

F18 FDG PET/CT Imaging

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From Galveston College
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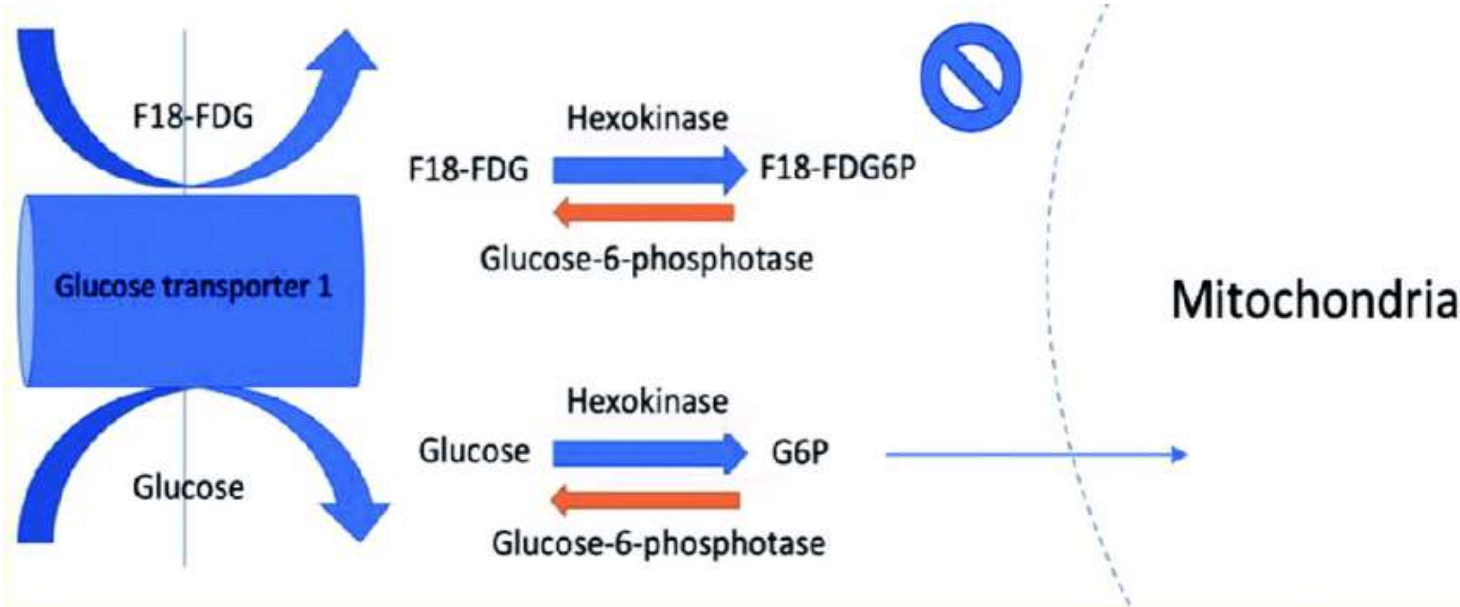
F18 FDG

Purpose

F18 FDG is used in PET imaging for cardiology, neurology, and oncology. This study was an oncology patient.

Characteristics

- FDG stand for F-18 fluoro-2-deoxyglucose
- Cyclotron produced
- 110-minute half life
- Imaging of glucose metabolism



Case Study

5

- 41-year-old male patient, 6'2 and 323 lbs.
- Presented to ER after several days of right-side weakness, ataxia, and facial drooping
- CT showed large frontal lobe hemorrhage with possible underlying metastatic tumor
- S/P left frontal craniotomy
- Second PET scan (~4 months later) for assessment of chemotherapy treatment response and further treatment planning for stage IV metastatic melanoma



Early PET Scan

3D Volume 2
Ex: 4730

Se: 12
HD MIP No cut

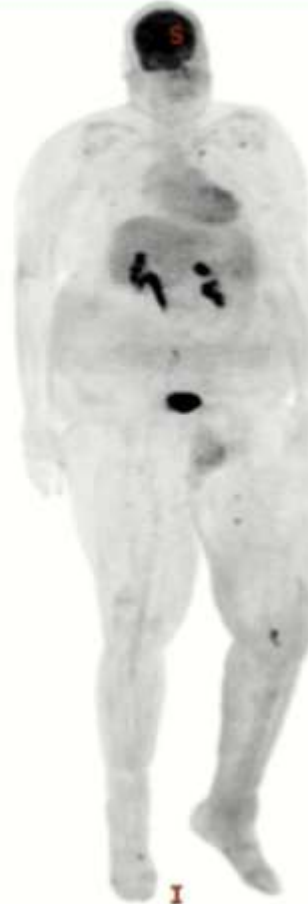
DFOV 203,6 cm

R
P

No VOI

3,3mm /3,3sp

12:19:25 PM
m=0,00 M=5,00 g/ml



Later PET Scan

3D Volume 2
Ex: 4899

Se: 12
HD MIP No cut

DFOV 203,6 cm

R
P

No VOI

3,3mm /3,3sp

10:49:46 AM
m=0,00 M=5,00 g/ml

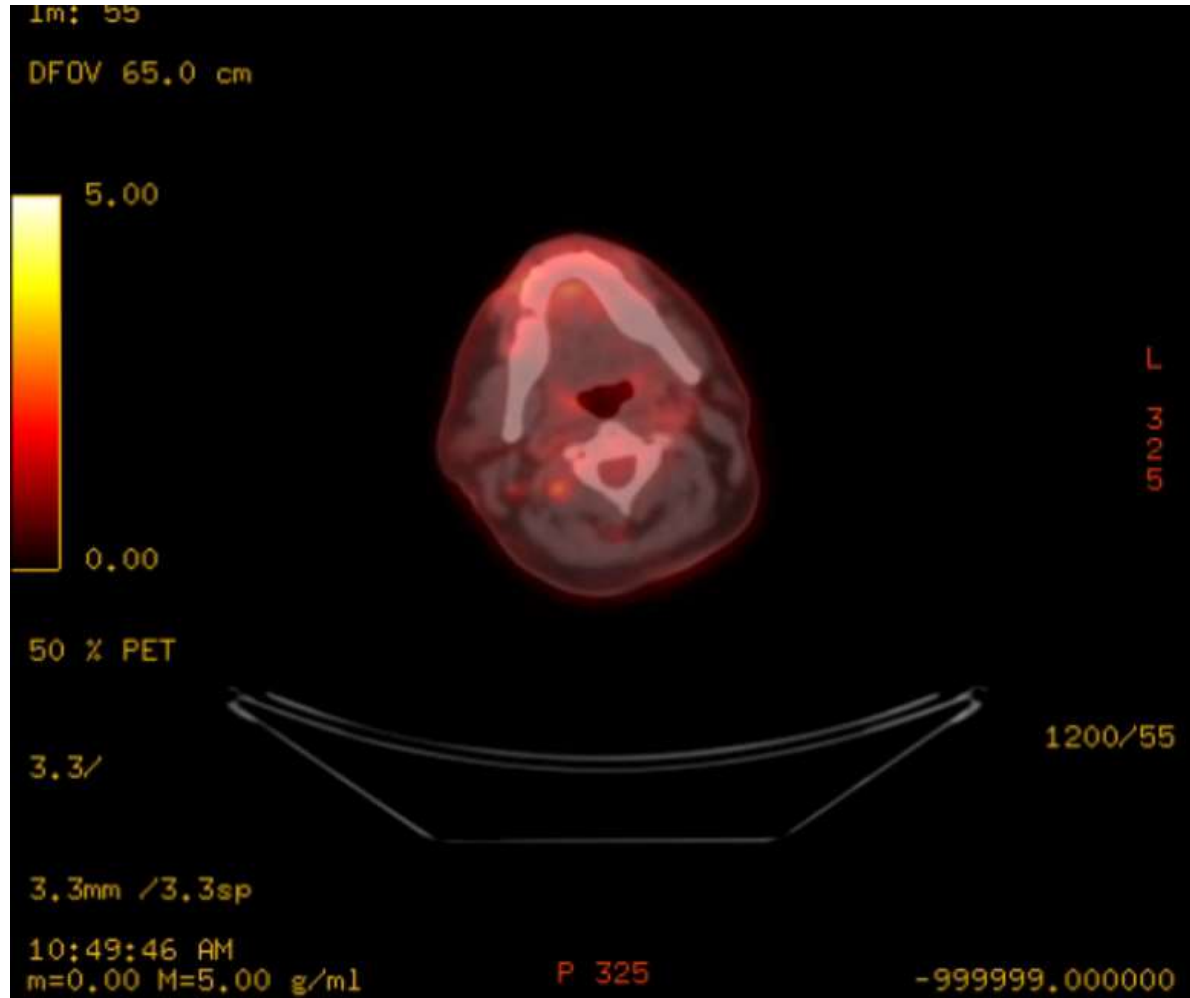


F18 FDG Monitoring Cancer Progression

- Doses were 13.0 and 10.3 mCi of F18 FDG
- Uptake time 1 hour
- Blood glucose at injection was 127 and 115 mg/dL

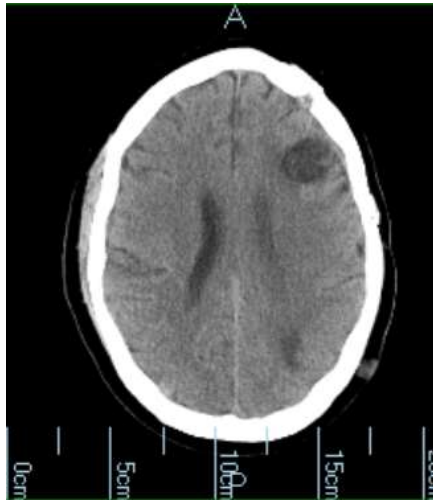
Follow up PET

- Over time, PET scans can be compared to image disease progression.
- Second PET scan showed widespread uptake in line with stage IV melanoma, metastasized to other parts of the body and lymph nodes
 - Especially evident in left hilar lymph nodes

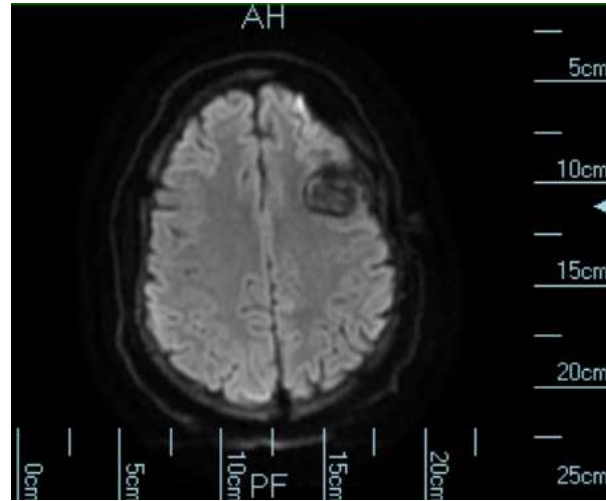


Modality Comparison

Anatomical Imaging

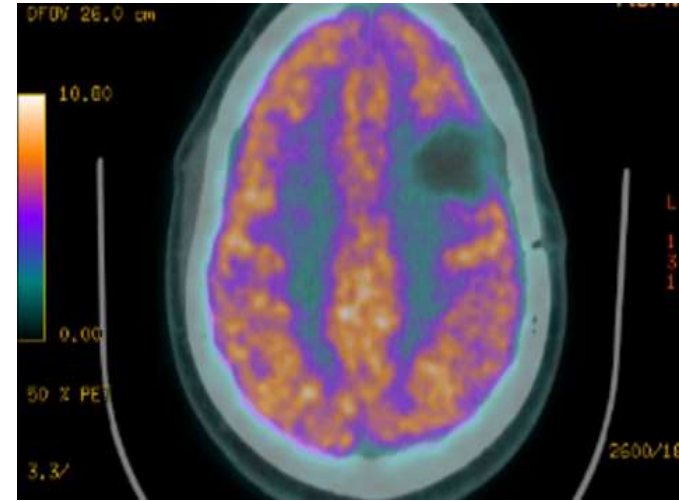


CT



MRI

Physiological Imaging



PET

Teaching Points

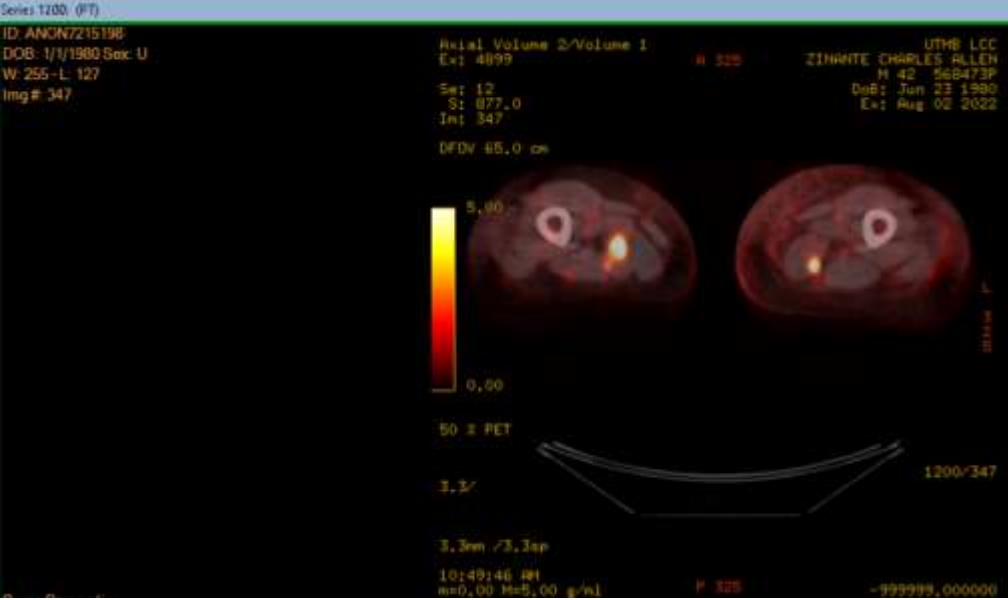
1. CT and MRI have advantages in anatomical imaging, but PET imaging allows for imaging of physiological function.
 1. Monitoring of tumor progression and imaging post-surgery to identify if any residual tumor remains (glucose metabolism or absence)
2. PET imaging can be affected by patient preparation. Proper preparation includes a diet 12-24 hours before the scan to prevent glucose saturation when the FDG tracer is injected. Patients should fast with no food and no drinks besides unflavored water for 4 hours before the start of their test. The diet should be high protein, low carbs, and low sugar. The dinner before their test in the morning, they should avoid alcohol and only a small amount of carbs for dinner before fasting after midnight. Strenuous exercise should be avoided for at least 6 hours, and preferably 24 hours, before their scan.

Conclusion

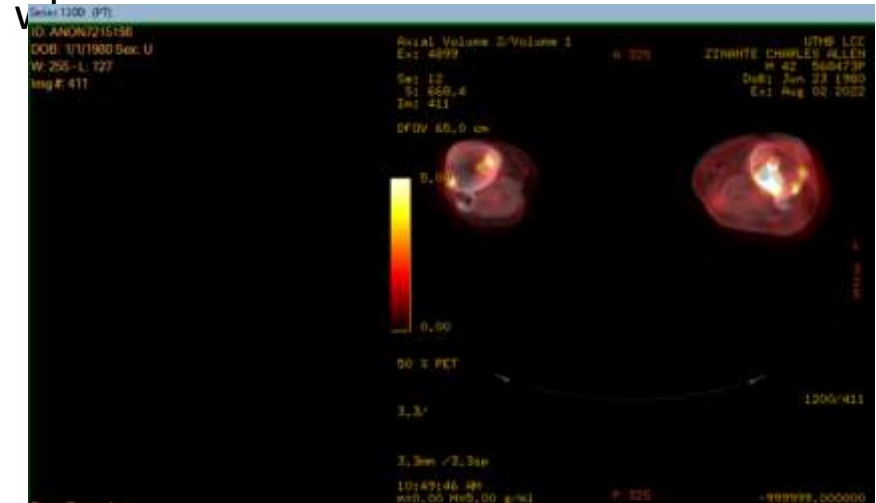
^{18}F FDG PET and PET/CT has many useful applications in the imaging of oncology, neurology, and cardiology patients. Because of its relatively long half life allowing for more widespread commercial use of it, and the chemical similarity to glucose allowing for known and researched uptake patterns in tissue, it has become a cornerstone of PET imaging that allows for unique insight into the physiological function of different tissues.

Works Cited

- 1) Boellaard, R., Delgado-Bolton, R., Oyen, W. J. G., Giammarile, F., Tatsch, K., Eschner, W., Verzijlbergen, F. J., Barrington, S. F., Pike, L. C., Weber, W. A., Stroobants, S., Delbeke, D., Donohoe, K. J., Holbrook, S., Graham, M. M., Testanera, G., Hoekstra, O. S., Zijlstra, J., Visser, E., . . . Krause, B. J. (2014). FDG PET/CT: EANM procedure guidelines for tumour imaging: version 2.0. *European Journal of Nuclear Medicine and Molecular Imaging*, 42(2), 328–354. <https://doi.org/10.1007/s00259-014-2961-x>
- 2) *Fludeoxyglucose F 18 Injection*. (n.d.). Siemens Healthineers USA. <https://www.siemens-healthineers.com/en-us/molecular-imaging/petnet-solutions-mibr/fludeoxyglucose-f-18-injection>
- 3) Komal, S. (2020, October 19). *Localization Mechanisms of Radiopharmaceuticals*. IntechOpen. <https://www.intechopen.com/chapters/73661>
- 4) Schultz, C. (2017, August 27). The Effect of Glucose on Quality of PET Scan Results. <https://www.ommegaonline.org/article-details/The-Effect-of-Glucose-on-Quality-of-PET-Scan-Results/869>
- 5) Images and Physician Interpretation (case study) provided by UTMB League City
- 6) DirectMed Parts & Service, Parts, D., Parts, D., Parts, D., Parts, D., DirectMed Parts & Service, DirectMed Parts & Service, DirectMed Parts & Service, DirectMed Parts & Service, DirectMed Parts & Service, & DirectMed Parts & Service. (n.d.). *CT Scanner Streak Artifacts*. DirectMed Parts & Service. <https://directmedparts.com/ct-scanner-streak-artifacts/>
- 7) What is Metastasis? (2022, September 2). Cancer.Net. <https://www.cancer.net/navigating-cancer-care/cancer-basics/what-metastasis>



1200 fsd ax pet

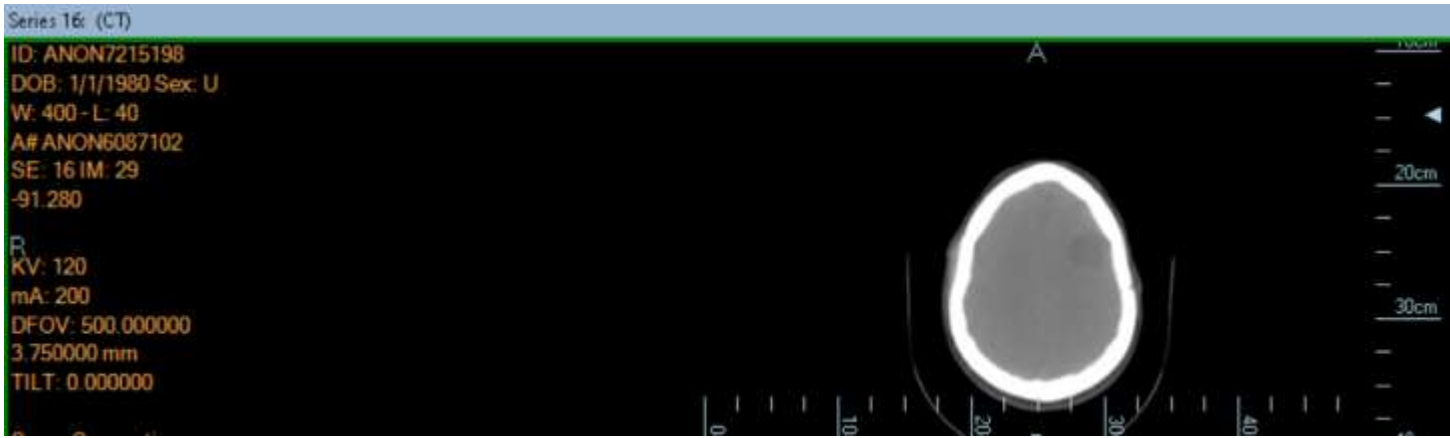


Interval development of multifocal FDG avid intramuscular soft tissue and osseous foci predominantly involving the left lower extremity

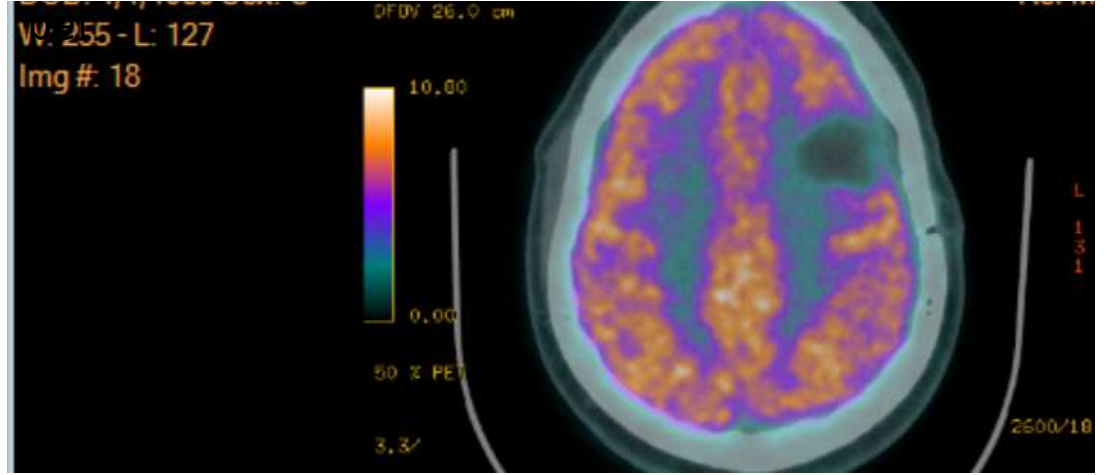
Images

In the CT performed, a difference in tissue density can be seen clearly, but is not necessarily clear from the CT.

Changing the window width and length can help visualize the region better, and differentiate between different tissue densities.

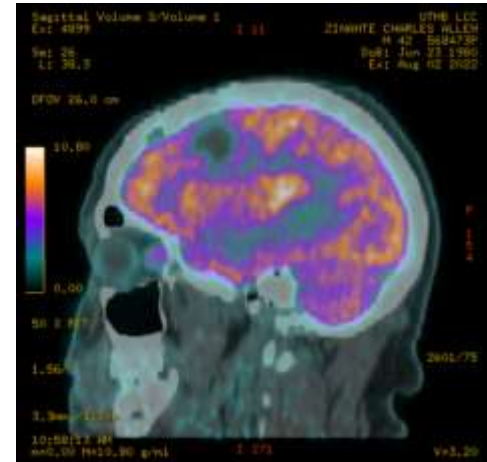
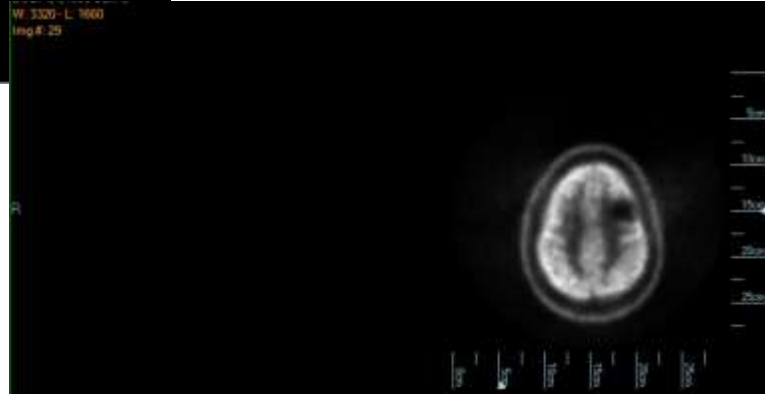


Series 2600 fsd



Series 26 PET

Series 27
pet



Fsd sag 2601

