Nuclear cardiology

Department of Nuclear Medicine

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Investigations

• First passage heart study
• Radionuclide ventriculography
• Myocardial perfusion scintigraphy
• PET investigations
• Heart adrenerg innervation study
• Myocardial infarction scintigraphy
First passage heart study I.

- Patient preparation: not needed
- Radiopharmaceutical: $^{99m}$Tc-HSA, $^{99m}$Tc-pertechnetate (for in vivo labelling of red blood cells)
- Administration: thyroid blockade (K-perchlorate per os), inactive pyrophosphate i.v, $^{99m}$Tc-pertechnetate i.v in bolus
First passage heart study II.

- Data acquisition: prior the bolus
- Images: RAO (30), AP
- (ECG gating)
- Indications: calculation of ejection fraction, cardiac shunts
Radionuclide ventriculography I.

- Patient preparation: not needed
- Radiopharmaceutical: $^{99m}$Tc-HSA, in vivo labelled red blood cells
- Administration: thyroid blockade (K-perchlorate per os), inactive pyrophosphate i.v, $^{99m}$Tc-pertechnetate i.v
Radionuclide ventriculography II.

- Data acquisition: in equilibrium, ECG gating, frame or list mode
- Images: planar AP, LAO opt (45), LLAT (70), gated SPECT
- Evaluation: ejection fraction, wall motion, parametric images
- Indications: coronary artery disease, congestive heart failure, application of cardiotoxic chemotherapy
Myocardial perfusion scintigraphy I.

- Patient preparation: fasting
- Radiopharmaceuticals: $^{201}$Tl-chloride, $^{99m}$Tc-isonitrile (MIBI), $^{99m}$Tc-tetrophosmin, $^{99m}$Tc-teboroxim
- Administration:
  - $^{201}$Tl-chloride: one injection (stress, rest study), reinjection
  - $^{99m}$Tc-labelled compounds: separate stress and rest studies
Myocardial perfusion scintigraphy II.

- Imaging: planar (AP, LAO 45, LAO 70), SPECT
- Evaluation: reoriented slices, bull’s eye
Modalities for stress myocardial perfusion imaging

- Exercise: submaximal, symptom limited, maximal
- Pharmacologic stress:
  - Vasodilators: adenosine, dipyridamole
  - Inotropic: dobutamine, atropine
Summary of clinical indications for myocardial perfusion imaging

• Diagnosis of coronary artery disease
• Assessment of the degree of coronary stenosis and impact on regional perfusion
• Myocardial viability assessment
• Risk assessment (prognosis) in patients post myocardial infarction
• Monitoring treatment effect after coronary revascularization
Myocardial PET

- Patient preparation: $^{18}$F-FDG PET: 80 g glucose per os
- Radiopharmaceuticals
  - blood flow: $^{13}$N-ammonia, $^{15}$O-water, $^{82}$Rb
  - metabolism: $^{11}$C-palmitate, $^{18}$F-FDG
- Indications: ischaemic heart disease, myocardium viability investigation, CMP
Additional nuclear cardiac investigations

• Adrenerg innervation scintigraphy:
  – $^{123}$I-MIBG

• Myocardial infarction scintigraphy:
  – $^{99m}$Tc-pirophosphate