QueenslandXRay

GP UPDATE

FDG PET IN NEURODEGENERATIVE CONDITIONS / DEMENTIA

PET/CT

Positron emission tomography (PET) is an increasingly utilised functional imaging technique that provides sensitive and specific measures of a wide range of biologic processes. Combined PET and computed tomography (CT) scanners create images that provide both functional and structural information, improving diagnostic accuracy.

FDG

Radiopharmaceuticals used in PET imaging target various disease biomarkers and allow in vivo visualisation and tracking of disease. 18F-Fluorodeoxyglucose (FDG) is the most widely utilised PET radiopharmaceutical and behaves similar to glucose, the major substrate of brain metabolism.

FDG PET/CT for dementia

The clinical diagnosis of dementia and determination of the dominant underlying cause is challenging. FDG PET/CT is a well-recognised tool to assist in the differentiation of dementia syndromes with good accuracy, or in the case of mild cognitive impairment, predict the risk of progression to dementia. This is based on over 4 decades of research and clinical use where characteristic region-based patterns of brain hypometabolism have been established across a range of different dementia aetiologies, with examples listed adjacent.

Alzheimer's disease (AD)

- **Dementia Alzheimer's Type (DAT)**
- **Posterior Cortical Atrophy (PCA)**
- **Behavioural variant AD (bvAD)**
- **Logopenic variant PPA (lvPPA)**

Dementia with Lewy bodies (DLB)

Limbic-predominant age-related TDP43 encephalopathy (LATE-NC)

Frontotemporal dementia (FTD)

- **Behavioural variant FTD (bvFTD)**
- **Semantic variant PPA (svPPA)**
- **Nonfluent variant PPA (nfvPPA)**
- **Movement disorders**
  - Progressive supranuclear Palsy (PSP)
  - Corticobasal degeneration (CBD)

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To discuss your patient's needs with one of our radiologists, please call our Referrer Help Desk on 1800 77 99 77

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Brain imaging with FDG PET/CT vs blood flow SPECT

Cerebral blood flow imaging with single photon emission computed tomography (SPECT) is an alternative functional imaging technique to assist in the differentiation of dementia syndromes. Regional energy metabolism and cerebral blood flow are tightly coupled in physiologic or nonacute pathologic conditions so interpretation of both FDG PET/CT and cerebral blood flow SPECT is similar. However, SPECT suffers from technical factors, such as a lower spatial resolution, inaccuracy in the attenuation correction, and difficulties in standardizing image quality and quantification. FDG PET/CT has been shown to demonstrate a 14% higher sensitivity and 20% higher specificity for diagnosing dementia compared with SPECT.

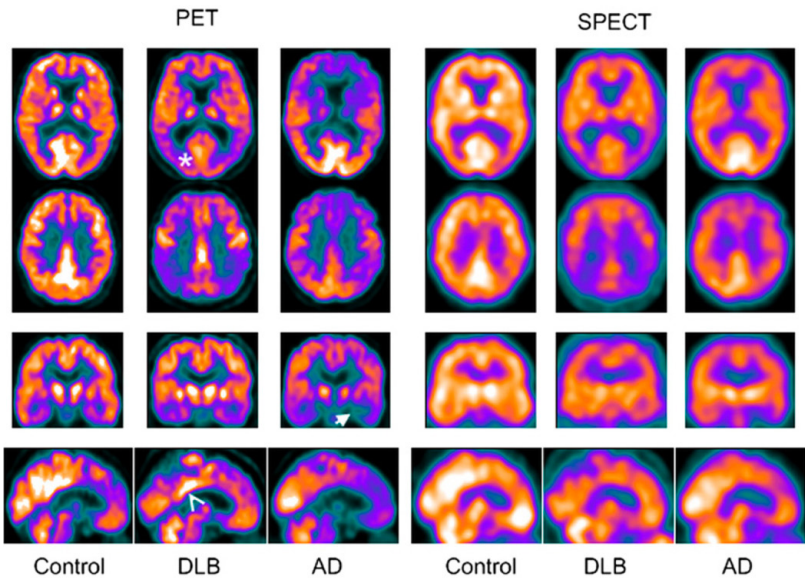
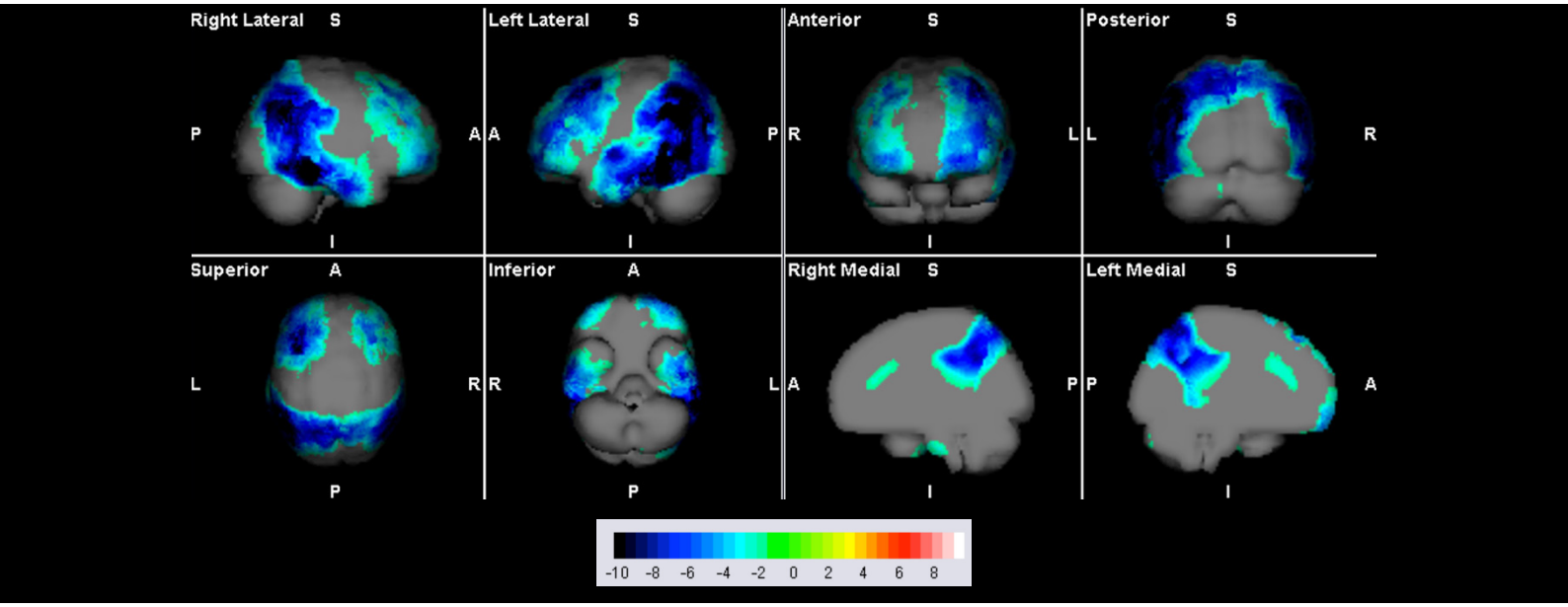


Image from O'Brien et al. Journal of Nuclear Medicine. 2014. DOI:10.2967/jnumed.114.143347

FDG PET/CT brain at Queensland X-Ray

Patients are required to fast 6 hours prior to their examination. A history will be taken, peripheral intravenous cannula inserted and a blood sugar level will be obtained. The FDG will then be injected intravenously and the patient will rest in an quiet, dimly lit uptake room for around 30 minutes. The PET will then be acquired followed by diagnostic CT on the same hybrid system.

At Queensland X-Ray, we routinely use quantitative software to anatomically standardise the images and compare to a database of similarly processed image sets from multiple age-similar, cognitively normal subjects. Differences between the individual scan compared with the normal database are visualised as a Z score map which indicates both the spatial distribution of the reduced metabolism as well as the severity, significantly improving the accuracy of PET interpretation.



71 year old female—Pattern of hypometabolism strongly supportive of Alzheimer's Disease

Access our online billing guide for fee information by scanning the QR code, or visiting qldxray.com.au/billing-guide