Single-photon emission computed tomography

Single-photon emission computed tomography (SPECT, or less commonly, SPET) is a nuclear medicine tomographic imaging technique using gamma rays. It is very similar to conventional nuclear medicine planar imaging using a gamma camera. However, it is able to provide true 3D information. This information is typically presented as cross-sectional slices through the patient but can be freely reformatted or manipulated as required.

The technique requires the delivery of a gamma-emitting radioisotope (a radionuclide) into the patient, normally through injection into the bloodstream. On occasion, the radioisotope is a simple soluble dissolved ion, such as a radioisotope of gallium(III). Most of the time, though, a marker radioisotope is attached to a specific ligand to create a radioligand, whose properties bind it to certain types of tissues. This marriage allows the combination of ligand and radiopharmaceutical to be carried and bound to a place of interest in the body, where the ligand concentration is seen by a gamma-camera.

Common SPECT Modalities by Organ/System

Bone SPECT Tracer: 99mTc-MDP or 99mTc-HDP

Use: Bone metastases, occult fractures, osteomyelitis, prosthetic joint evaluation

□ Brain SPECT Tracer: 99mTc-HMPAO or 99mTc-ECD

Use: Epilepsy localization (ictal/interictal), dementia (Alzheimer's, frontotemporal), cerebrovascular reserve assessment, traumatic brain injury

◆ Cardiac SPECT (Myocardial Perfusion Imaging) Tracer: 99mTc-sestamibi or 99mTc-tetrofosmin

Use: Coronary artery disease (ischemia vs infarction), myocardial viability, stress/rest perfusion studies

[] Infection/Inflammation SPECT Tracer: 99mTc-HMPAO-labeled leukocytes or 99mTc-sulesomab

Use: Suspected osteomyelitis, infected prosthesis, fever of unknown origin

Parathyroid SPECT Tracer: 99mTc-sestamibi

Use: Localization of parathyroid adenomas in hyperparathyroidism (often SPECT/CT)

Thyroid SPECT Tracer: 99mTc-pertechnetate or 123I

Use: Nodular thyroid disease, functional status, ectopic thyroid tissue

Dopaminergic SPECT (DaTSCAN) Tracer: 123I-ioflupane

Use: Differentiating Parkinson's disease from essential tremor or atypical parkinsonism

Cerebral Perfusion in Brain Death Tracer: 99mTc-HMPAO

Use: Demonstrates absence of cerebral perfusion

see CBF SPECT

Tc-99m ECD SPECT

Indications

Single-photon emission computed tomography (SPECT) traditionally has been the most sensitive modality for diagnosing active (early) spondylolysis. More recently, high signal change (HSC) in the pedicle or pars interarticularis on fluid-specific (T2) magnetic resonance imaging (MRI) has been shown to be important in the diagnosis of early spondylolysis.

From: https://neurosurgerywiki.com/wiki/ - **Neurosurgery Wiki**

Permanent link: https://neurosurgerywiki.com/wiki/doku.php?id=single-photon_emission_computed_tomography

Last update: 2025/05/28 06:34

