## Cardiac Scans

### $^{201}$Tl (Thallium)

- Thallium acts as $K^+$ analogue.
- Taken up by myocardial cells and reveals myocardial perfusion.
- Can do stress testing with exercise or dipyridamole.
- "Cold" spots show areas of ischaemia, if irreversible → infact
- Higher radiation dose than sestamibi scan.

### $^{99m}$Tc (Technetium) sestamibi

- $^{99m}$Tc decay (isomeric transition to $^{99}$Tc) detected using a gamma camera for single photon emission computed tomography (SPECT)
- Acute imaging (while patient having chest pain) highly sensitive for sig. IHD.
- Imaging performed 60-90min post-radioisotope injection.
- Scanning can be performed up to 5hr after injection.
- Images acquired at rest and after stressing (exercise or pharmacologically).
- Scans compared to find ischaemic/infracted areas and & wall motion abnormalities
- $^{99m}$Tc sestamibi has $T_{\frac{1}{2}}$ of 6hrs so may need rpt dosages.

### $^{99m}$Tc tetrofosmin

- Longer $T_{\frac{1}{2}}$ than sestamibi so only 1 injection needed.

### $^{99m}$Tc pyrophosphate

- Early (1$^{st}$ 7d) diagnosis of AMI
- Necrotic tissue takes up radioisotope and forms a "hot" spot.

### $^{99m}$Tc labeled RBC

- Gated cardiac blood pool scan
- Looks at ejection fraction, wall motion, regurgitation fraction
- Used prognostically in AMI, pre-chemo, or for SOB investigation.

## Other Tc Scans

- V/Q scan
- Labelled RBC scans for GIT bleeding
- Bone scans – detects 95% #s at 72hr, also detects Ca, mets, arthritis, infection & avascular necrosis
- DTPA, DMSA & MAG3 renal scans

## $^{111}$Indium WBC

Shows areas of acute infection/inflammation

## $^{67}$Gallium

Binds lactoferrin & transferrin
Shows areas of chronic infection/inflammation, PCP in immunosuppressed.

## Positron Emission Tonmography (PET)

Positrons (e+) from $^{11}$C, $^{15}$O, $^{13}$N, $^{18}$F collide with an e- → 2 x gamma rays as particles annihilated.
Uses: Localisation of epileptic foci, myocardial function, brain area activity (glucose utilization)
Can be used to measure: local blood flow, metabolic activity, drug movement, neurotransmitter receptors, enzymes