

CREIGHTON UNIVERSITY MEDICAL CENTER

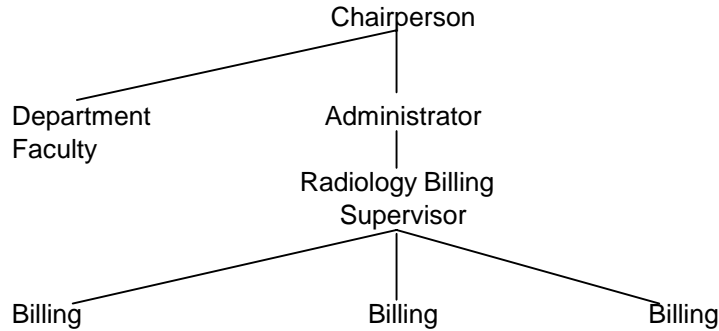
DEPARTMENT OF RADIOLOGY

DEPARTMENTAL COMPLIANCE MANUAL

## INTRODUCTION

The Department of Radiology at Creighton University Medical Center provides care to patients needing radiographic studies for inpatient, outpatient or emergency settings. This service includes many diagnostic modalities including routine film, fluoroscopy, CT, MRI, ultrasound, nuclear medicine and angiography. The department also carries out minimal invasive treatments through its interventional division. Radiology works with the consulting physicians to provide optimal medical care and assure that the appropriate diagnostic exam is ordered. The radiologic interpretation is faxed directly to the ordering physician. Emergent or significant unexpected findings may be communicated directly to the ordering physician by phone or in person.

The Chairman of the Department of Radiology has ultimate responsibility for the direction and policies of the department. All new policies or changes are then approved by the faculty. Administrative responsibilities are performed by Ray Kopp. Sharon McGuire supervises the billing services. Creighton University Medical Center provides technical support for the department. There are two separate bills generated by a radiologic exam. Creighton Radiology (CMA) bills for the professional interpretative fee and Creighton University Medical Center bills for the technical fee.



There are ten physicians responsible for the education of residents, medical students, and other medical personnel. Each faculty has a specific subspecialty which he or she is responsible for.

Martin L. Goldman, MD	Angiography/Interventional
James C. Brown, MD	Ultrasound
James J. Phalen, MD	Abdominal
Matthew F. Omojola, MB, FRCPC	Neuroradiology
Andrew I. Gelbman, DO, Ph.D	Musculoskeletal
Mary S. Davey, MD	Mammography
Peter G. Canaday, MD	Thoracic
Subash Paknikar, MBBS.	Nuclear Medicine
Marcus Maydew, MD	Cross Sectional Imaging
Khalil Yousef, MD	Angiography/Interventional
Gary Peet, MD	Cross Sectional Imaging

There are currently eleven residents that are trained by the Creighton Radiology faculty. One fellow in nuclear medicine also receives training by the primary subspecialty faculty. The nuclear fellowship is a joint program with the University of Nebraska Medical Center.

### **COMPLIANCE OVERSIGHT AND INVOLVEMENT**

There is a compliance liaison physician for the Department of Radiology. The physician is chosen by the chairman. All compliance questions and concerns are initially reviewed by the responsible person in the department. If further attention is needed then the liaison physician is notified. The administrative and billing personnel will assist the liaison physician when needed. All department personnel will adhere to the department's guidelines and will be continually updated when necessary. Compliance issues may be discussed during monthly departmental meetings or during dedicated compliance meetings that are scheduled as needed. Quarterly reports are made and transmitted to the University Compliance Officer.

### **POLICY GUIDELINES**

The Department of Radiology has a policy on resident interpretation of diagnostic images and procedures.

A teaching physician is a staff radiologist (other than a resident) who involves residents in the care of his or her patients. The teaching physician is responsible for the supervision of the activities of the resident and must review every diagnostic radiologic image.

All interventional radiology procedures require the staff radiologist to be present during the entire procedure or key portion(s) of the procedure. The resident or fellow initially evaluates the patient and then reports to the staff radiologist. The staff radiologist will then decide on the appropriate exam or procedure. All procedures are performed or personally supervised by the staff radiologist. Upon completion, the staff radiologist will discuss the case with the resident/fellow and a note is written on the patient's chart. The report, including a complete procedure paragraph, is dictated by the resident/fellow or the staff radiologist. A statement is placed in the report by the resident or fellow to document the presence of the attending during the procedure. If the procedure is dictated by the attending, it is taken for granted that the attending was present during the procedure. All dictated reports are reviewed, edited and signed by the staff radiologist involved in the case.

All plain-film emergency radiology examinations are contemporaneously interpreted by the on-call resident until 2300 hours. The examination is then returned to the Emergency Department with the preliminary interpretation on the Diagnostic Imaging Check-in Form(DICF). The Emergency Department Physician or Physician Assistant either agrees, disagrees or consults with the resident. This is documented on the DICF. After 2300 hours, the Emergency Physician may consult the on-call resident about any examination. All computed tomography, magnetic resonance, ultrasound, and nuclear medicine studies must be preliminarily interpreted by the resident after the exam is performed and documented on the DICF. All other non-emergency examinations will be evaluated by the resident after the films are placed on the viewing alternator. If there are

any major findings noted on the exam, the resident contacts the consulting physician and documents this on the DICF. In addition, the on-call faculty radiologist is available to review any examination performed after hours, as requested. His presence could be requested or images sent to him by teleradiology.

The above examinations are always reviewed by the on-call staff radiologist, the following morning. If there are any discrepant findings, the consulting physician is immediately notified and the findings are documented on the DICF and timed. The resident then dictates the report. All dictated reports are reviewed, edited, and signed by the staff radiologist. The finalized reports are available for the resident to review. The resident will not review any preliminary reports or electronically sign the staff radiologist's reports. All reports that are not signed-off are identified as preliminary. All faculty are encouraged to complete reports prior to a leave. If there are unsigned reports, the Chairman or his or her designee may choose to sign reports. This should affect less than one percent of the exams. Reviewing the exam may be necessary.

Occasionally, the Department of Radiology will hire a substitute radiologist to cover a service when one of the faculty is away or on vacation. The substitute radiologist will function as a faculty radiologist, however billing will be assigned to the faculty radiologist for whom the substitute radiologist is covering for continuous coverage periods of 60 days or less. The billing department is notified that services were provided by the substitute radiologist.

The issue of medical necessity is an important one demanded by third party payers. The department was made aware of proper ICD-9 codes. It is important for referring physicians to provide reasons and proper indications for the examination being requested. The department also implemented a policy that exams will only be performed when a proper indication is present.

Each radiology division head has established a standard exam protocol for the technologist to perform. All exam protocols are subject to change. The imaging protocols are listed in appendix A.

The Department of Radiology follows the list of commonly used abbreviations that Creighton University Medical Center has established. See appendix B.

All coding and billing procedures are initially handled by any of the radiology billing personnel. The billing personnel goes through each radiology report to determine level of service, evidence of medical necessity, and documentation of teaching physician presence. Sharon McGuire, radiology's billing supervisor, may be notified, if needed. The interpreting physician has ultimate coding authority and, occasionally, is asked for assistance. The Creighton University Helpline (280-5846) will be used when there is a discrepancy between the coding personnel and the interpreting physician. All claims are submitted in a timely fashion, currently within one week. If over/under-billing is identified, it is the University and the Department of Radiology's policy to correct the error as quickly as possible and this matter is addressed by the billing supervisor. The Department is aware that failure to correct a claim constitutes civil and/or criminal fraud and punishable by fine/imprisonment and possibly exclusion from federal and/or state health care programs.

Department compliance policies will be updated when necessary and reviewed annually. All department compliance policies and procedures must be approved by the Creighton Compliance Committee.

### **DEPARTMENT EDUCATION AND TRAINING**

Training sessions for physicians, staff, and residents will be provided annually and as otherwise necessary. Mandatory attendance is required and a sign-in sheet must be initialed by all department personnel. Ongoing training sessions will be provided as changes occur and these sessions are also mandatory. The Compliance Officer and Compliance liaison physician are responsible for the training/updating sessions and the Compliance Officer shall assure that the information is correct and current. Generally, the training sessions will be during a departmental meeting or at a Grand Rounds Conference. Such training sessions are recorded by video and available for viewing by those who could not attend the training session. This viewing will be documented by such individuals.

The job description for the coding/billing personnel is provided in Appendix C.

### **DEPARTMENT MONITORING**

There are quarterly random coding audits of exams numbering from about 10 exams per physician. This is carried out by Sharon McGuire, the Billing Supervisor for Radiology. If there are questions concerning billing or coding, the interpreting physician or coder is notified and correction, if needed, is made. All department physicians will be randomly audited. The first twenty encounters of every new provider will be audited before submitting claim to third party payers. Results of the audit will be made available and distributed to department personnel when necessary. Relevant findings of the audit will be incorporated into training/improvement sessions. Audit results will be reported quarterly to the department and Compliance Officer. The University Compliance Officer has also instituted regular departmental audits. A monthly billing audit is performed utilizing the HBO system at Creighton University Medical Center. All exams where a bill has not been generated are reviewed and a bill issued.

### **REPORTING AND INVESTIGATION OF NONCOMPLIANT CONDUCT**

When noncompliant behavior is observed, it is the Department's policy to handle the problem internally. Initially, the person is educated and trained on appropriate procedure and all pertinent regulations are discussed. If noncompliant behavior continues, a meeting with appropriate department personnel is held and a 6-month probation period is initiated. At this time, the Compliance Officer is notified of the situation and a specific corrective action plan is addressed and implemented. The compliance liaison will assist the Compliance Officer with the situation.

A Hotline (280-2107) is available to allow employees and agents of Creighton University to provide information concerning suspected violations. This can be performed in an anonymous fashion.

All radiology employees and agents must review and sign the University compliance plan annually.

## **APPENDIX**

- A. IMAGING PROTOCOLS
- B. LIST OF ABBREVIATIONS
- C. BILLING DEPARTMENT JOB DESCRIPTION

## APPENDIX A

### INSTRUCTIONS TO PATIENTS

**MRI:** All patients must check in at Admissions ½ hour before scheduled time. They should have no metal on their clothes (bra, zippers, snaps, metal buttons, jewelry, etc.) Suggested clothing would be sweatshirt/pants with no print on them. Patients may bring a favorite CD to listen to during the scan. ***If a patient needs to be sedated (child or adult), they need to arrive 2 hours before their scheduled appointment.***

**X-RAY:** ALL PATIENTS MUST CHECK IN ADMISSIONS ½ HOUR PRIOR TO EXAM AND MAKE SURE THEY HAVE THEIR REFERRAL OR NECESSARY PAPERS.

**MAMMOGRAM:** Mammogram on the average take twenty to thirty minutes. Prior to the exam do not use any deodorant or powder. Also, for your convenience, please wear a blouse or sweater rather than a dress.

**UPPER GI:** NPO after midnight or nothing to eat for at least eight hours. This includes chewing gum or hard candies. If you are diabetic or have to take medications at a particular time, please let the technologist know. This exam will take on the average ½ hour to 45 minutes.

**ESOPHAGRAM:** If only a esophagram is ordered, patient may eat, otherwise NPO after midnight. This exam will take on the average ½ hour to 45 minutes.

**SMALL BOWEL:** Whether this exam is done in conjunction with a UGI, the patient needs to be NPO after midnight. This exam will take on the average 1 ½ hours to complete. At times longer depending on the patient's digestive system.

**BARIUM ENEMA:** Exprep between 2 and 4 pm the day before. A liquid supper (beef or chicken broth, jello, etc.) NPO after midnight. Enemas in the morning until clear. If patient does not have an enema kit, this part can be excluded on Outpatients.

**IVP:** Exprep between 2 and 4 pm. NPO after midnight. It is important to find out if patient has any allergies to contrast or any substance at all. A list of questions will be available. The patient must have blood work done (BUN, creatine) prior to the exam time. This exam on the average will take one hour.

### **ULTRASOUND:**

**Abdomen/Aorta:** NPO after midnight, babies NPO for four hours.

**OB/GY/PROSTATE:** Full bladder, suggest 5-6 8 oz. Cups of fluid.

**Thoracentesis (chest):** None

**Brain:** Neonate to 2 yrs – no prep.

**Superficial:** No prep. (Specify area of interest.)

**NUCLEAR MEDICINE:**

**DISIDA (HIDA):** NPO after midnight. (Gallbladder, biliary system)

**Thallium:** NPO after midnight (Myocardial perfusion)

**Thyroid uptake and scan:** No x-rays with contrast 2-3 months before exam. No thyroid medication for 6 weeks prior to exam.

**Gallium:** None before first injection. (Soft tissue neoplasm or abscess)

**Bone:** None. (Metastatic workup, skeletal abnormalities)

**Esoph. Swallow/Gastric emptying:** NPO after midnight

**Indium (IN-111):** None (imaging for sites of infection)

**Ex or Rest RVG (MUG):** None (Ejection fraction of the heart)

**Schillings:** NPO after midnight. No. B12 for 3 days prior to exam. (Pernicious anemia)

## **HISTORY QUESTIONNAIRE FOR IV CONTRAST USE RADIOLOGY**

These questions are to be used in any examination that requires the use of any iodized contrast medium. Any answers that the patient may give that could give the indication of a possible contrast reaction needs to be reported to a radiologist as soon as possible. If a patient is at high risk the exam may be canceled. In some cases the patient may be given an antihistamine or corticosteroid drug the night before the exam to minimize the possibility of a reaction. In these case the primary physician is contacted. It is also important to ascertain that the patient is not on Glucophage. If patient is glucophage it will be necessary to stop the medication at least one and preferably 3 days before IV contrast administration. All responses to these questions must be documented and recorded.

1. Are you allergic to anything that you know of?
  
2. If so, what are you allergic to?
  
3. Do you suffer from Diabetes mellitus?
  
4. If so, are you taking Glucophage or metformin?

## II. *Lower Extremity*

On all long bones, you must have at least one AP view of each joint space included in the exam. Any extremity ordered as a post reduction must include an AP and lateral of both joint spaces. All films ordered as a post reduction must include an AP and lateral of both joint spaces. All films ordered which show a metallic internal fixation device must include the entire device. Utilize gonadal shielding on all patients except where diagnoses could be compromised. It is always important to protect yourself with lead aprons, gloves and thyroid shields when needed. All films taken must have the technologist initials on each radiograph as well as the time of exam. Each request must be filled out with technologist name or initials, time of exam and any pertinent information about the patient, exam or both.

### A. Foot

#### 1. Routine projections

10 x 12 nongrid cassette

- a. AP – (dorsoplantar)
- b. 30 degree medial oblique
- c. Lateral-
- d. *Optional*: Lateral weight bearing

### B. Os Calcis or Calcaneus

#### 1. Routine projections

10 x 12 crosswise nongrid cassette

- a. Dorsoplantar (semiaxial)
- b. Lateral

### C. Ankle

#### 1. Routine projections

10 x 12 crosswise nongrid cassette

- a. AP-
- b. Medial oblique *45 degree or Mortise 15-20 degrees obl.*
- c. Lateral
- d. *Optional*: Stress views of the ankle to rule out ligament damage.

### D. Lower Leg

#### 1. Routine projections

14 x 17 nongrid cassette

- a. AP-
- b. Lateral-

### E. Knee

#### 1. Routine projections

10 x 12 bucky

- a. AP

- b. Lateral
- 2. *Optional*
  - a. Intercondylar fossa PA axial  
(Holmblad or Camp-Coventry)
  - b. Weight bearing AP knee

F. Patella

1. Routine projection

10 x 12 bucky

- a. AP knee
- b. Lateral
- c. Tangential (Sunrise, Houghston, Settegast)

**NOTE:** In the case of a suspected fracture,  
The pelvis and AP hip should be checked before  
Lateral is positioned.

J. Pelvis

1. Routine projection

14 x 17 crosswise bucky

- a. AP

2. *Optional:* Inlet and outlet

- a. 1 exposure 25 degrees cephalic male, 40 degrees  
female
- b. 2 exposure 35-40 degrees caudad

**CREIGHTON UNIVERSITY MEDICAL CENTER**  
**DEPARTMENT ROUTINE**

I. Upper Extremity

On all long bones, you must have at least one AP view of each joint space included in the exam. Any extremity ordered as a post reduction must include an AP and lateral of both joint spaces. All films ordered which show a metallic internal fixation device must include the entire device. Utilize gonadal shielding on all patients except in cases where diagnoses could be compromised. It is always important to protect yourself with the use of lead aprons and thyroid shields when needed. All films taken must have the technologist initials on each radiograph taken. Each request must be filled out with technologist name or initials, time of exam and any pertinent information about the patient and exam.

A. Hand

1. Routine projections

film 10 x 12 crosswise nongrid cassette

- a. PA
- b. PA 45 degree medial oblique
- c. Lateral

B. Thumb

1. Routine projections

film 10 x 12 crosswise nongrid cassette

- a. PA hand
- b. Oblique hand
- c. AP thumb
- d. Lateral thumb

C. Fingers

1. Routine projections

film 10 x 12 crosswise nongrid cassette

- a. PA hand
- b. Medial oblique hand
- c. Lateral of affected finger

D. Wrist

1. Routine projections

film 10 x 12 crosswise nongrid cassette

- a. PA
- b. PA 45 degree medial oblique
- c. Lateral
- d. *Optional projection for navicular (Stecher method)*
- e. *Optional projection*  
Inferiosuperior projection of the Carpal canal (Gaynor-Hart)

E. Forearm

1. Routine projections

film 11 x 14 or 14 x 17 nongrid cassette

- a. AP
- b. Lateral

F. Elbow

1. Routine projections

film 10 x 12 crosswise nongrid cassette

- a. AP elbow
- b. 45 degree medial oblique
- c. Lateral elbow
- d. *Optional:* 45 degree lateral oblique

H. Shoulder

1. Routine projections

film 10 x 12 crosswise bucky

- a. AP external
- b. 45 degree posterior oblique  
(*example – rt. Shoulder 45 degree RPO*)  
arm must be in a neutral position for the obl.  
(*hand in thumb up position*)
- c. Axillary

2. Shoulder orthopedic department routine

- a. AP external, 45 degree posterior obl. With hand in neutral position and axillary (inferiorsuperior)
- b. Scapular Y with 10 degree caudal angle.

I. AC joints

1. Routine projections

film 14 x 17 crosswise or two 10 x 12 placed together crosswise  
....nongrid 72" SID or 40" SID

- a. AP bilateral AC joints....1 exposure without weights
- b. 2<sup>nd</sup> exposure with 10 lb. Weights

J. Clavicle

1. Routine projections

film 10 x 12....crosswise....bucky

- a. AP clavicle
- b. AP axial CR 25 to 30 degrees cephalic

K. Scapula

1. Routine projections

film 10 x 12 lengthwise bucky

- a. AP Scapula
- b. Lateral

### III. Spine

On all trauma patients a cross table lateral spine must be obtained before the routine radiographs are performed. The cross table lateral films need to be cleared by the staff radiologist, resident on call or staff doctor in the emergency department. Use gonadal shielding on all patients except in the cases where diagnoses could be compromised. It is also important to protect yourself by using lead aprons, gloves and thyroid shields when necessary. Each film must have the patient's name, medical record number, date, time of exam and technologist initials clearly marked on each film. Every request filled out by the technologist must have the technologist name or initials, time of exam and any pertinent information about the patient and/or exam or both.

#### A. Cervical spine

##### 1. Routine projections

film 10 x 12 bucky

- a. Lateral 72" nongrid cassette
- b. Open mouth C1, C2
- c. AP 15-20 degree angle
- d. Both oblique either LPO, RPO or RAO, LAO

*Optional:* Pariethoacanthial (Waters) or  
Reverse Waters....Swimmers – C-6 to T-4 (Lateral)

Note: All films can be taken either upright or recumbent.

*Additional:* Lateral cervical spine with flexion and extension.

#### B. Thoracic spine

##### 1. Routine projections

film 14 x 17 bucky

- a. AP collimated
- b. Lateral (left) Breathing technique
  1. *Additional:* 70 degree oblique

Note: Collimation on AP thoracic will improve detail significantly. Collimation and placing lead behind the patient on lateral thoracic is very important. This will decrease back scatter and improve detail of the radiograph. Building up the patient's lower ribs will not only increase patient comfort but will keep the spine horizontal to the film. Bending the patient's knees on the AP will increase patient comfort and decrease the kyphosis of the thoracic spine.

#### C. Lumbar spine

##### 1. Routine projections

film 14 x 17 bucky

- a. AP
- b. Lateral
- c. spot film of L5-S1 10 x 12 film 5-8 degree caudal angle

1. *Additional:* lumbar spine projections:
  - a. 45 degree oblique 11 x 14 film LPO, RPO or RAO, LAO
  - b. Flexion, neutral, extension standing laterals
  - c. (Dr. Branigan) AP lumbar 2 films:
    - 1 with CR perpendicular, 2 CR 15 degrees cephalic angle.

Note: On AP lumbar, bending the knees will help decrease lordosis of the spine and increase patient comfort. Collimation on the AP will improve detail of the spine but should not be done on Dr. Brannigan's patients or trauma patients. When positioning for a lateral lumbar, a support at the lower ribs will keep the spine horizontal to the film and increase patient comfort. Also, placing lead behind the patient is very important and will improve detail of the spine by decreasing backscatter.

#### D. SI joints

##### 1. Routine projections

film 10 x 12 bucky

- a. AP Pelvis
- b. Both AP oblique 25-30 degrees
  1. *Optional* – PA oblique

#### E. Sacrum

##### 1. Routine projections

film 10 x 12 bucky

- a. AP 15 degree cephalic angle
- b. Lateral

Note: Collimation and lead behind the patient on the lateral will greatly improve the detail of the sacrum. The waist of the patient can be built up to decrease pelvic tilt.

#### F. Coccyx

##### 1. Routine projections

film 10 x 12 bucky

- a. AP 10 degree caudal angle
- b. Lateral

Note: Collimation and lead behind the patient on the lateral will greatly improve the detail of the coccyx. When both sacrum and coccyx are ordered, both AP must be done separately, but a lateral sacrum and coccyx can be done on one film. The patient's waist can be built up to decrease the pelvic tilt of the patient.

#### G. Scoliosis survey

##### 1. Routine projections

film 14 x 36 ortho only 72" SID

- a. PA or AP

Note: PA projection will decrease the amount of radiation to the breasts and gonads.

#### IV. *Skull*

On all skull work, all metal objects must be removed. This includes wigs, dentures, partials, hairpins, hair barrettes, any type of hair bands, earrings, hearing aids, neck chains and eyeglasses. Certain pathologies only require particular projections. If there is any doubt on what radiographs to take, ask a radiologist. All films must be flashed with the following information: patient's name, date of exam, medical record number, physician's name, technologist initials and time of exam. Each request must have the technologist name or initials, time of exam and any pertinent information about the exam or patient. Utilize gonadal shielding on all patients. It is also important to protect yourself by wearing lead aprons, gloves and thyroid shields when needed.

#### A. Skull

##### 1. Routine projections

film 10 x 12 bucky

- a. AP axial (Towne, Occipital) 30 – 37 degrees caudal
- b. PA
- c. Right and left laterals CR 2" ^EAM

#### B. Sinus

##### 1. Routine projections

film 10 x 12 bucky

- a. Parietoacanthial (Waters)
- b. Lateral of affected side CR 1" > outer canthus
- c. PA axial 15 degrees caudal (Modified Caldwell)

Note: All sinuses must be done upright if patient condition and age permit. On infants and small children (2 yrs. or less) check before doing an entire series.

#### C. Facials and Orbits

##### 1. Routine projections

film 10 x 12 bucky

- a. PA
- b. Parietoacanthial (Waters)
- c. PA axial 25 degree caudad (Caldwell)
- d. Lateral of affected side CR zygoma

D. Zygoma

1. Routine projections

film 10 x 12   bucky

- a. SMV (submentalvertex)
- b. Parietoacanthial (Waters) with a 10 caudal CR

*Optional:* Tangential both zygomas

1. *PA tangential:* tilt and rotate head 15 degrees toward affected side.
2. *AP tangential:* tilt and rotate head 15 degrees toward affected side.

E. Nasal

1. Routine projections

film 10 x 12   nongrid cassette and bucky

- a. PA collimated
- b. Parietoacanthial (Waters)
- c. Soft tissue lateral (nongrid cassette) collimated

F. Mandible

1. Routine projections

Panorex cassette

- a. Panorax

2. Routine projections if unable to do a panorex

- a. PA
- b. Lateral of affected side
- c. Bilateral axiolateral oblique   CR 25 degrees cephalic

*Note:* place the part of the mandible you are interested in parallel to the film. For example: if interested in the body, place it parallel to the film and then angle 25 degrees cephalic.

G. IAC

1. Routine projections

film 10 x 12   bucky

- a. Posterior profile of petrous ridges (Stenvers) MSP 45 degrees toward affected side contact points forehead, nose, cheek CR 12 degree cephalic collimated
- b. PA axial   25 degree cephalad (Haas) collimated
- c. Transorbital 5 degrees caudad (tightly collimated)

1. *Optional:* Lateral of affected

*Note:* the IAC's are most often imaged through CT. The radiographs are ordered when checking post op cochlear implant placement.

H. Mastoid

1. Routine projections

film 10 x 12   nongrid cassette   bucky

- a. AP tangential (Hicky) MSP 55 degrees CR 15 degrees caudad IOML perpendicular to film nongrid cassette
- b. Axiolateral (Laws or Schuller) CR 15-25 degrees

Note: remember to tape the ears forward before taking the radiographs. On the AP tangential you can use a 15 degree angle sponge instead of angling the CR. Close collimation will improve image detail.

## I. TMJ

### 1. Routine projections

- a. Panorex Open and closed mouth

### 1. *Optional CT*

### 2. *Optional projections*

- a. AP axial CR – 30-37 degrees caudad (Townes) collimated
- b. Axial transcranial CR 25-30 degrees caudad collimated bilateral open and closed mouth projections.

# FLUORO EXAMS

These are normal exams under normal conditions.

## UGI

1. A study of the esophagus and stomach including reflux and stomach emptying.
2. Thick barium and crystals, 105 and spots are used.
3. Films---AP, PA and two Right Anterior Obliques.

## Small Bowel

1. A study of the small intestine from stomach to colon.
2. Thin barium with a small amount of gastrografin is used.
3. Films: Preliminary KUB, immediate KUB after barium has been drunk. Films every 20 minutes until terminal ileum is visualized. Then fluoro of the TI area.

## ESOPHAGUS

1. A study of the esophagus---looking for obstruction, hiatal hernia reflux and strictures.
2. Normal exam---thin barium, barium tablet, video and 105 rapid film used.
3. FILMS: AP, BOTH RIGHT AND LEFT OBLIQUES AND LATERAL VIEW while patient swallows barium.

## SWALLOWING CENTER PROTOCOL

1. Same as esophagus above---video and rapid 105 film, patient number of screen for correct identification.
2. Thin barium, barium tablet, barium burger are used.
3. Films: AP (PA) and LATERAL esophagus films are obtained.

## MODIFIED SWALLOWING EXAMS---DR. CANIGLIA OR PAT GILL

1. Exam will be modified according to the patient's condition. Dr. Caniglia or Pat McGill will direct the exam.
2. Video, 105 film, thick and thin barium, and a cracker may be used.
3. No overhead films are taken.

## POSTOP OR GASTROGRAFIN SWALLOW

1. Post op exam following surgery---gastrografin is used to determine any leaks at the surgery site.
2. Video and 105 rapid films---no overheads.

## BARIUM ENEMA

1. A study of the large bowel using barium as a contrast.
2. Preliminary KUB is taken to insure adequate prep for the exam.
3. AIR CONTRAST EXAM: thick barium plus air are used. Films---spot films during fluoroscopy, then an AP, both obliques, both decubitus films, PA, and an angle shot of the rectum with the enema tip still in are taken. After removal of

the tip (okay'd by Resident), a cross table lateral rectum is obtained. Patient is then permitted to use the restroom and then an evacuation film is taken.

4. SINGLE CONTRAST EXAM: thin barium in premixed barium bag is used. Bag is filled with water to the 2500 mark. Spot films are obtained during fluoroscopy and the overhead films are the same as above except no decubitus films are done due to lack of air administered.

5. GASTROGRAFIN ENEMA: A 2:1 diluted mixture of gastrografin and water is used. A KUB preliminary film is obtained. Spot films are taken during the exam(105 films if the patient condition is poor). Overhead films as determined by the Resident.

#### T-TUBE CHOLANGIOGRAM

A study of the biliary tree—post removal of the gall bladder and any stones found. A T-tube has been placed for any remaining drainage from the biliary system. T-tube should be clamped for two hours prior to the exam.

A preliminary 14x17 film is taken favoring the right side of the body. 50 cc's of Renografin is drawn up in a syringe and using a 19 gauge butterfly needle is injected into the outside drainage tube of the T-tube. Spot films are obtained as the biliary tree fills—looking for any residual stones. A post 14x17 film is then obtained. Occasionally a right anterior oblique will be requested.

#### GALL BLADDER

A study of the gall bladder after 6 telepaque pills have been given the previous evening. An AP and a left anterior oblique are taken on 10x12 film. Fluoroscopy of the gall bladder then follows if visualization is adequate. If poor visualization occurs, the exam is repeated the next day after six more tablets are given. Ultrasound is normally used to visualize the gall bladder and any stones.

#### MYELOGRAM

A study of the spinal canal with an injection of radiographic contrast---either cervical or lumbar myelograms are obtained. AP and lateral views of the lumbar or cervical spine is obtained on a 10 x 12 film using the wafer grid.

A myelogram kit, 22g spinal needle , 3-way stop cock , sterile gloves, Isovue 200M for lumbar and Isovue 300M for cervical, betadine or alcohol are needed. A "R" or "L" marker is put on the fluoro screen to signify right or left side of patient.

Spot films are taken after contrast is injected—patient standing if condition warrants.

Routine films: cross table lateral on 10x12 followed by a PA and both obliques on 14x17 film for a lumbar myelogram. For a cervical myelogram a cross table lateral is obtained and then a Swimmer's view and a PA cervical spine. (For a cervical myelogram it is suggested that someone sit at the head of the table to stabilize the head motion while the contrast is advanced to the cervical area.

### SIALOGRAM

A study of the salivary or parotid glands. This is performed under fluoroscopy. An AP and Lateral preliminary films of the mandible are obtained. A sialogram needle (various needle sizes are available), lemon juice, 4x4's, 10c of Renografin, a tongue blade, additional lighting, spot films and 105 film is needed. The lemon juice is used to stimulate the gland into opening, allowing the needle to be inserted. Overhead films are taken as requested by the Radiologist.

### CYSTOGRAM OR VOIDING CYSTOGRAM

A study of the bladder, ureters and urethra is obtained using contrast to fill the bladder. Reflux is seen when the contrast refluxes into the ureters. A preliminary KUB is taken. Reno M Dip is the contrast used. A catheter is placed into the bladder either in our department or in the Urology clinic. The bladder is filled and spot films are taken as taken as the bladder fills. (Follow Dr. Neal's protocol if he is the ordering physician.) For a voiding cystogram spot films are taken as the patient urinates. Upright urination is recommended for adults while a child may stay lying down.

### ENTEROCLYSIS

A study of the small bowel using barium and methyl cellulose. This procedure produces a double contrast study of the small bowel and especially the terminal ileum. This exam is useful for diagnosing Crohns disease and adhesions of the bowel. A Balbour tube is used. (These are kept in the cabinet in R&F 3.) The tube is inserted through the nose and through the stomach into the first part of the small bowel. When the tube is correctly placed, thin barium is injected through the tube. The amount of barium will vary with the Radiologist, but 150 cc's is usually minimal. Then a great volume of methyl cellulose is injected, 50 cc's (as with the barium) at a time until the methyl cellulose creates a double contrast and the terminal ileum is visualized. A preliminary KUB is taken and spot films are obtained as the methyl cellulose is injected. Upon completion, an AP, PA, and both obliques are obtained as well as fluoroscopy of the terminal ileum on spot films.

### SHOULDER ARTHROGRAM

This exam involves insertion of a spinal needle directly into the shoulder joint, an injection of contrast to visualize any abnormalities of the joint—primarily a tear of the rotator cuff. Preliminary films include an internal view, an external view and an axillary view of the designated shoulder. The shoulder is then scrubbed for 5 minutes with a sterile betadine brush and the shoulder is draped with a sterile towel. On a sterile field a 22g spinal needle, 2 pkgs of sterile towels, 2 4x5's, an 18g, 21g, and a 25g needle, 2 10cc syringes—one with lidocaine, the other with 10cc of isovue 370 and a connector (K50) tube and sterile gloves are placed. Fluoroscopy is used to aide in the placement of the needle. When the needle is properly placed, the contrast is injected under fluoro. Upon completion of the injection, an internal, external and axillary films are taken. The patient then

exercises the arm for five minutes and another set of films are taken—internal, external and axillary views.