Cardiac PET

Positive Emission Tomography

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Disclosures

None
Objectives

The principle of PET
Differences in dosage of nuclear vs radiology studies
Advantages of PET and appropriate patient population
PET Scanner
Positron Emission Tomography: Basic Principle
Process for PET Stress

- Rb-82 50-60 mCi
- Dipy 0.56 mg/kg

- scoutCT-trans
  - 70-90 sec
  - 90-120 sec
- gated rest
  - pt out
- scoutCT-trans
  - 70-90 sec
  - 90-120 sec
- gated stress

Approx 1 min  Approx 7 min  Approx 6 min  Approx 1 min  Approx 7 min
Nuclear
Most radiation is wasted.

Radiology
98% efficient.
Radiation Dose

Thallium 70-80 KEV  T ½  73 hours

4 mCi Th

Test time

Exposure time

24 hours
Radiation Dose

Tc 140 KEV  T ½  6 hours

Exposure time

30 mCi Tc\textsubscript{99}

4 mCi Th

Test time

6 hours

24 hours
Radiation Dose

Rubidium 511 KEV  T½  60 seconds

60 mCi Rb

30 mCi Tc₉⁹

4 mCi Th

Test time  6 hours  24 hours

Exposure time
PET Instrumentation


Image originally published in Turkington TG. J Nucl Med Technol
SPECT Relative Activity

PET Absolute flow per gram of myocardium

Flow Reserve
Epicardial – COR
Myocardial - PET

Normal

Less
Advantages and differences of PET versus SPECT

- SPECT stress test takes approximately 2.5 to 3 hours minimum
- PET can be completed in less than 45 minutes
- PET eliminates the majority of patient attenuation seen with SPECT
- Images are much more clear and crisp. Think standard definition television versus high definition.
- Minimize LOS for inpatients
- PET requires a pharmacologic stress
- PET minimizes patient and staff radiation exposure
PET

- Lower radiation
- Higher sensitivity
- Higher specificity
- Especially useful as BMI increases
Why is PET not the standard? COST!

**Capital Cost**
- PET scanner $2.2 million
- Smaller secondary market
- SPECT $400,000

**Radiopharmaceutical**
- Cytotron
- Strontium 82 generator
- Rb82
- Krypton 82

**Generator** $8,000 week
- Rb dose $320
- Tc dose $70
- Th dose $60

Business decision
- Throughput vs cost
- False positive study in obesity = more normal COA
Patient population for PET

- BMI Greater than 40
- Large breasts
- Mastectomy
- Breast implants
- Chest wall deformity
- Pleural effusion
- Pericardial effusion
- Non-diagnostic SPECT
Questions?