FDG-PET/CT

18F-2-fluoro-2-deoxy-D-glucose (FDG) represents the most widely used tracer in oncologic PET imaging and has evolved over the last several decades into the paramount clinical PET modality for cancer detection [1].

Due to the long half-life of the fluorine-18 isotope (110 minutes), in-house production of this tracer is not necessary, overcoming logistic problems that occur with isotopes of shorter half-life. Thus, FDG can be transported to all PET centers, alleviating the need for an on-site cyclotron-based manufacturing. Increased FDG uptake is commonly seen in highly proliferating cancer cells because of increased expression of glucose transporters and hexokinase, the enzyme that converts glucose (and FDG) to a phosphorylated product. Related to increased glycolysis, the uptake of FDG in neoplastic tissue is generally higher than in non-neoplastic tissue. However, the high and regionally variable FDG uptake in normal brain parenchyma often makes the delineation of tumors in the brain difficult [2]

Furthermore, inflammatory tissue can exhibit high FDG tracer uptake, also diminishing diagnostic specificity [3].

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see 18F positron emission tomography.

Fluorine-18 (18F) is a fluorine radioisotope which is an important source of positrons. It has a mass of 18.0009380 u and its half-life is 109.771 minutes. It decays by positron emission 97% of the time and electron capture 3% of the time. Both modes of decay yield stable oxygen-18.

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Fludeoxyglucose (18F) (INN), or fludeoxyglucose F 18 (USAN and USP), also commonly called fluorodeoxyglucose and abbreviated [18F]FDG, 18F-FDG or FDG, is a radiopharmaceutical used in the medical imaging modality positron emission tomography (PET). Chemically, it is 2-deoxy-2-(18F)fluoro-D-glucose, a glucose analog, with the positron-emitting radioactive isotope fluorine-18 substituted for the normal hydroxyl group at the 2' position in the glucose molecule.

The uptake of 18F-FDG by tissues is a marker for the tissue uptake of glucose, which in turn is closely correlated with certain types of tissue metabolism. After 18F-FDG is injected into a patient, a PET scanner can form two-dimensional or three-dimensional images of the distribution of 18F-FDG within the body.

Since its development in 1976, 18F-FDG had a profound influence on research in the neurosciences.

1)
Herholz K, Langen KJ, Schiepers C, Mountz JM. Brain tumors. Semin Nucl Med. 2012; 42(6):356-370.
2)
Albert NL, Weller M, Suchorska B, et al. Response Assessment in Neuro-Oncology working group and European Association for Neuro-Oncology recommendations for the clinical use of PET imaging in gliomas. Neuro Oncol. 2016; 18(9):1199-1208.
3)

Langen KJ, Galldiks N, Hattingen E, Shah NJ. Advances in neuro-oncology imaging. Nat Rev Neurol. 2017; 13(5):279-289.