Frequency of incidentally discovered additional synchronous primary malignancies and resulting clinical implications for patients staged or restaged with 18FDG-PET/CT

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Disclosure

• The authors declare no financial conflicts of interest
Background

- PET/CT now integral in staging/restaging of several malignancies

- The whole body (WB) field of view (FOV) PET/CT images from the top of the head to the toes and includes the arms

- Limited WB FOV excludes portions of the head, upper and lower extremities

- WB PET/CT detects more lesions than limited WB PET/CT

- PET/CT has been shown to detect second primary malignancies including gastrointestinal, pulmonary, breast, and thyroid malignancies
Purpose

- **Aim:**
  - To evaluate the frequency of incidentally discovered second cancers detected on PET/CT
  - To assess how often these change clinical management

- **Materials and methods:**
  - Retrospective review of 804 consecutive WB PET/CT studies performed on 556 subjects for known or suspected malignancy
  - Suspicious metabolic foci were identified based on:
    - SUV>2.5
    - Not a normal variant
    - Outside of the typical metastatic route of spread for the malignancy for which the study was performed
    - Lesions confirmed by biopsy were recorded
Results

- Most common indications for PET/CT

Table 1: Most frequent indications for PET/CT

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>No. of Patients</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solitary Pulmonary Nodule</td>
<td>125</td>
<td>22.5</td>
</tr>
<tr>
<td>Lung cancer&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>70</td>
<td>12.6</td>
</tr>
<tr>
<td>Head and neck cancer&lt;sup&gt;c,d&lt;/sup&gt;</td>
<td>50</td>
<td>9.0</td>
</tr>
<tr>
<td>Lymphoma&lt;sup&gt;b,c,f&lt;/sup&gt;</td>
<td>50</td>
<td>9.0</td>
</tr>
<tr>
<td>Colorectal cancer</td>
<td>30</td>
<td>5.4</td>
</tr>
<tr>
<td>Hepatocellular cancer</td>
<td>30</td>
<td>5.4</td>
</tr>
<tr>
<td>Esophageal cancer</td>
<td>30</td>
<td>5.4</td>
</tr>
<tr>
<td>Bladder cancer</td>
<td>17</td>
<td>3.1</td>
</tr>
<tr>
<td>Melanoma&lt;sup&gt;i&lt;/sup&gt;</td>
<td>14</td>
<td>2.5</td>
</tr>
<tr>
<td>Multiple myeloma&lt;sup&gt;g&lt;/sup&gt;</td>
<td>13</td>
<td>2.3</td>
</tr>
<tr>
<td>Renal cell cancer</td>
<td>9</td>
<td>1.6</td>
</tr>
<tr>
<td>Anal cancer</td>
<td>8</td>
<td>1.4</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>6</td>
<td>1.1</td>
</tr>
<tr>
<td>Prostate cancer</td>
<td>6</td>
<td>1.1</td>
</tr>
<tr>
<td>Sarcoma&lt;sup&gt;d,h&lt;/sup&gt;</td>
<td>5</td>
<td>0.1</td>
</tr>
<tr>
<td>Testicular cancer</td>
<td>3</td>
<td>0.1</td>
</tr>
<tr>
<td>Total</td>
<td>466</td>
<td>83.8</td>
</tr>
</tbody>
</table>

Figure 1: Subject with rectal and incidental esophageal cancer
Results

- 7.7% (43/556) of subjects had suspicious lesions for a newly discovered primary malignancy that was different from the malignancy for which the study was performed.

- Approximately 1% of subjects had atypical hypermetabolic lesions in the:
  - thyroid (6/556)
  - prostate (6/556)
  - colon (7/556)
  - parotid glands (7/556) and
  - lung (6/556)

- These lesions changed the clinical management in 3.2% (18/556) of subjects.
Results

- 1.4% (8/556) of subjects had biopsy confirmation of an additional primary malignancy

- Two simultaneous new primary malignancies were found in 0.18% (1/556) of subjects

- Subjects with early disease (Stage 1 and 2) were more likely to have suspicious lesions further evaluated than subjects with advanced disease (Stage 3 and Stage 4) (45% vs 15.7% respectively), however this difference was not statistically significant (p = 0.10)

Limitations
- Not all suspicious lesions were biopsied because of subject refusal, low likelihood of changing clinical course
- Subjects with advanced disease (stage 3 or 4) were less likely to have lesions further evaluated
- Retrospective analysis performed at an academic institution so results are influenced by referral patterns and underlying subject demographics
Conclusion

- Subjects with cancer have an increased risk of having a second primary malignancy probably due to an underlying genetic predisposition or environmental exposure.

- Approximately 1.4% of subjects had second primary malignancies detected by WB PET/CT.

- Incidental second primary malignancies were more likely to change management in subjects where the first primary malignancy was early disease (stage 1 or 2) compared to subjects with advanced disease (stage 3 or 4).

- PET/CT can lead to early detection and successful treatment of these incidentally discovered second malignancies.