F18 Fluciclovine PET in Biochemical Recurrence

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67 y/o male with Gleason 4+3 prostate adenocarcinoma, status post radical prostatectomy in 2004, had biochemical recurrence in 2008 and received salvage radiotherapy and Lupron injections. Subsequently PSA began to slowly rise with values (ng/ml) of 0.09 in 2012, 0.22 in 2014, 0.80 in 2016 and 1.91 in 2017. F18 fluciclovine PET was ordered for biochemical recurrence.

F18 fluciclovine PET/CT showed an abnormal tracer accumulation in a 9 mm short axis left para-aortic lymph node.
74 y/o male with prostate carcinoma diagnosed in 2006 and treated with brachytherapy was referred to Northwestern with rising serum PSA level, most recently 17.9 ng/ml. No source of biochemical recurrence was identified on outside bone scan and abdomen/pelvis CT. F18 fluciclovine PET was ordered for biochemical recurrence.

F18 fluciclovine PET/CT showed an intense abnormal tracer accumulation in the region of the prostate gland to the left of midline.
88 y/o male with prostate cancer diagnosed in 1996 and treated with prostatectomy and radiation therapy was referred to Northwestern with rising serum PSA, most recently 3.55 ng/ml. No source of biochemical recurrence was identified on outside bone scan and chest/abdomen/pelvis CT. F18 fluciclovine PET was ordered for biochemical recurrence.

F18 fluciclovine PET/CT showed an abnormal tracer accumulation in a 7 mm short axis lymph node in the left lower posterolateral pelvis.
What is F18 Fluciclovine (F18 FACBC)

• An FDA approved radioactive diagnostic agent (Axumin – Blue Earth Diagnostics, Burlington, MA) indicated for positron emission tomography (PET) imaging in men with suspected prostate cancer recurrence based on elevated blood prostate specific antigen (PSA) levels following prior treatment

• A non-natural amino acid analog

• Used to detect increased amino acid transport associated with tumor cells in comparison to normal tissues

• Not metabolized and not incorporated into newly synthesized proteins

• Taken up to a greater extent in prostate cancer cells compared with surrounding normal tissues
How to interpret Axumin PET

• A negative image does not rule out recurrent prostate cancer.
• A positive image does not confirm recurrent prostate cancer.
• The performance of Axumin seems to be affected by PSA levels.
• Axumin uptake may occur with other cancers and benign prostatic hypertrophy in primary prostate cancer.
• Clinical correlation, which may include histopathological evaluation of the suspected recurrence site, is recommended.
• F18 fluciclovine distributes to the liver, pancreas, lung, red bone marrow, myocardium, and, with increasing time, skeletal muscle.
Take Home Points

- Axumin is a novel molecular imaging agent and is first FDA approved F-18 labeled PET imaging agent indicated in patients with suspected recurrent prostate cancer.
- It is beneficial for the localization of recurrent prostate disease when conventional imaging is negative.
- When interpreted with knowledge of radiotracer biodistribution and normal variants, it is highly specific for extraprostatic metastasis but has lower specificity for disease within an intact or treated prostate.
- Less data are available on its performance in bone metastases; therefore, skeletal-specific imaging is recommended for suspected bone involvement if fluciclovine PET is unrevealing.
- There is no absolute threshold for PSA level in the recommendation of when to obtain F18 fluciclovine PET. Diagnostic performance varies with PSA level and kinetics. Fluciclovine PET positivity rate will increase with increasing PSA and with more rapid doubling times.
References

• **Axumin** (http://www.axumin.com)

