PET uses

A common use for PET is to measure the rate of consumption of glucose in different parts of the body. Accumulation of the radiolabeled glucose analogue 18-fluorodeoxyglucose (FDG) allows measurement of the rate of consumption of glucose. FDG is transported into cells by glucose transporters and phosphorylated by hexokinase to FDG-6-PO4. One clinical use of this is to distinguish between benign and malignant tumours, as malignant tumours metabolise glucose at a faster rate than benign tumours. Whole body PET scans can be used to stage a cancer. Other applications of PET include looking at blood flow and oxygen consumption in different parts of the brain, for example, in assessing strokes and dementia. Tracking chemical neurotransmitters such as dopamine in Parkinson's disease, can also be performed with this technique. PET has further applications in cardiology, in pretransplantation assessment of viable myocardium, and in distinguishing recurrent tumors from radiation necrosis and surgical scarring, and in a variety of cancers. Functional PET is a neuroimaging method involving continuous infusion of FDG radiotracer during the course of a PET examination. Compared to conventional loan administration of FDG in a tatic PET scan, functional PET provides a significantly higher temporal resolution to study the dynamics of glucose uptake. Functional PETprovides a unique method to map dynamic changes of glucose uptake in the resting human brian and in response to extrinsic stimulation. PET can be co-registered with MRI. advantages of PET/MRI include; combines functional information obtained from PET with anatomical and quantitative information obtained from MRI, decreased radiation dose, improved motion correction, and the convenience of a combined exam. However PET/CT remains more widely available, inexpensive, and offers a higher throughput.

PET advantages

Advantages of PET include: yields three dimensional images, yields both structural and functional information, yields quantifiable results, wide applicability, ability of co-registration with CT and MRI, great resolution (4-5mm) especially in comparison to EXPECT (10mm), high throughput due to rapid imaging time (seconds to minutes), high patient comfort, and PET/CT yields the greatest sensitivity and specificity in images in comparison to all other imaging modalities.

PET disadvantages

Disadvantages of PET include; the use of ionising radiation as the dose administered is higher than that administered in any other imaging modality, very expensive it carries the highest cost of all imaging modalities, limited availability, motion artefacts, and a lower resolution (4-5mm) in comparison to CT (0.1mm) and MRI (0.1mm), and a lower sensitivity (1-10 pmol) in comparison to SPECT (10-100 pmol) and MRI (10-100 pmol).