Focal Pituitary gland uptake on 18F-FDG PET/CT: Rare incidental finding or a more routine observation with modern scanning techniques?

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PURPOSE
To assess the spectrum of focal pituitary uptake on routine imaging with modern PET/CT scanners and reconstruction algorithms.

PATIENTS AND METHODS
• Retrospective analysis of imaging in patients undergoing routine FDG PET/CT between Jan–Dec 2015 and in whom contemporaneous MRI of brain was performed within 1 year of the PET/CT study.
• 195 eligible patients were identified. 17 brain MRI studies were deemed unsuitable to adequately assess the morphology of the pituitary gland, due to artefacts or lack of at least 3 multipplanar T1W / T2W sequences [1] and these were excluded.
• All PET/CT studies were undertaken on a Siemens Biograph mCT Flow Edge™ with Ultra-HD™ reconstruction.
• All MRI examinations were undertaken either on a 1.5 T Philips Achieva or 1.5 T GE 450W MRI scanners.
• For all patients, standardised region of interest tool [2] was used to calculate Pituitary, Mid-axial blood pool (MBP) and Liver background (LB) SUVmax.

RESULTS
• 178 patients were included in the analysis, mean age 59 years, of which 81 were males and 97 females.
• 173/178 patients had morphologically normal (MN) pituitary glands on MRI (Table 1). Pituitary SUVmax in 147/173(84.9%) was above MBP and in 69/173(39.8%) was above LB.
• 5/178 patients had morphologically abnormal (MA) MRI (Table 2). 3 of these had macroadenomas and 1 microadenoma on MRI. In one of these patients (Figure 3) no significant uptake was seen in an abnormal pituitary gland and this was thought to be a case of hypophysis.

Table 2: Summary of SUVmax in morphologically normal pituitary glands on MRI.

<table>
<thead>
<tr>
<th>Pituitary SUVmax</th>
<th>Mediastinal blood pool SUVmax</th>
<th>Liver background SUVmax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>Range</td>
<td>Mean</td>
</tr>
<tr>
<td>3.91</td>
<td>2.1 - 5.2</td>
<td>2.23</td>
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</tbody>
</table>

• No statistically significant correlation could be established in predicting MA when the pituitary SUVmax was compared to the MBP and LB activity.
• Of interest in our dataset, the range of inherent activity in some of the MN glands (Fig 4) was higher then the reference values (SUVmax 4.1) quoted in prior studies [3] thought to be statistically significant in predicting the presence of abnormal pituitary glands.

Table 2: Summary of SUVmax in abnormal pituitary glands.

<table>
<thead>
<tr>
<th>Pituitary SUVmax</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>Range</td>
<td>Mean</td>
</tr>
<tr>
<td>16.3</td>
<td>2.5 - 42.7</td>
<td>1.7</td>
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</tbody>
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TAKE HOME MESSAGE
Base of skull and other midline structures are important review areas while reporting whole body FDG PET/CT examinations [4].

Our results demonstrate that on contemporary scanners and reconstruction algorithms, focal pituitary gland uptake can be quite conspicuous with normal SUVmax somewhat higher than previously reported in the literature.

With advances in diagnostic imaging including PET/CT, incidentalomas of the pituitary gland have been described with increasing frequency [5]. Reporters should familiarise themselves with the range of normal pituitary uptake in their routine clinical practice particularly if there is any change in equipment.

REFERENCES