Radiology Research at BUMC

Jorge Soto, MD
Vice Chair Research, Radiology
Associate Professor, Radiology

12/19/07
Overview

• Description modality, risks and benefits for:
  – CT
  – MRI
  – PET/CT

• Benefits of adding Radiology faculty to your protocol as co-investigators
CT

- Noninvasive... uses X-rays and powerful computers to generate images and reconstruct in multiple planes, simultaneously.
- Best tool for comprehensively studying chest and abdomen due to cross-sectional views of all tissue types and in all planes.
- Also preferred for many cancers to confirm tumors and measure size and location.
CT @ BMC

- At BMC, 3 GE LightSpeed 64 MDCTs (2 HAC, 1 ENC) + 1 16 slice CT (ENC).
- Oral and/or IV contrast may be administered.
- Scan times 5-30 secs.
- CT Angiography.
- CT Perfusion.
- Head, neck, chest, cardiac, abdomen, pelvis, extremity.
- Table weight limit: 500 lbs
CT

Benefits:
- Painless, noninvasive, accurate.
- Image bone, soft tissue and blood vessels at same time.
- Fast and simple (vs. MRI).
- Cost effective.
- Can be used if have metal implantation.
- No radiation remains in body after completion.
CT

Risks:

- Ionizing radiation exposure – 62 M CT scans/yr, 4 M in children …and growing
  Effective dose: 10 mSv
- Venipuncture if IV contrast administered.
- Preferably not in pregnant women.
- Breastfeeding women wait 24 hours after contrast injection.
- Risk of allergic reaction from iodine contrast agent (minimal).
MRI

- Noninvasive.
- Using powerful magnetic field, radiofrequency waves and a computer.
- Used to evaluate:
  - Ideal for neuro applications (brain, spine)
  - Organs of chest, abdomen and pelvis.
  - Soft tissues.
  - Bone marrow (mineral not seen)
  - Blood vessels (MR Angiography).
MRI @ BMC

- 2 Philips 1.5T Intera MRI scanners (HAC and ENC).
- 3rd Philips 1.5T Intera to be added 2008 on HAC.
- Center for Bioimaging: 3T Achieva – not part of Radiology.
- Oral and/or IV contrast potentially administered.
- Scan times: 30-45 minutes.
- All SOC patients and research subjects undergo screening for metal.
- Table weight limit: 350 lbs
MRI

Benefits:
• Noninvasive, no exposure to ionizing radiation.
• Higher sensitivity to identify certain abnormalities and focal lesions – good for early diagnosis.
• Helps evaluate structure of organ.
• Function
• Multiple applications to replace invasive tests
• Contrast material not iodine – anaphylaxis exceedingly rare.
MRI

Risks:

• Considered “minimal risk” by IRB for adults.
• If patient is claustrophobic – may not tolerate exam and require sedation. Risk of excessive sedation. Children require sedation.
• Venipuncture if IV contrast administered.
• No medical devices containing metal.
• Per FDA safety of MR not completely established for embryos and fetuses.
• ACR – risk acceptable for pregnant patients if beneficial vs. ionizing radiation.
• BU IRB – not acceptable for research subjects in pregnancy. Thus, pregnancy test required on women of childbearing potential.
PET/CT

• Positron Emission Tomography – special imaging cameras and radioisotope-labeled contrast producing images of function and metabolism of cells.

• Computed Tomography – detailed view of organ and tissue structure.

• Merger of technologies – anatomical and functional information.

• Used most often to detect cancer – characterizes biochemical changes. Also brain, heart
PET/CT @ BMC

• GE Discovery ST 16 slice PET/CT (Moakley, ground floor).

• Scan time: 2 hours –
  – 60 minutes for uptake of FDG (radioactive sugar).
  – Scan range: 20-45 minutes.

• CT not diagnostic, can only be used in conjunction with PET.

• Table weight limit: 400 lbs.
PET/CT

Benefits:

• Early detection of disease/response before changes in anatomy seen on CT or MR.
• Low radiation exposure as radioactivity is short-lived.
PET/CT

Risks:

• No pregnant or breastfeeding research subjects due to risk to fetus or trace in breast milk from radioisotope.
• Risk of ionized radiation from CT portion.
• Venipuncture from injection.
• Very rarely: headache, rash, dizziness or trouble breathing.
Why include a Radiologist as Co-I?

- 30+ faculty…and rapidly growing in multiple subspecialties
- Expertise in imaging protocol development.
- May suggest utilization of other modality to optimize imaging.
- Cost effective for study – less to add radiologist for % salary support vs. pay profee for read/scan.
- More timely research reads from faculty.
- New ideas, collaboration