Case of the Quarter-Hibernoma

Clinical History:

75-year-old male ex-smoker with a left upper lobe nodule. PET-CT requested to further characterise.

Findings:

An FDG scan was acquired from skull base to below knees together with a low dose CT scan for attenuation correction and image fusion.

There is a 1.2 cm part-solid nodule within the left upper lobe, axial CT image 272, which shows only low-grade uptake, SUV max 1.5. There is no abnormal hilar or mediastinal nodal uptake.
There is a very avid uptake associated with a predominantly fat density right latissimus dorsi intramuscular lesion measuring 8x5x9 cm, SUV max 11.6. The lesion appears to extend posterior to the shoulder girdle with a further separate site of avid uptake within the subcutaneous tissues overlying the right scapula, see axial fused image 276. Uptake related to bilateral shoulder girdle musculature appears physiological.
FDG uptake is otherwise within normal physiological limits.

Interpretation:

Uptake within the left upper lobe nodule is low-grade and it may be benign or represent low-grade malignancy. Continued CT surveillance suggested.

The FDG avid right shoulder girdle lesion needs further assessment with MRI. The scan findings maybe in keeping with a benign hibernoma but it would be prudent to exclude a malignant tumour such as a liposarcoma.

Follow-up:

The patient subsequently underwent a dedicated MRI of the right shoulder, which demonstrated a well-defined lesion deep to the right latissimus dorsi muscle with predominantly fat signal, with thin internal septa, vessels, and a small amount of oedema. The patient was subsequently reviewed at a dedicated sarcoma centre, and a diagnosis of a hibernoma was made based on the combination of clinical findings and multimodality imaging appearances.

Key Teaching points and Discussion:

- Brown adipose tissue is thermogenic, containing more mitochondria than regular adipose tissue. As a result, it is highly metabolically active, and takes up FDG avidly compared to regular adipose tissue.
- Hibernomas are benign tumours containing brown adipose tissue, and are highly metabolically active on FDG PET-CT. They grow slowly, and usually present as painless masses.

- They usually present in the thigh, shoulder, back, neck and chest (in descending order of frequency), and can be large, growing up to 20cm.
- They may have a capsule or pseudocapsule on non-contrast CT, and may also have thin internal septations and traversing vessels.
- There are no reported cases of metastases or malignant transformation.
- Well differentiated liposarcoma, a malignant neoplasm of adipose tissue, is the major imaging differential diagnosis. These tend to have lower SUVs than hibernomas, but this cannot be reliably used to differentiate the two, as there is a degree of overlap. As a result, dedicated MRI is recommended in suspected cases to further characterize the lesion/s alongside consideration of specialist referral.
- Biopsy tends to be avoided due to an elevated risk of bleeding, but may be necessary in equivocal cases.

References:

Smith CS, Teruya-Feldstein J, Caravelli JF, Yeung HW. False-positive findings on 18F-FDG PET/CT: Differentiation of Hibernoma and Malignant Fatty Tumour on the Basis of Fluctuating Standardized Uptake Values. AJR 2008; 190:1091-1096

Kim JD, Lee HW. Hibernoma: Intense Uptake on F18-FDG PET/CT. Nucl Med Mol Imaging 2012; 3: 218-222

Murphey MD, Carroll JF et al. From the archives of the AFIP: benign musculoskeletal lipomatous lesions. Radiographics. 2004; 5: 1433-66.