Knowledge Based Objectives: At the end of the rotation the resident should be able to:

1. Demonstrate continued knowledge of requirements for previous rotations.
2. Discuss, with increased understanding, GI/GU tract pathology.
3. Integrate knowledge of all radiologic imaging modalities for the evaluation of GI/GU pathology with the clinical information so that the most appropriate study will be done and studies will be done in the proper sequence.
4. Assist in preparation and presentation of the GI/GU conferences.
5. Teach and supervise the learning activities of rotating students and residents.

Technical Skills: At the end of the rotation the resident should be able to:

1. Show improvement in performance of the skills listed in the previous rotations.
2. Demonstrate ability to perform the skills listed in previous rotations at the competence level associated with a beginning practitioner in radiology.

Decision Making and Value Judgment Skills: At the end of the rotation the resident should be able to:

1. Make decisions and value judgments at the competence level associated with a beginning practitioner in radiology.
2. Read and dictate studies with supervision and minimal assistance from the faculty radiologist.

General Competencies:
The resident will be able to:

Patient Care

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

- communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- gather essential and accurate medical and radiologic history pertinent to the procedure for which the patient is scheduled or for the examination that the patient has had
- Perform tailored fluoroscopic procedures
- Work with health care professionals, including those from other disciplines to
- provide patient focused care

Assessment

- Global ratings by faculty
- 360 degree evaluation
- ACR In-service examination
- ABR Written exam
- Evidence of accomplishments in the learning portfolio

Medical Knowledge

Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate sciences and the application of this knowledge to patient care. During this rotation, residents are expected to:

- Know the normal abdominal plain film anatomy

- Interpret plain radiographs of the abdomen
- Interpret fluoroscopic studies and intravenous urography
- learn the radiographic manifestations of the disease entities seen in the above studies
- Attend GI conference and be prepared to discuss recently performed cases, as well as using the information from conference to tailor patient exams.
- understand the indications and uses of contrast material
- Be able to treat contrast reactions

Assessment

- Global ratings by faculty
- 360 degree evaluation
- ACR In-service examination
- ABR Written exam
- Mock Boards
- Evidence of accomplishments in the learning portfolio

Practice Based Learning and Improvement

Residents must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices. Residents 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 plain films, fluoroscopic procedures and intravenous urography and their role in the clinical care of the patient
- use information technology to manage information, access on-line medical information; and support their own education
- Facilitate the learning of students and other health care professionals. Medical students, residents from other disciplines and college students will periodically rotate through Fluoroscopy.
- locate, appraise and assimilate evidence from scientific studies
- maintain a personal procedure log
- demonstrate knowledge and use of medical informatics in patient care and education

Assessment

- Global ratings by faculty
- 360 degree evaluation
- ACR In-service examination
- ABR Written exam
- Medical Student evaluations
- Evidence of accomplishments in the learning portfolio

<u>Interpersonal and Communication Skills</u>

Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange with technologists, referring physicians and other medical personnel. Residents are expected to

- Work professionally and effectively with other health care professionals, including technologists, secretaries, schedulers, speech pathologists, nurses, students, residents and physicians
- Interact effectively and sensitively with patients, and with family members of patients, by greeting them appropriately, introducing yourself and your role, explaining the procedure to be performed, allowing them an opportunity to ask questions, obtaining informed consent when indicated, and discussing results as indicated
- Produce a accurate, concise dictated report
- Communicate findings effectively with the referring clinicians
- Communicate and document the communication of critical findings with the appropriate medical personnel in a timely fashion

Assessment

- Global ratings by faculty
- 360 degree evaluation
- ACR In-service examination
- ABR Written exam
- Mock Boards
- Evidence of accomplishments in the learning portfolio

Professionalism

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

- demonstrate respect, compassion and integrity
- display appropriate grooming and dress habits
- maintain an appropriate professional demeanor and bearing
- demonstrate a commitment to excellence and on-going educational and professional development
- demonstrate a commitment to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, and business practices
- demonstrate sensitivity and responsiveness to patients' culture, age, gender and disabilities

Assessment

- Global ratings by faculty
- 360 degree evaluation
- ACR In-service examination
- ABR Written exam
- Evidence of accomplishments in the learning portfolio

Systems Based Practice

Residents 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 are that is of optimal value. Residents are expected to

- understand how their professional practice affects other health care professionals, the health care organization and the larger society, and how these elements affect their own practice
- assist referring clinicians in providing cost effective healthcare
- practice cost effective health care and resource allocation that does not compromise quality of care
- evaluate requests for imaging as regards cost, effectiveness, and appropriateness, and to facilitate performance of an alternative study if indicated
- Understand the ACR Appropriateness Criteria

Assessment

- Global ratings by faculty
- 360 degree evaluation
- ACR In-service examination
- ABR Written exam
- Evidence of accomplishments in the learning portfolio

Reading List

1. Gastrointestinal Radiology; The Requisites 3rd Edition., Halpert, R., Elsevier Science, 2006\\.
2. Genitourinary Radiology: The Requisites, Zagora, R., Elsevier Science,2004.
3. Alimentary Tract Radiology, Margulis and Burhenne
4. Gastrointestinal Radiology: a Pattern Approach, Eisenberg
5. Radiology of the Liver, Biliary Tract and Pancreas, Friedman and Dachman
6. Fundamental of Radiology, Michael Davis , Jeffrey D. Houston
7. Gastrointestinal Radiology. Gedgaudas-McClees.
8. Fundamentals of Diagnostic Radiology, appropriate chapters, of Brant and Helms.
9. Textbook of Gastrointestinal Radiology, by Gore, Levine, Laufer
10. Common Problems in Gastrointestinal Radiology. 1989, by William Thompson.
11. Double Contrast Gastrointestinal Radiology. 1979, by Laufer. Chapter 3 - "Upper Gastrointestinal Tract: Technical Aspects", pp 59-77.
12. R*adioGraphics*, review articles on GI/GU
13. *Radiology* and *American Journal of Radiology* , GI/GU articles
14. GI AND GU Section in Radiology, Resource and Review CD-ROM
15. http:/www-medlib.med.utah.edu/webpath/ORGAN.html#organ

Additional Reading Resources

Imaging Atlas of Human Anatomy, Weir, J., Abrahams, P.,

Elsevier Science, 2003.
Computed Tomography of the Body with Magnetic Resonance Imaging: Abdomen, Vol. 3., Moss, A., Gamsu, G., and Genant, H., Elsevier Science, 1992.
Dynamic Radiology of the Abdomen: Normal and Pathologic Anatomy, Myers, M., Springer-Verlag New York LLC, 2000.
Genitourinary Imaging, 2nd Edition-Case Review Series, Zagoria, R., Mayo-Smith, W., and Fielding, J., Elsevier Science, 2007.
Gastrointestinal Imaging, 2nd Edition-Case Review Series. Halpert,R., Elsevier Science, 2008.
Gastrointestinal Imaging: Case Review Series Robert D. Halpert. Second edition.

GENITOURINARY RADIOLOGY

Genitourinary radiology is not a specific rotation in and of itself, as GU radiology is taught and performed within all sections of the department.

Residents will acquire GU knowledge base, technical skills, and decision-making and value judgment skills during their fluoroscopy and reading room rotations (plain films, IVPs, loopograms, voiding cystourethrograms), as well during cross-sectional rotations in US (renal, bladder, prostate, and pelvic scanning), CT, and body MR (additional multiplanar and cross-sectional imaging where anatomic and pathologic and vascular and functional information is gathered), in nuclear medicine (renal scans), and finally during their angio and interventional rotation (percutaneous nephrolithotomy tracts, percutaneous nephrostomy catheters, antegrade placement of internal ureteral stents, nephrostograms and tube changes, renal biopsies).

Genitourinary tract imaging and intervention

Attendance at multidisciplinary conferences held weekly/monthly in conjunction with the departments of urology, nephrology, and obstetrics and gynecology.

Didactic teaching sessions and case review conferences held monthly and weekly, respectively, also provide GU teaching.

Residents will learn the basic indications, contraindications, and complications of various modalities of GU imaging and interventions.

Residents shall become competent in:
Reading plain radiographs of the abdomen and pelvis, including renal tomograms;
Intravenous and retrograde pyelography;
Cystography (including voiding cystourethrography);
Retrograde urethrography;
Loop-o-grams/ileal conduit/reservoir studies;

Hysterosalpingography

Residents shall become familiar with:
Sonohysterography
Tubal catheterization

Residents shall become competent in:
Ultrasound—abdomen, renal, adrenal, bladder, ureter
Renal transplant examination
Testicular and scrotal
Female pelvis, including transvaginal, and obstetrical

Computed Tomography and Magnetic Resonance Imaging as related to the genitourinary system, including, but not limited to, kidneys, adrenal glands, renal and pelvic vasculature, uterus and adnexae, ureters and bladder

Nuclear Medicine as relating to the genitourinary tract including renal scintigraphy, diuretic renography, reflux studies, PET.

Angiography and Interventional Radiology—percutaneous biopsy and drainage/aspiration of collections/abscesses, percutaneous nephrostomy tube placement, antegrade ureterography and ureteral stent placement, renovascular angiography, and possible therapeutic embolization for bleeding neoplasms, AMLs, trauma, adrenal vein sampling, and renal artery angioplasty/stenting for hypertensive related investigation and treatment, respectively.

General Competencies

Patient care
Residents must become capable of providing patient care that is empathetic, compassionate, and appropriate. Care must be suited to the establishment of diagnoses and provision of treatment. This shall include effective communication with patients and their families as well as peers, colleagues, and referring staff. The resident shall gather background information and knowledge appropriate to initiating and performing the diagnostic study in question and interpreting results.

Medical knowledge
Residents must become familiar with basic science, including anatomic and pathologic, and biomedical and clinical knowledge and be able to apply these to patient care and further understanding of investigation and treatment of illness. This shall include knowledge of normal GU anatomy and embryology, interpretation of normal and abnormal imaging studies, basic manifestations of common illnesses, effective and concise presentation of diagnostic studies and findings and interpretations at GU conferences. Residents must be able to discuss appropriate contrast agents and treatment of contrast reactions.

Practice-based learning and improvement
Residents must be able to evaluate patient care outcomes and practices, collect and evaluate scientific evidence, and improve patient care practices. This shall include the use of information technology, review study designs and basic statistical analyses. Residents shall facilitate learning of other residents, medical students, and health care personnel where appropriate.

Interpersonal and communication skills
Residents must demonstrate effective and timely interpersonal and communication skills to other health care professionals, including nurses, technologists, secretaries, nurse practitioners, medical students, and referring clinicians. Residents must interact professionally and sensitively with patients and their families when performing studies, obtaining informed consent and discussing results. Residents shall communicate study results to referring physicians and document these in a timely and concise fashion.

Professionalism
Residents must demonstrate integrity and compassion, along with professional demeanor, toward patients and their families, as well as to peers and medical staff alike. The ability for ethical consideration and ongoing education development will be shown. Ongoing commitment to excellence and professional development shall be shown.

Systems-based practice
Residents must understand how the care they provide relates to the larger context of health care and a patient's health care plan. They should be able to refer to additional resources, such as educational texts and cross specialty services in their quest to deliver optimum patient care. They should assist in providing cost-effective health care and practice health care cost initiatives with resource maintenance in mind without compromising patient care.

Reading List:
1. *RadioGraphics*, review articles on GU
2. *Radiology* and *American Journal of Radiology*, GU articles
3. GU Section in Radiology, Resource and Review CD-ROM
4. http:/www-medlib.med.utah.edu/webpath/ORGAN.html#organ
5. *Genitourinary Radiology: A Multimodality Approach*, Kutcher and Lautin
6. *Essentials of Uroradiology of the Kidney*, by Amis
7. *Radiology of the Kidney*, Davidson
8. *Textbook of Uroradiology*, Reed Dunnick
9. *Fundamentals of Diagnostic Radiology*, Brant WE, Helms CA.

Articles:
1. Diseases of the Esophagus: Diagnosis with Esophagography, Levine MS, Rubesin, SE, *Radiology* 2005;237 (2): 414-427
2. Usefulness of Barium Studies for Differentiating Benign and Malignant Strictures of the Esophagus, Sonya Gupta, Marc S. Levine, Stephen E. Rubesin, David A. Katzka, Igor Laufer, *AJR* 2003;180:737–744

3. Double-Contrast Upper Gastrointestinal Radiography: A Pattern Approach for Diseases of the Stomach, Stephen E. Rubesin,MD, Marc S. Levine,MD, Igor Laufer,MD, *Radiology* 2008; 246(1): 33-48
4. Pattern Approach for Diseases of Mesenteric Small Bowel on Barium Studies, Marc S. Levine,MD, Stephen E. Rubesin,MD, Igor Laufer,MD, *Radiology* 2008; 249(2): 445 -460
5. Colorectal Cancer: Screening Double-Contrast Barium Enema Examination in Average-Risk Adults Older Than 50 Years, Justin W. Kung,MD, Marc S. Levine,MD, Seth N. Glick,MD, Paras Lakhani,MD, Stephen E. Rubesin,MD, Igor Laufer,MD, *Radiology* 2006; 240(3): 725-735
6. Pause and Pulse: Ten Steps That Help Manage Radiation Dose During Pediatric Fluoroscopy, Marta Hernanz-Schulman, Marilyn J. Goske, Ishtiaq H. Bercha, Keith Strauss. *AJR* August 2011; 197:475-481; doi:10.2214/AJR.10.6122

BODY IMAGING CORE LECTURE CURRICULUM

LECTURE TITLE	Presenter
INTRODUCTORY (5 lectures)	
INTRODUCTION TO FLUOROSCOPY	**Chertoff**
INTRODUCTIONS TO ABDOMINAL PLAIN FILMS	**Chertoff**
INTRODUCTION TO CT Scanners MDCT Technique & dose adjustment Contrast enhancement dynamics Phases of imaging	**McNulty**
INTRODUCTION TO MRI Scanners Technique & sequences used in body	**Tsapakos**

MRI, MRA, MRCP, MR Urography
Contrast enhancement dynamics
Contraindications and safety (non-contrast related)

CT AND MRI CONTRAST AGENTS & REACTIONS **Silas**

Oral agents
IV agents:
Iodinated
Gadolinium
Allergies and Contraindications
Renal insufficiency, GFR
NSF
Metformin use
Contrast infiltration
Contrast reaction algorithms

LIVER (4 lectures)

LIVER 1 **Tsapakos**

- Normal anatomy, including blood supply, lymphatic drainage and variants
- Imaging methods and protocols
- Diffuse disease-fatty infiltration, hepatitis, infections, hemochromatosis, infarction, storage diseases

LIVER 2 **Tsapakos**

- Focal benign masses-hemangioma, cyts, focal nodular hyperplasia, adenoma, abscess, dysplastic & regenerating nodules
- Focal malignant masses-hepatocellular carcinoma, metastases, fibrolamellar hepatocellular carcinoma, lymphoma, biliary neoplasms

LIVER 3 **McNulty**

- Cirrhosis and portal hypertension
- Vascular-THAD, AV shunting, Budd Chiari, Trauma with vascular and biliary injury, cav transformation PV

LIVER 4 **McNulty**

- Post intervention interpretation: RFA, chemoembo, bland embo, Post transplant
- Cases/unknowns and spillover from above 3

GALLBLADDER & BILIARY (2 lectures)

BILIARY 1 **McNulty**

- Normal anatomy, including blood supply, lymphatic drainage and variants
- Congenital abnormalities-choledochal cysts, Caroli's disease
- Diffuse disease-sclerosing cholangitis, PBC, AIDS cholanigopathy, ischemic bile duct strictures, traumatic and post surgical injury

BILIARY 2 **Tsapakos**

- Imaging methods and protocols
- ERCP/MRCP correlation
* Infections, cholangitis, parasites
* Neoplasms-GB, cholangio
- Stone disease

SPLEEN **(1 lecture)** **Yen**

- Normal anatomy, lymphatic drainage
- Imaging methods and protocols
- Splenomegaly
- Asplenia, polysplenia, splenules, splenosis (some crossover with Pediatrics)
- Focal lesions-cyst, hamartoma, hemangioma, lymphangioma, abscess, neoplasm (primary and metastatic)
- Vascular- splenic infarcts & aneurysms (some crossover with IR)
- Trauma
- Infections/inflammatory-bacterial, fungal, sarcoidosis, AIDS

PANCREAS (3 lectures)

PANCREAS 1 **McNulty**

- Normal anatomy including blood supply & lymphatic drainage, and variants-divisum, annular pancreas, fatty replacement
- Imaging methods and protocols

PANCREAS 2 **Tsapakos**

- Trauma
- Pancreatitis-acute, chronic, complications and sequelae

PANCREAS 3 **Tsapakos**

- Neoplasm-adenocarcinoma, cystic neoplasms, IPMT, islet cell tumors, solid epithelial stromal tumor, cysts, VHL

PERITONEUM, MESENTERY & ABDOMINAL WALL

(1 lecture) **McNulty**

- Normal anatomy-compartments and spaces

- Ascites, hemoperitoneum, pneumoperitoneum
- Inflammatory processes-peritonitis, fibrosing mesenteritis, mesenteric panniculitis, sclerosing peritonitis, TB
- Omentum-infracts, carcinomatosis
- Neoplasm-mesothelioma, carcinoid, metastases, pseudomyxoma peritonei
- Hernias-types and names, incarcerated, causing SBO

LYMPHATIC SYSTEM (1/2 lecture, with retroperitoneum)

Tsapakos

- Anatomy-retrocrural, celiac, porta hepatic, retroperitoneal, mesenteric, pelvic, inguinal groups
- Metastatic spread patterns
- Cisterna chili
- Inflammatory processes
- Neoplastic processes

RETROPERITONEUM (½ lecture, with lymphatics) **Tsapakos**

- Normal anatomy
- Retroperitoneal and extraperitoneal spaces and spread of disease
- Inflammatory disease-fibrosis, psoas abcess
- Hematomas, air
- Neoplasms-primary (sarcomas) and metastatic

VASCULAR SYSTEM (AORTA, IVC, and BRANCH VESSELS)
(2 lectures)

VASCULAR 1 **McNulty**

- Normal anatomy and variants
- Imaging methods and protocols CTA, CTV, MRA, MRV
- Aneurysms, intramural hematoma, ulcerating plaque, dissection

VASCULAR 2 **McNulty**

- Vascular grafts-endografts
- IVC thrombosis
- Renal & Mesenteric artery and vein thrombosis
- Gonadal vein thrombosis

ADRENAL GLANDS (2 lectures)

ADRENAL GLANDS 1 **Yen**

- Normal anatomy, including blood supply & lymphatic drainage, and function

- Infections, inflammatory disease & hemorrhage

ADRENAL GLANDS 2 **Yen**

- Imaging methods and protocols
- Hyperplasia
- Benign and malignant neoplasms

KIDNEYS (3 lectures)

KIDNEYS 1 **Silas**

- Normal anatomy, lymphatic drainage, embryology and variants-cross fused ectopia, horseshoe kidney
- Imaging methods and protocols-renal mass protocol
- Inflammatory/infectious conditions-pyelonephritis, pyoneprhosis, abscess, xanthogranulomatous pyelonephritis

KIDNEYS 2 **Silas**

- Cystic disease-ADPCK, MCD, MLCN, simple and complex cysts, Bosniak
- Benign and malignant masses & syndromes
- Post RFA

KIDNEYS 1 **Yen**

- Nephrocalcinosis & Stone disease of *kidney*
- Vascular-MRA, CTA renal arteries, infarcts, RV thrombosis

RENAL COLLECTING SYSTEM, URETERS, AND BLADDER
(2 lectures)

Collecting Systems, Ureters, Bladder 1 **Silas**

- Normal anatomy, embryology and congenital variants
- Imaging methods and protocols – CTU, renal stone
- Benign processes-cystitis, pseudodiveritculosis, ureteritis cystica, atony, neurogenic bladder, stones, diverticulae

Collecting Systems, Ureters, Bladder 2 **Silas**

- Neoplasms, benign and malignant, and malakoplakia
- Infections, leukoplakia

GU SYSTEM TRAUMA, URETHRA (1 lecture) **Silas**

- RUG, trauma and strictures
- Female urethra
- Kidney trauma
- Collecting system trauma
- Bladder trauma-intra/extrap rupture

PROSTATE, SEMINAL VESICLES, DEFECOGRAPHY
(1 lecture) **Dann**

- Normal anatomy and variants
- Imaging methods and protocols
- Benign hypertrophy
- Infections/Abscess
- Neoplasm
- Defecography

UTERUS AND FALLOPIAN TUBES (2 lectures)

UTERUS & FT 1 **Dann**

- Normal anatomy
- Imaging methods and protocols
- Benign & malignant uterine conditions-fibroids, adenomyosis, leiomyosarcoma
- Benign and malignant endometrial disease-hyperplasia and carcinoma, endometriosis
- Cervical malignancy

UTERUS & FT 2 **Dann**

- Congenital uterine anomalies
- Fallopian tubes: salpingitis isthmica nodosa, patency, recannalization
- Inflammatory processes-pelvic inflammatory disease
- Miscellaneous-Bartholin, Gartners, Skenes, etc

OVARIES (1 lecture) **Dann**

- Normal anatomy
- Imaging methods and protocols
- Benign & malignant ovarian masses and cysts
- Pelvic congestion
- Ultrasound correlation

FETAL MRI (1 lecture) **Dann**

- All

GASTROINTESTINAL TRACT

PHARYNX (1 lecture) **Austin**

- Normal anatomy & normal swallow mechanism
- Methods of imaging and protocols
- Webs, diverticula, foreign bodies

- Congenital disorders
- Motility disorders-oral phase, epiglottic inversion, etc
- Post-op laryngectomies

(Dr. Gosselin will continue to give his lecture on post-laryngectomy imaging)

ESOPHAGUS (2 lectures) **Chertoff**

Esophagus 1

- Normal anatomy & embryology, normal variants
- Methods of imaging and protocols
- Inflammatory and infectious disease
- Benign masses-leiomyoma, lipoma, duplication cysts
- Malignancy-barrett's, adenocarcinoma, squamous cell
- Webs, rings, divericuli, polyps, hernias and reflux
- Motility disorders, achalasia

Esophagus 2

- Trauma, post-op, Emergency

STOMACH (3 lectures)

STOMACH 1 **Chertoff**

- Normal anatomy and embryology
- Methods of imaging and protocols
- Ulcer, gastritis, Inflammatory and infectious disease
- Diverticula

STOMACH 2 **Chertoff**

- Malignant neoplasms: adenocarcinoma, lymphoma, GIST, carcinoid, linitis plastica
- Benign masses: leiomyoma, lipoma
- Ischemia
- Volvulus

STOMACH 3 **Chertoff**

- Post-op
- Bariatric

SMALL BOWEL (2 lectures)

SMALL BOWEL 1 **Chertoff**

- Normal anatomy and embryology
- Methods of imaging and protocols, fluoroscopy and CT

- Anatomic variants: malrotation, diverticular disease, Meckel's diverticulum, duplications
- Ulcers
- Infectious diseases
- Fold abnormalities

SMALL BOWEL 2 **Chertoff**

- Benign neoplasms including polyposis syndromes
- Neoplasms: adenocarcinoma, carcinoid, lymphoma, metastases, GIST
- Ileus and bowel obstruction-including closed loop (some of this will have been covered in the plain film lecture)
- Trauma

LARGE BOWEL AND APPENDIX (2 lectures)

LG BOWEL & APPX 1 **Chertoff**

- Normal anatomy and embryology
- Methods of imaging and protocols
- Infectious/inflammatory diseases- C diff, diverticulitis
- Bowel obstruction & volvulus

LG BOWEL & APPX 2 **Chertoff**

- Appendix-mucocele, appendicitis
- Trauma
- Polyps, benign and malignant neoplasms
- Virtual colonscopy

GI TRACT SPECIFIC DIFFUSE DISEASES (3 lectures)

ISCHEMIA OF GI TRACT **Chertoff**

INFLAMMATORY BOWEL DISEASE **Chertoff**

AIDS OF THE GI TRACT **Chertoff**