A Guide to Common Diagnostic Radiology Procedures

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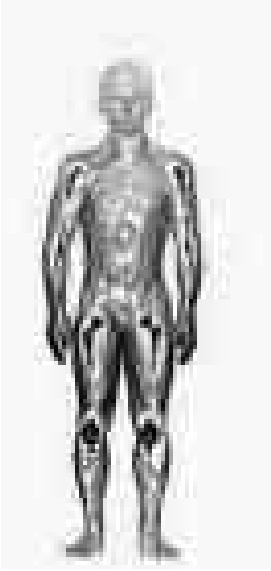

Massachusetts General Hospital

Department of Radiology

A Guide to Common Diagnostic Radiologic Procedures

Preface

This Guide was developed to describe common diagnostic and interventional radiologic procedures, offer information to order and schedule tests, and assist in informing patients who may undergo one or more of these examinations during a hospitalization.

Any questions regarding the information provided should be directed to the area in which the examination is performed.

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Radiology Services by Location

Location	Services Provided
Main Campus 55 Fruit Street Boston, MA 02114 View Map (617) 724-XRAY	All radiology services
Mass General Imaging-Chelsea 80 Everett Avenue Chelsea, MA 02150 View Map (617) 887-3500	CT - MRI
Mass General Imaging-Charlestown 13th Street, Building 149 Charlestown, MA 02129 (617) 726-5701	MRI
MGH Chelsea Health Care Center 151 Everett Avenue Chelsea, MA (617) 889-8529 View Map	All routine adult and pediatric chest, abdomen, and bone exams are done upon the patient's arrival in the department (no appointment needed). The following exams need to be scheduled a minimum of 24 hours in advance: · Barium studies · Tomography · IVPs · Ultrasound
MGH Revere Health Care Center 300 Ocean Avenue Revere, MA (781) 485-6180	Routine adult and pediatric chest, abdomen, and bone exams. Routine mammography.
MGH Charlestown Health Care Center (Bunker Hill Health Center) 73 High Street Charlestown, MA 02129 (617) 724-8146	Routine adult and pediatric chest, abdomen, and bone exams.

Locations Cont'd >>

MGH Professional Office Building 275 Cambridge Street Boston, MA 02114 (617) 724-XRAY	Routine adult and pediatric chest, abdomen, and bone exams.
MGH Mammography Screening Center WACC 219 Main Campus (617) 724-XRAY	Mammography (Breast Imaging)

Mass General West Imaging 40 Second Avenue The PARC Center Suite 100 (Diagnostic Services) Suite 120 (CT/MRI Services) Waltham, MA 02451 (800) 697-8296 View Map	CT MRI 3D Imaging Nuclear Medicine Ultrasound Fluoroscopy Radiography (x-rays) Pediatric Services Mammography / Bone Density

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CT (COMPUTERIZED TOMOGRAPHY) SCAN

Description: A non-invasive x-ray technique that is often one hundred times more sensitive than conventional x-rays. It allows a structure/part of the body to be visualized one to eight slices at a time, creating 2 and 3 dimensional images made in seconds, which appear on a TV monitor outside the room. Scanning can be done on any part of the body. Abnormal findings can reveal tumors, nodules, cysts, enlarged lymph nodes, and pleural effusions.

Preparation: Continue diet as ordered. Continue medication prior to test unless otherwise ordered. A contrast material may be used to highlight certain body parts. It may be administered intravenously, by mouth, or via G or J tube if the oral route is not possible. For abdominal or pelvic CT scans serial doses of gastrografin or Barium are required prior to the test. Based on whether the test is scheduled for that same day or the following day, a radiologist will order the doses.

In patient Transportation: Wheelchair or stretcher depending on whether the patient is able to transfer onto the procedure table without assistance.

Patient Comfort: The test is painless. If intravenous contrast material is used, the patient may feel a hot flushed sensation. This is normal and will pass within a few seconds. Patient will be positioned on an adjustable table and slid in and out of a “doughnut” shaped machine. Patient will be asked to hold still and may be asked to hold their breath for short periods.

Test Time: 15 – 30 minutes.

Requisition: Out patient: CT requisition.
In patient: Order entry.

Consent: No consent is necessary.

Test Areas: MGH main campus; MassGeneral Imaging, Chelsea; MassGeneral West Imaging, Waltham.

Post Procedure: With oral contrast or IV contrast, patient should drink plenty of fluid. Eight (8) 8 oz. glasses of water minimum.

CT Cont'd >>

Points of Emphasis:

- Notify doctor if patient is pregnant or allergic to iodine or shellfish.
- Patient is alone in room during the test. A technologist is in an adjoining room who is able to see and hear patient.
- A pre-medication may be necessary if patient experiences claustrophobia.
- Ensure patient has no hypersensitivity to the contrast, iodine, or shell fish. It should be noted that there is a risk of reaction to the contrast.
- Patients with allergy to iodine or shell fish should not receive I.V. contrast without contacting radiologist first.
- Check patient for signs and symptoms of contrast reactions that may occur several hours after procedure (i.e. flushing of skin, hives, swelling of lips, face, tongue, and throat).
- Patients with a possible diagnosis or confirmed diagnosis of bowel perforation should receive Gastrografin for abdominal / pelvis CT's. These patients should NOT be given barium.
- Patients with compromised renal function may require further evaluation prior to receiving I.V. contrast.
- Diabetics who take Glucophage will have to omit taking the medication 48 hours prior to the exam, pending notification of their Primary Care Physician (PCP). A blood test should be done at the end of 48 hours to check kidney function before restarting the Glucophage.

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GASTROINTESTINAL / GENITOURINARY STUDIES

Barium Enema

Description: A rectal tube is inserted into the anus through which a barium sulfate enema is administered to the patient. X-rays are taken which outline the large intestine. This test aids in the diagnosis of colorectal cancer and inflammatory disease. Detects polyps, diverticula, and structural changes.

Preparation: Patient must obtain an E-Z EM prep kit which may be picked up at Ellison 2 reception area or at MGH Pharmacy.

In patient Transportation: Wheelchair or stretcher.

Patient Comfort: The test can be uncomfortable as well as embarrassing for the patient.

Test Time: 30 – 45 minutes.

Post Procedure: See MD order for diet. A cleanout is usually ordered to prevent barium obstruction (ex. MOM or Mg Citrate).

Requisition: Out patients: Standard x- ray requisition.
In patients: Order entry.

Test Area: MGH Main Campus; MGH Chelsea Health Care Center.

Points of Emphasis:

- Ensure patient expels barium.
- Barium Enema should precede a Barium Swallow and Upper G.I. Study since it may take several days for the barium to pass through the G.I. tract. This may interfere with subsequent x-ray studies.

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Intravenous Cholangiogram

Description: Intravenous administration of a contrast material that concentrates in the biliary tree and is visualized on x-ray film. This test detects stones, structures, and congenital abnormalities in the biliary tree.

Preparation: Clear liquid diet the day before the test. A cleanout is usually ordered the day before the exam so the duct may be better visualized during the x-ray.

In patient Transportation: Wheelchair or stretcher depending on whether the patient is able to transfer onto procedure table on their own.

Patient Comfort: Patient may feel slightly nauseated and flushed when the contrast is injected.

Test Time: 2 - 4 hours.

Requisition: Out patients: Standard x-ray requisition.
In patients: Order Entry.

Test Area: MGH Main Campus.

Post Procedure: See MD. There are no special dietary restrictions.

Points of Emphasis:

- Ensure patient has no hypersensitivity to the contrast, iodine, or shell fish. It should be noted that there is a risk of reaction to the contrast.
- Patients with allergy to iodine or shell fish should not receive I.V. contrast without contacting radiologist first.
- Check for signs and symptoms of contrast reactions which may occur several hours postprocedure (i.e. flushing of skin, hives, swelling of lips, face, tongue, and throat, etc.).

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Percutaneous Transhepatic Cholangiogram

Description: A long, thin, flexible needle is inserted through the skin (of the abdomen) into the liver. Contrast is then injected into the intrahepatic bile duct. X-rays are then taken to visualize the biliary tree. P.T.C. distinguishes between obstructive and nonobstructive jaundice. The test determines the location, extent, and cause of the obstruction.

Preparation: NPO 4 hours prior to test. Conscious sedation is provided.

In patient Transportation: Stretcher.

Patient Comfort: Patient will feel some discomfort while receiving local anesthesia before the needle is inserted through the skin. Patient may feel pressure, epigastric fullness, and upper back pain on the right side when the contrast is being injected. Patient may have to hold his/her breath for short periods at various times during the procedure.

Test Time: 1 - 3 hours depending on the ease of locating the bile duct.

Requisition: Standard x-ray requisition.

Test Area: MGH Main Campus.

Post Procedure: Vital signs will be checked frequently. Check for signs and symptoms of bleeding. Patient is to remain on bed rest, preferably on his right side. Out-patients will require an escort to travel with. Driving is prohibited.

Points of Emphasis:

· Check patient's history and lab tests for bleeding abnormalities.

Percutaneous Transhepatic Cholangiogram Cont'd >>

- Ensure patient has no hypersensitivity to the contrast, iodine, or shell fish. It should be noted that there is a risk of reaction to the contrast.

- Patients with allergy to iodine or shell fish should not receive I.V. contrast without contacting radiologist first.

- Check for signs and symptoms of contrast reactions which may occur several hours postprocedure (i.e. flushing of skin, hives, swelling of lips, face, tongue, and throat, etc.).

- Out-patients will be required to stay in Ellison 2 Holding Area for 2-3 hours post procedure.

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T-Tube Cholangiogram

Description: Contrast is administered through the T-tube into the biliary tree. These structures are then visualized by x-ray. This test detects stones or structures as well as patency of the common bile duct prior to t-tube removal.

Preparation: Withhold one meal prior to procedure.

In patient Transportation: Wheelchair.

Patient Comfort: Patient will experience no pain during the procedure but will have some bloating from the contrast.

Test Time: 1 hour.

Requisition: Out patient: Standard x-ray requisition.
In patient: Order entry.

Test Area: MGH Main Campus.

Points of Emphasis:

- Ensure patient has no hypersensitivity to the contrast, iodine, or shell fish. It should be noted that there is a risk of reaction to the contrast.
- Patients with allergy to iodine or shell fish should not receive I.V. contrast without contacting radiologist first.
- Check for signs and symptoms of contrast reactions which may occur several hours postprocedure (i.e. flushing of skin, hives, swelling of lips, face, tongue, and throat, etc.).

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Upper GI With Small Bowel Follow Through

Description: Barium or gastrografin is swallowed by the patient. X-rays are taken which outline the esophagus, stomach, small intestine and cecum (beginning of the large intestine). This test detects hiatal hernias, diverticula and varicies. It also aids in the diagnosis of strictures, ulcers, tumors, malabsorption, and motility disorders.

Preparation: NPO 6 hours prior to test.

In patient Transportation: Wheelchair or stretcher.

Patient Comfort: Patient may find barium/gastrografin distasteful to swallow.

Test Time: 1 – 4 hours, or more.
Barium moves through the gastrointestinal system at various rates of time.

Requisition: Out patient: Standard x-ray requisition.
In patient: Order entry.

Test Area: MGH Main Campus.

Post Procedure:.A cleanout is usually ordered to prevent barium obstruction (ex. MOM or Mg Citrate).

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GASTROINTESTINAL / GENITOURINARY STUDIES

Upper GI Series

Description: Barium or gastrografin is swallowed by the patient. X-rays are taken which outline the stomach and duodenum. This test detects hiatal hernias, ulcers, and tumors.

Preparation: NPO 6 hours prior to test.

In patient Transportation: Wheelchair or stretcher, depending on the patient condition (consider length of test).

Patient Comfort: Patient may find barium/gastrografin distasteful to swallow. Patient will be positioned on an adjustable table and x-rays will be taken at various angles.

Test Time: 1 hour.

Requisition: Out patient: Standard x-ray requisition.
In patient: Order Entry.

Test Area: MGH Main Campus.

Post Procedure: See M.D. order for diet. A laxative is usually ordered to prevent barium obstruction (MOM or Mg Citrate).

Points of Emphasis:

- Ensure patient expels barium.
- Barium enema should precede upper G.I. exam since it may take several days for the barium to pass through the G.I. tract. This may interfere with subsequent x-ray studies.

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Barium Swallow

Description: Barium or gastrografin is swallowed by the patient. X-rays are taken while the patient is swallowing. Barium outlines the esophagus to detect abnormalities (ulcers or strictures).

Preparation: No preparation is required. Continue medications as ordered.

In patient Transportation: Wheelchair.

Patient Comfort: Some patients find barium distasteful to swallow.

Test Time: 30 minutes.

Requisition: Out patient: Standard x-ray requisition.
In patient: Order Entry.

Test Area: MGH Main Campus, MGH Chelsea Health Care Center.

Post Procedure: See M.D. order for diet. The patient must drink plenty of liquids in order to expel the barium. A cleanout is usually ordered to prevent barium obstruction (ex. MOM or Mg Citrate).

Point of Emphasis: Ensure patient has expelled barium. Modified Barium Swallow should be distinguished as a different test that is often used to detect aspiration.

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Entercylisis

Description: A direct visual examination of the esophagus, stomach, and the duodenum. The physician will spray a local anesthetic on the back of the throat. The tongue and mouth will become numb, feel swollen, and make it difficult to swallow. A flexible endoscope is then passes through the mouth to not only visualize the above mentioned structures but gather tissue specimens, biopsy tumors, diagnose bleeding, and find and remove foreign objects.

Preparation: No preparation required.

In patient Transportation: Stretcher.

Patient Comfort: The test is uncomfortable and patient may experience coughing and/or gagging. The room will be darkened for better visualization.

Test Time: 2 hours.

Requisition: Out patient: Standard x-ray requisition.
In patient: Order entry.

Test Area: MGH Main Campus.

Post Procedure: Patient will remain NPO 2 - 4 hours after procedure. Patient may experience a sore throat or hoarseness after procedure which is temporary.

Point of Emphasis: Check for gag reflex prior to resuming diet as ordered to prevent aspiration.

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GASTROINTESTINAL / GENITOURINARY STUDIES

Intravenous Pyelography (IVP)

Description: This test allows visualization of the renal parenchyma, calyces, and pelvis, as well as ureters and bladder following intravenous administration of contrast material. Films are then taken 1 minute following injection of the dye, then at 5, 10, and 15 or 20 minute intervals. Indications for this test include suspected space occupying lesions, congenital anomalies, trauma to the urinary system, renal stones, renal or urinary tract infections.

Preparation: Patient should be well hydrated prior to test. NPO 3 hours prior to test.

In patient Transportation: Stretcher.

Patient Comfort: Patient may experience a burning/flushing sensation when the contrast material is injected. X-ray machine may make loud sounds during the test. Patient may develop nausea and/or vomiting with contrast injection.

Test Time: 1 hour.

Requisition: Out patient: Standard x-ray requisition.
In patient: Order entry.

Test Area: MGH Main Campus, MGH Chelsea Health Care Center.

Post Procedure:

- Ensure patient has no hypersensitivity to the contrast, iodine, or shell fish. It should be noted that there is a risk of reaction to the contrast.
- Patients with allergy to iodine or shell fish should not receive I.V. contrast without contacting radiologist first.
- Check for signs and symptoms of contrast reactions which may occur several hours postprocedure (i.e. flushing of skin, hives, swelling of lips, face, tongue, and throat, etc.).

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MRI (MAGNETIC RESONANCE IMAGING)

Description: MRI allows visualization of soft tissue (muscles, fat, and internal organs) without the use of x-rays. Using two natural, safe forces, magnetic fields and radio waves, this unique imaging technique can look "through" hard bones to examine soft tissue.

Preparation: Abdominal and pelvic scans NPO 4 - 6 hours before exam to decrease peristaltic motion. No preparation required for other exams. Continue usual meds and diet. Have patient void prior to test due to the length of the procedure.

In patient Transportation: Wheelchair or stretcher depending on whether the patient is able to transfer onto procedure table without assistance.

Patient Comfort: Painless examination. Patient must remain still for the 45 - 60 minute exam. This may be difficult and uncomfortable for children and patients who have back problems and breathing difficulties. Patient may need to be made aware prior to the exam that the scanner tunnel is narrow and will come within inches of their body During the exam, the patient will hear a loud drum like sound coming from the scanner. Because some patients may experience claustrophobia in the scanner tunnel, mild sedatives, earplugs and prism glasses are recommended to relieve patient's anxiety.

Test Time:	1 - 2 hours.
Post Procedure:	No special instructions.
Requisition:	Out patient: MRI requisition. In patient: Order entry.
Consent:	Only if patient needs to be sedated or is pregnant.
Test Area:	MGH Main Campus; MassGeneral Imaging Charlestown; MassGeneral West Imaging, Waltham. Pediatric exams are done on MGH Main Campus (Ellison 2) only.

MRI Cont'd >>

Points of Emphasis:

- Obese patients (300 lbs. or more) may not fit into scanner tunnel.
- The MRI machine is very loud, equivalent to the sound of banging on metal.
- Mild sedatives, earplugs, and prism glasses are offered to help relieve patient's anxiety.
- Inappropriate candidates may include patients with pacemakers, heart valves, shrapnel, and who are pregnant, in unstable condition and/or life support equipment including implanted pumps.
- The patient's head is always in the machine.
- All jewelry,watches, earrings, necklaces, hairpins, etc. must be removed prior to MRI exam.
- MR contrast does not contain iodine. Allergic reaction is unlikely.
- Children under 6 years of age will require sedation.

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NUCLEAR MEDICINE, NUCLEAR CARDIOLOGY AND

POSITRON EMISSION TOMOGRAPHY (PET) STUDIES

PET (POSITRON EMISSION TOMOGRAPHY)

Description: PET is an imaging technique that assists in the diagnosis and management of many diseases. PET allows the physician to examine the whole patient at once. The images produced show body metabolism and other functions rather than simply the gross anatomy and structure revealed by conventional x-rays or CT scans.

A small amount of radioactive glucose is injected into the bloodstream. There is no danger from this injection. Glucose (also known as sugar) is a common substance every cell in your body needs in order to function. Radioactive glucose must pass multiple quality control measures before it is used for any patient injection. The radiation exposure associated with PET is similar to that associated with a CT scan. After the injection, the patient will wait approximately an hour, while the injected material is distributed throughout your body. The patient will be asked to lie on a table that passes slowly through a scanner. The scanner resembles a CT scanner, but has a much larger opening.

Preparation: NPO 6 hours prior to scan.

In patient Transportation: A patient can walk in or will be taken by wheelchair or stretcher.

Patient Comfort: The test is painless. There are no side effects from the injected tracer. If you have a heart scan, you may feel flushed afterward.

Test Time: You can expect to be in the PET Center for one and a half to three hours depending on the type of exam you are having.

Requisition: PET requisition.

Test Area: White 2 in the Nuclear Medicine Department or in a mobile unit across from the Massachusetts Eye and Ear Infirmary entrance.

Post Procedure: There are no special instructions for the patient. The studies are read shortly after the PET scan is completed and patients

PET Cont'd >>

can expect verbal reports to be available to their physicians on the day of the study. Use universal precautions when handling blood or urine to avoid any radioactive contamination. **NOTE**: The radiopharmaceutical, although radioactive is not harmful to personnel taking care of the patient. Proper use of universal precautions will minimize any exposure to nursing personnel.

Points of Emphasis:

- Tell your Physician if you are a diabetic, pregnant or a nursing mother.
- Hearing aids, glasses, and dentures are allowed in the PET center.
- Take medications as prescribed unless told not to.
- Avoid all beverages with caffeine and sugar 24 hours prior to exam.

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NUCLEAR MEDICINE, NUCLEAR CARDIOLOGY AND POSITRON EMISSION TOMOGRAPHY (PET) STUDIES

Bone Scan

Description: Intravenous administration of a radioisotope that accumulates in new or abnormal bone. A bone scan detects bone lesions, degenerative bone disorders, fractures and infection.

Preparation: Nuclear medicine technologists will administer an injection (intravenously) of a radioisotope approximately 2 _ hours prior to test.

In patient Transportation: Wheelchair or stretcher depending on whether patient is able to transfer onto procedure without assistance.

Patient Comfort: The test is painless. Patient will be repositioned several times during the test and must hold still for short periods.

Test Time: 30 minutes.

Requisition: Nuclear Medicine requisition.

Test Area: MGH Main Campus; MassGeneral West Imaging, Waltham.

Post Procedure: Use universal precautions when handling blood or urine to avoid any radioactive contamination. **NOTE**: The radiopharmaceutical, although radioactive is not harmful to personnel taking care of the patient. Proper use of universal precautions will minimize any exposure to nursing personnel.

Points of Emphasis:

- The radioisotope, although radioactive, is harmless and emits less radiation than the standard x-ray.
- Hydrate patient with 3 - 4 glasses of water after the injection of isotope to increase circulation.
- Notify doctor if pregnant.

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NUCLEAR MEDICINE, NUCLEAR CARDIOLOGY AND POSITRON EMISSION TOMOGRAPHY (PET) STUDIES

Gated Blood Pool Scan

Description: This study is performed using radiolabeled RBC's and is designed to assess global and regional function of both right and left ventricles. The test is useful, whenever, assessment of ventricular function is required (e.g. chemotherapy, CAD in patient with difficult cardiac ultrasound windows.)

Preparation: There are no particular preparations for this test and fasting is not necessary. Patient's chart should accompany the in-patient to Nuclear Cardiology.

In patient Transportation: Wheelchair or stretcher as indicated. If the patient is on a cardiac monitor is it necessary for a travel nurse to accompany the patient.

Patient Comfort: The test requires an I.V. stick in order to administer radioactive isotope and label the RBC's. The test is non-invasive and the patient will be comfortably positioned on an imaging table or patient stretcher for the duration of the study.

Test Time: 1 hour

Requisition: Nuclear Cardiology requisition.

Test Area: MGH Main Campus.

Post Procedure: Practice universal precautions when handling blood and urine to avoid radioactive contamination. **NOTE**: The blood will remain radioactive for several hours but presents no hazard to nursing personnel who utilize universal precautions.

Points of Emphasis:

- If more radionucleide studies are needed, check for proper sequencing with Nuclear Medicine Dept.
- To avoid radioactive exposure, maintain universal precautions when handling blood or urine.

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NUCLEAR MEDICINE, NUCLEAR CARDIOLOGY AND POSITRON EMISSION TOMOGRAPHY (PET) STUDIES

V.Q. Scan (Ventilation and Quantitative Scan)

Description: During this test, both ventilation and perfusion of the lungs are measured. A tight fitting mask is placed over the nose and mouth. The patient inhales air mixed with radioactive gas while the chest is scanned, showing areas of the lung that are ventilated. Following ventilation, the patient is injected with radioisotope (intravenously) which produces a visual image of pulmonary blood flow. The test is useful in identifying pulmonary emboli, areas of lung capable of ventilation, evaluate arterial perfusion of the lung, and preoperative pulmonary function.

Preparation: No prep. Continue meds as ordered.

In patient Transportation: Wheelchair. Stretcher if patient unable to transfer onto procedure table.

Patient Comfort: Patient will be asked to wear a tight fitting mask. This may be difficult for an individual who experiences claustrophobia. Technician remains with patient during inhalation.

Test Time: 45 minutes.

Requisition: Nuclear Medicine requisition.

Test Area: MGH Main Campus.

Post Procedure: Use universal precautions when handling blood or urine to avoid any radioactive contamination. **NOTE**: The radiopharmaceutical, although radioactive is not harmful to personnel taking care of the patient. Proper use of universal precautions will minimize any exposure to nursing personnel.

Point of Emphasis: Scheduling the patient for more than one radionuclide test a day can interfere with certain types of nuclear exams. Check with Nuclear Medicine Department when scheduling for proper sequence.

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Imaging Exercise Study

(Sestamibi or Thallium) – Treadmill

Description: This study utilizes treadmill exercise (standard or modified Bruce protocol) with injection of a Radiopharmaceutical at peak exercise and again approximately one hour later at rest. The radiopharmaceutical localizes in the myocardium and is used to demonstrate the distribution of blood flow at stress and rest.

Preparation: The patient must be kept NPO from midnight and refrain from any caffeine products for 24 hours prior to the study date. Imaging stress tests should be performed before or at least 24 hours after any Nuclear Medicine study which used Technetium. The med. sheet and patient chart should accompany the patient to Nuclear Cardiology.

In patient Transportation: Wheelchair or stretcher as indicated. All patients who are on cardiac monitors must be accompanied by a nurse.

Patient Comfort: Patients will be kept in the Nuclear Cardiology Lab for the entire duration of the test. Patients will be fed between the stress and rest portions of the study while in Nuclear Cardiology.

Test Time: 3 hours

Requisition: Nuclear Cardiology requisition.

Test Area: MGH Main Campus.

Post Procedure: Use universal precautions when handling blood or urine to avoid any radioactive contamination. **NOTE**: The radiopharmaceutical, although radioactive is not harmful to personnel taking care of the patient. Proper use of universal precautions will minimize any exposure to nursing personnel.

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NUCLEAR MEDICINE, NUCLEAR CARDIOLOGY AND POSITRON EMISSION TOMOGRAPHY (PET) STUDIES

Non-Imaging Stress Test

Description: This test is utilized to assess functional status and ECG response to increase workload, typically according to the Bruce protocol. The study is best suited for in patients who will be able to exercise and will not be limited by non-cardiac problems (e.g. COPD, orthopedic problems).

Preparation: Patients should be NPO approximately two hours prior to the scheduled time of the non-imaging stress study. Patient med. sheets and chart should accompany the in patient to Nuclear Cardiology.

In patient Transportation: Wheelchair or stretcher as indicated. If patient is on a cardiac monitor he or she should have a nurse accompany the transport.

Patient Comfort: Immediately after recovery from the stress study the patient will be transported back to their floor.

Test Time: 30 - 45 minutes.

Requisition: Nuclear Cardiology requisition.

Test Area: MGH Main Campus.

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NUCLEAR MEDICINE, NUCLEAR CARDIOLOGY AND POSITRON EMISSION TOMOGRAPHY (PET) STUDIES

Pharmaceutical Stress Imaging Studies

Description: This study is used for patients who cannot exercise in the conventional manner on the treadmill. Pharmaceutical stress is used to increase myocardial blood flow and create flow disparity between segments with and without coronary stenosis. These pharmaceuticals are used in conjunction with the Radiopharmaceutical (Sestamibi and Thallium) for stress imaging studies.

Preparation: The patient must be NPO from midnight and be caffeine free for 24 hours prior to the study. These studies should be performed before all other Nuclear Medicine studies or least 24 hours after a Nuclear Medicine procedure. Send patient med. sheets and chart along with the in-patient to Nuclear Cardiology.

In patient Transportation: Wheelchair or stretcher as appropriate. If patient is on a cardiac monitor a nurse should accompany them.

Patient Comfort: The patient will be kept in the Nuclear Cardiology lab and fed a meal between the stress and rest portions of the study. Upon completion of the study the patient will be transported back to the floor as soon as possible with a preliminary report in the chart.

Test Time: 3 hours.

Requisition: Nuclear Cardiology requisition.

Test Area: MGH Main Campus.

Post Procedure: Use universal precautions when handling blood or urine to avoid any radioactive contamination. **NOTE**: The radiopharmaceutical, although radioactive is not harmful to personnel taking care of the patient. Proper use of universal precautions will minimize any exposure to nursing personnel.

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VASCULAR INTERVENTIONAL AND ANGIOGRAM/ANGIOGRAPHY

The visualization and radiographic filming of the blood vessels in the body.

Description: A long thin plastic tube or "catheter" is inserted into an artery through which radiographic contrast material is injected. Rapid sequences of x-rays are taken and the vascular system is visualized on a TV screen. Lights are usually dimmed to facilitate visualization. Most often the femoral site is used for catheter access.

Preparation:

- For morning exams: Nothing to eat or drink (NPO) after midnight.
- For afternoon exams: Light breakfast; Nothing to eat or drink after 7:00 am.
- Continue meds as ordered. Pre-procedure meds may be ordered (ex. sedatives).
- An I.V. will be inserted; if femoral site is used, both groins will be shaved to prevent infection (This will be done either on the previous night or in the Prep/holding area).

Prep Considerations:

- Previous lab work and informed consent is required.
- Patients cannot be on the following medications:
  - Coumadin.
  - Metformin or Glucophage.
  - If a patient diabetic and insulin dependant, _ of the normal dose of insulin is required for morning exams.

In patient Transportation: Stretcher.

Patient Comfort: When IV contrast is injected, Patient may feel a hot flushed sensation. This is normal and passes within a few seconds.

Test Time: 1 - 2 hours.

Vascular Cont'd >>

Requisition: A “face sheet” or a packet of patient information is requested/faxed from the referring doctor.

Test Area: MGH Main Campus.

Post Procedure: Check order for diet. Pushing fluids is recommended to “flush out” the kidneys unless patient is fluid restricted. Bedrest for 6 - 8 hours (lie flat with log rolling). Vital signs and puncture site will be checked frequently.

Points of Emphasis:

- Early detection of bleeding/hematoma is of utmost importance.
- Ensure patient has no hypersensitivity to the contrast, iodine, or shell fish. It should be noted that there is a risk of reaction to the contrast.
- Patients with allergy to iodine or shell fish should not receive I.V. contrast without contacting radiologist first.
- Check for signs and symptoms of contrast reactions which may occur several hours postprocedure (i.e. flushing of skin, hives, swelling of lips, face, tongue, and throat, etc.).

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ULTRASOUND

Description: Ultrasound is a noninvasive procedure in which a water-soluble gel is placed on the area to be visualized; an ultrasound probe(transducer) is guided over the area of interest. High frequency sound waves are emitted from the transducer and received by the transducer, forming an image that is displayed on the monitor. The appropriate images are selected and transmitted to a review station for the Radiologist to interpret.

Preparation:

Pelvic	Patient should drink 32 – 40 oz of water 45 minutes prior to their appointment time. The exam requires a full bladder for better visualization of the pelvic organs.
Abdominal	NPO for 8 hours prior to appointment.
Abdominal Aorta	NPO for 8 hours prior to appointment.
Secretin study	NPO for 8 hours prior to appointment.
Renal	No Preparation required.
Thyroid	No Preparation required.
Scrotal	No Preparation required.
Vascular	No Preparation required.

Transportation: Most patients walk in. All in-patients are transported by stretcher.

Patient Comfort: The exam is painless. The patient will lie face up on an exam table. Warm gel is applied onto the patient's skin, at the area of interest. Some mild pressure will be applied by running the transducer over the area to produce a better picture. The patient may be asked to roll onto their sides to produce a better quality image.

Ultrasound Cont'd >>

Test Time: All exams last approximately 20 - 30 minutes. Interventional procedures may take longer.

Requisition: Out patient: Ultrasound requistion
In patient: Order entry

Consent: Yes, if a patient is having an interventional procedure, biopsy, drainage or sonohysterogram, the patient will be asked to sign a consent form.

Test Area: Main Campus; MGH Chelsea Health Care Center; MassGeneral West Imaging, Waltham.

Post Procedure: There are no required post procedure instructions. When the exam is completed, the images are checked with the radiologist and the patient is discharged.

Points of Emphasis:

- Allergy to latex. Special precautions are taken for patients with latex allergies.
- Patients must notify staff if they are pregnant.

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DIRECTIONS TO MGH CAMPUSES

MGH Main Campus /

MGH Professional Office Building

From the West: Via the Massachusetts Turnpike take the Cambridge-Allston exit. Bear right after the tollbooth. Make a right at first set of lights onto Storrow Drive. After approximately five miles take the Government Center exit. Follow signs to Downtown and Government Center (Cambridge Street). At first set of lights take left onto North Grove Street. Parking garages on the left and the right.

From the North: Via I-93 or I-1 take the Storrow Drive exit and get in the left lane. Take the Government Center exit off Storrow Drive. Follow signs to Downtown and Government Center (Cambridge Street). At first set of lights take left onto North Grove Street. Parking garages on the left and the right.

From the South: Via Southeast Expressway (I-93) take the Storrow Drive exit. Take the Government Center exit off Storrow Drive. Follow signs to Downtown and Government Center (Cambridge Street). At first set of lights left onto North Grove Street. Parking garages on the left and the right.

By Train: Take the Red Line to Charles Street/MGH Station

Parking: Parking is available to patients and visitors in two garages with entrances on Fruit Street and in an open lot on North Anderson Street next to the Parkman Street garage. A parking fee is charged by the hour. Parking is validated after 3 hours only for a maximum rate of $6.00.

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Mass General Imaging-Chelsea

80 Everett Avenue
Chelsea, MA 02150
617-887-3500

DIRECTIONS TO MASS GENERAL IMAGING - CHELSEA

From Downtown Boston via Route 1 North & Tobin Bridge:

Take Route 1 North to the Tobin Bridge. Take the first exit on the bridge for "Chelsea Waterfront" (there is not a sign preceding the exit). At stop sign go straight and then up to the first set of lights and take a left. Go under the bridge and at the next set of lights, take a right onto Spruce St. Go through one set of lights, MGH Imaging Center – Chelsea is on the right.

From Route 1, Southbound:

Take Route 1 South to Carter Street Exit (last exit before Tobin Bridge). At the bottom of the exit ramp take a right onto Carter Street. At the first light, take a left onto Everett Avenue. Follow Everett Avenue across the railroad tracks, (pass by the MGH Chelsea facility on left; this is not Mass General Imaging Chelsea) and make a right at the first light onto Spruce St. MGH Imaging Chelsea is the second driveway on the left.

From 93/Everett/Revere via Route 16:

From 93/Everett, take Route 16 East through Wellington Circle, approx 1.5 miles past Wellington (see Super Stop & Shop on right) and make a right at the light on Everett Ave. From Revere take Route 16 West, (see Chelsea High School on the left) and make a left at the light on Everett Ave. Follow Everett Avenue across the railroad tracks, (pass by the MGH Chelsea facility on left; this is not Mass General Imaging Chelsea) and make a right at the first light onto Spruce St. MGH Imaging Chelsea is the second driveway on the left.

For written directions and detailed maps from anywhere to the Mass General Imaging Center-Chelsea, please use MapQuest

TRANSPORTATION

At Mass General Imaging-Chelsea we want your scan to be as stress-free as possible. We realize that some patients need transportation to and from their scan. Patients may be interested in taking advantage of Mass General Hospital's shuttle service. When scheduling your appointment, simply let us know that you are interested in taking the shuttle, and we will provide details of the shuttle service to you.

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MGH Charlestown Health Care Center

73 High Street
Charlestown, MA 02129
617-724-8146

From North of Charlestown: From Rt. 93, take the Charleston/ Sullivan Square Exit. Bear left, and at the bottom of the ramp bear right (Sullivan Square T station will be on your right). At the lights, bear left; take a right onto Main Street; the Schrafft's Center will be on your left. At the fork in the road, stay to the right, which is Main Street. Follow Main Street for 5 blocks. At the third set of lights, take a left onto Green Street. At the top of the hill, take a left onto High Street. We are located one block up on the right at the corner of Elm and High Streets.

From South of Charlestown: From the Southeast Expressway, take the North Station/Causeway Street Exit. At the bottom of the ramp take a right. At set of lights take a left. Proceed over the bridge until the next set of lights (City Square Charlestown). At lights take a right; then take the first left at lights (Warren Street). Proceed down Warren Street 5 blocks until you reach the next set of lights (Thompson Square). At lights, take a right onto Green Street. At top of hill, take a left onto High Street. Proceed two blocks, we are on the right (73 High Street).

Parking: Patient parking is available in our parking lot.

Public Transportation: The free Mass General shuttle bus runs between MGH Charlestown and Mass General in Boston. Also, you can get to MGH Charlestown from the Community College stop on the MBTA Orange Line and from bus numbers 92 and 93.

Wheelchair Access: A wheelchair ramp is located at the rear of the building.

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MGH Revere Health Care Center

300 Ocean Avenue
Revere, MA
(781) 485-6180

From 300 Broadway: Proceed North on Broadway. Take a right onto Central Avenue, across from the fire station, and continue through the set of lights to Beach Street. Follow the road to Bell Circle. At the rotary, go halfway around to Route 1A North. Take the second right onto Beach Street. At the second set of lights take a right onto Ocean Avenue. MGH Revere will be on your right.

From Boston: Follow Route 1 North over the Tobin Bridge to Revere Beach exit. At the third set of lights, Bell Circle, bear right. Take the second right, after Dunkin Donuts, onto Beach Street. Follow the road to the second set of lights and turn right onto Ocean Avenue. MGH Revere will be on your right.

From Saugus: Follow Route 1 South to exit Route 60 east. Follow the Revere Beach signs to Brown Circle. Go halfway around the rotary, exiting onto American Legion Highway. At the first set of lights, take a right onto Revere Street. Follow Revere Street to the end. Take a right onto Ocean Avenue. MGH Revere will be on your right.

From Lynn: Take Route 1A South to Revere. At the Wonderland Circle, take the second right onto North Shore Road. At the first set of lights, take a left onto Beach Street. Go up one block. MGH Revere will be on your right. Take a left to park.

Parking: You can park for free in the MGH lot next to our building at the corner of Ocean Avenue and Beach Street.

Public Transportation: You can get to MGH Revere from the Revere Beach MBTA Blue Line and all major bus lines to Revere Beach/Wonderland.

MGH Revere Health Care Center Cont'd >>

Also, The MGH Shuttle Bus runs between MGH Revere and Mass General in Boston. The bus also runs form MGH Revere to our satellite location at 300 Broadway and to MGH Chelsea at 151 Everett Avenue.

Wheelchair Access: Our facility is fully handicapped accessible. Wheelchairs are available on site. We several handicapped parking spots available. We welcome patients with disabilities.

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Mass General West Imaging – Waltham

40 Second Avenue
The PARC Center
Suite 100 (Diagnostic Services)
Suite 120 (CT/MRI Services)
Waltham, MA 02451
800-697-8296

From Boston: Take the Massachusetts Turnpike West to exit 15 andfollow instructions below for Route 95/128 Northbound.

From Framingham/Natick: Take the Massachusetts Turnpike to exit14 and follow instructions below for Route 95/128 Northbound.

From Route 95/128 Northbound: Take exit 27B (Winter St.Waltham) passing the brick and white P.A.R.C. Building on the left ofthe highway. Bear right off the exit, then right over the highway.Proceed straight through the first set of lights, and left through thesecond set. The Doubletree Hotel should now be on your right. Stay inthe right lane and follow the signs that say: Second Ave./Bear Hill Rd.Turn right, and then left into the parking lot of the P.A.R.C. Building.

From Route 95/128 Southbound: Take exit 27B (Winter St.Waltham) and bear right off the exit. Proceed straight through the firstset of lights, and then left through the second set. The DoubletreeHotel should now be on your right. Stay in the right lane and follow thesigns that say: Second Ave./Bear Hill Rd. Turn right, and then left intothe parking lot of the P.A.R.C. Building.

From Route 93 North or South: Take the Route 95/128 south exit andfollow instructions for Route 95/128 Southbound.Parking: There is ample free parking on site.Wheelchair Access: General Medical Associates and Mass GeneralWest are completely handicapped accessible.

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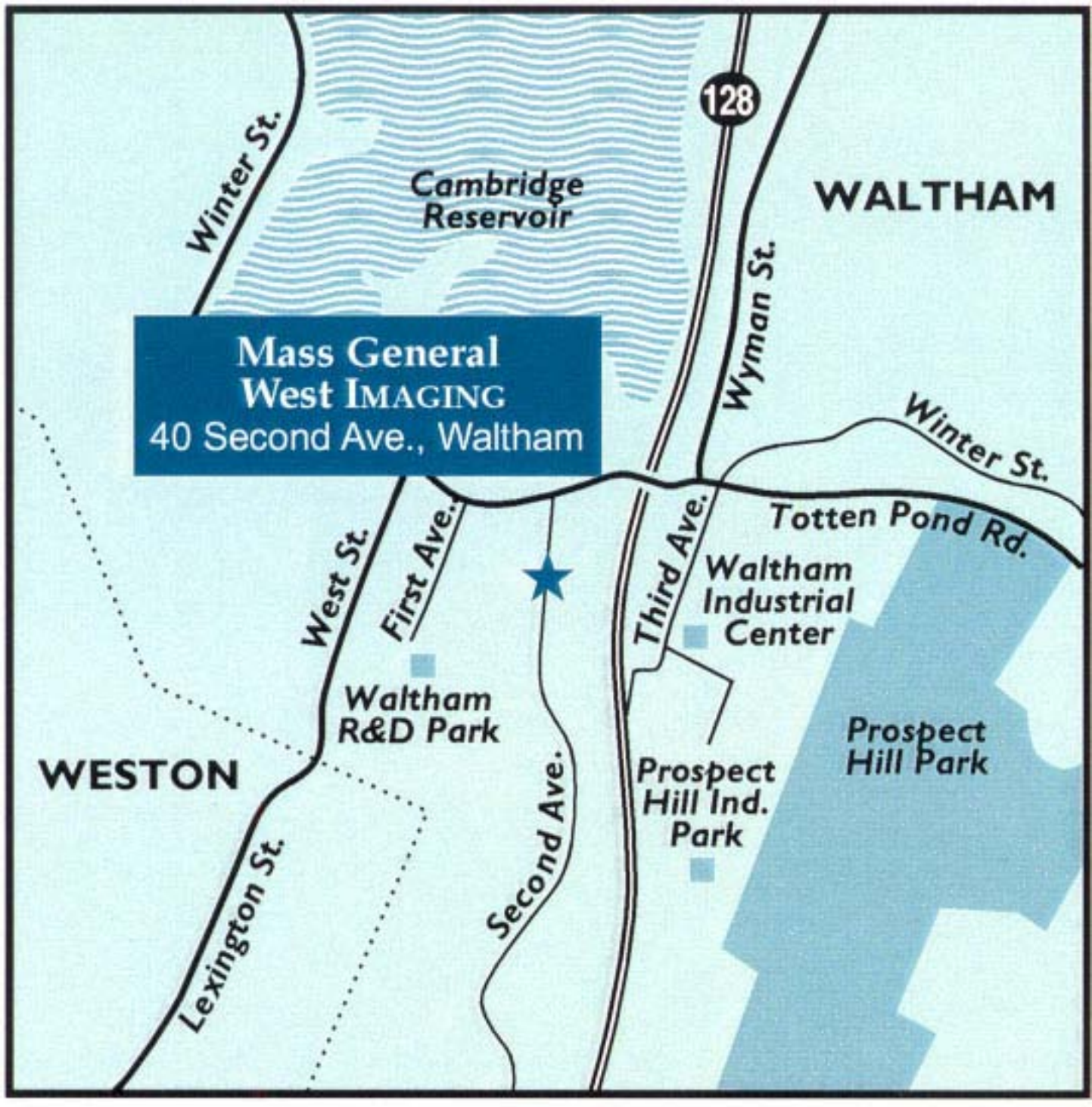
Mass General
West IMAGING
40 Second Ave., Waltham
Winter St.
Cambridge
Reservoir
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WALTHAM
Wyman St.
Winter St.
Totten Pond Rd.
West St.
First Ave.
Third Ave.
Waltham
Industrial
Center
Waltham
R&D Park
WESTON
Second Ave.
Prospect
Hill Ind.
Park
Prospect
Hill Park
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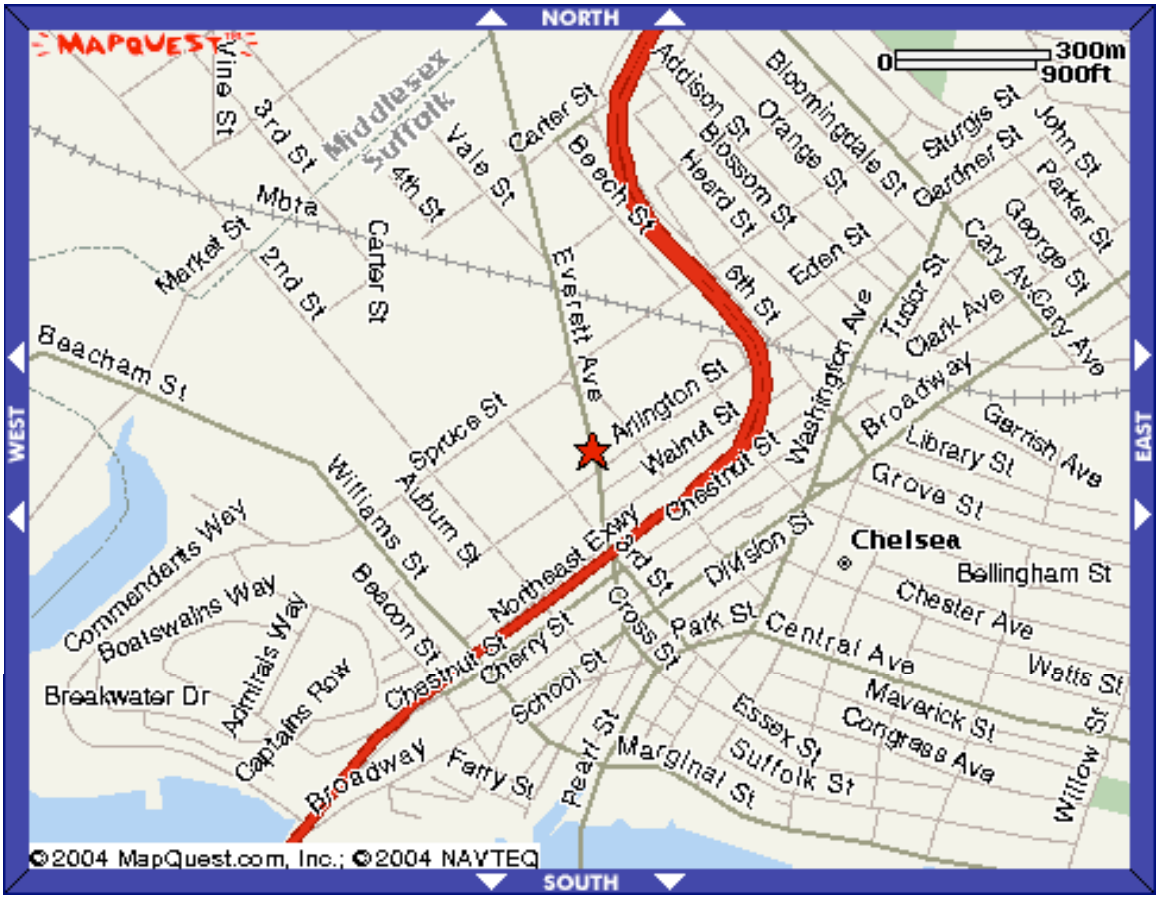

Mass General Imaging – Chelsea
80 Everett Avenue
Chelsea, MA 02150

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