PET AND SPECT

PET (Positron Emission Tomography)

SPECT (Single Photon Emission Computed Tomography)
MECHANISM OF PET AND SPECT
FDG-PET

FDG: Fluorodeoxyglucose (similar to Glucose).

Brain uses glucose as major source of energy. Normal brain picks up FDG in a large amount.

In epilepsy, the brain cell (neuron) does not function right or the neurons are lost due to a variety of reasons.

FDG-PET scan detects the regions of brain where the Glucose uptake is low (hypo-metabolism), which is often associated with the site of seizure origin.
SPECT

Brain Perfusion Study: measurement of blood flow to brain.

Radio-labeled chemical (ECD or HMPAO) is quickly injected at time of seizure onset to detect the region of increased blood flow, which is associated with seizure activity.

By computer analysis of comparing the ictal scan (imaged during seizure) and the interictal scan (imaged without seizure), the regions of activation in the brain are detected to locate the seizure origin.
PET and SPECT scan is different from CT, MRI or Ultrasound, which detect structure changes and anatomy, can provide physiological and molecular information of brain.

PET and SPECT are clinically indicated for pre-surgical localization of seizure origin. They are covered by most insurance providers.

They provide valuable seizure localization information in addition to MRI scan, EEG and clinical assessment to the surgeons.
Regional hypo-metabolism in patient with temporal lobe epilepsy (arrow)
SPECT detects the location of seizure in frontal lobe
WHAT SHOULD PATIENT PREPARE FOR THE PET AND SPECT

PET scan:
Fasting at least 4 hours before the scan.
Optimally, no seizure for 24 hours before the scan if the seizure infrequent.
Coordination with EEG lab for EEG monitoring around the time of study (45 minutes before and after the tracer injection).

SPECT Scan:
Done as in-patient during Video-EEG monitoring. Fasting if patient needs sedation.

For pediatric patients, sedation might be needed for optimal imaging quality.