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## Value of PET-CT fusion imaging in avoiding potential pitfalls in the interpretation of $^{18}\text{F}$ -FDG accumulation in the distal oesophagus

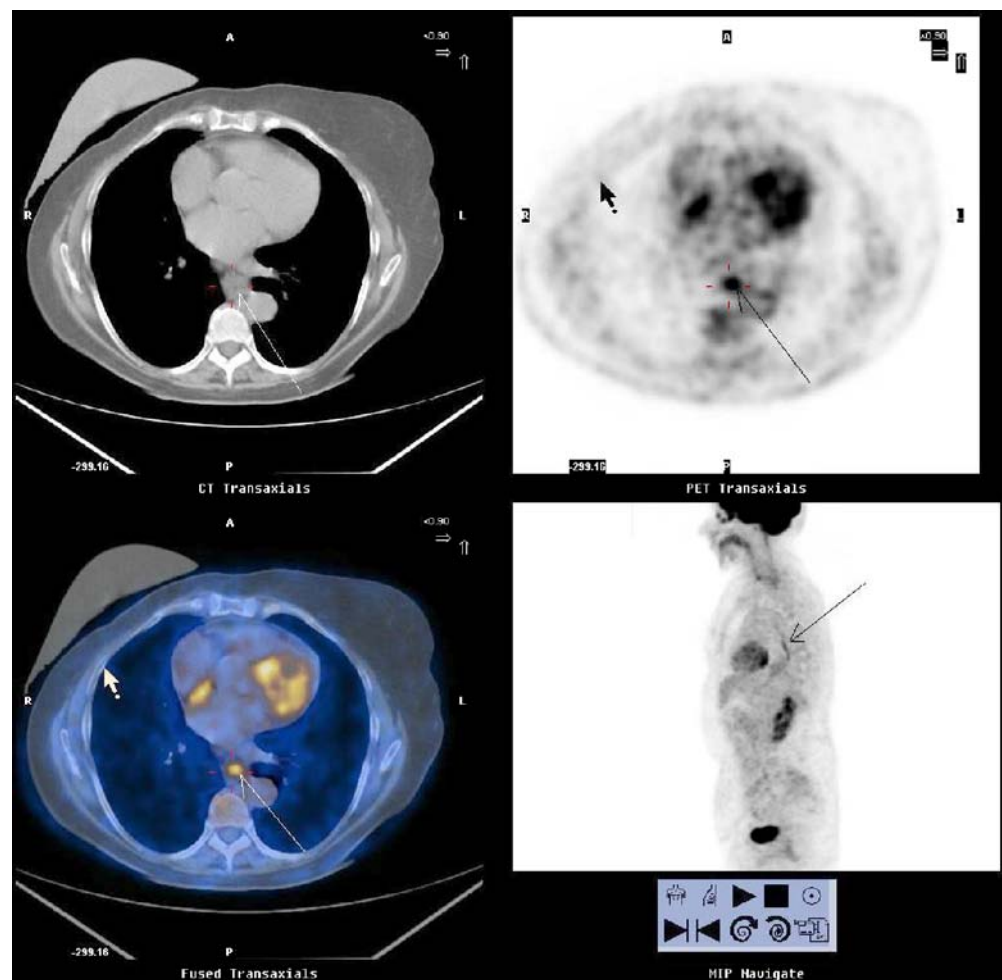
Dear Sir,

A potential problem with  $^{18}\text{F}$ -FDG PET is the misinterpretation of physiological accumulation of the radiotracer, leading to a false positive result. Sources of such misinterpretation documented in the literature include non-specific inflammation, abscess, sarcoidosis and other granulomatous diseases, recent radiotherapy, brown adipose tissue, thymic hyperplasia, muscle contraction, laryngeal

nerve palsy, gastritis, colitis, atherosclerotic plaque and occult lung infarction [1–9]. A relatively high false positive rate due to such causes could interfere with therapeutic decision making and patient management. To the best of our knowledge, the accumulation of  $^{18}\text{F}$ -FDG in the distal oesophagus has not previously been clearly described as a potential cause of false positive findings. Interestingly, this is a not infrequent situation in our experience, especially in patients with gastro-oesophageal reflux. Moreover, when considering the PET study only, such accumulation might be misinterpreted as focal uptake in the paravertebral region, mimicking lymph node accumulation (Fig. 1). On the other hand, fusion images, such as those obtained using a PET-CT scanner, might allow correct interpretation of  $^{18}\text{F}$ -FDG accumulation in the distal oesophagus as non-tumoural and non-specific (Fig. 1).

To verify the prevalence of this phenomenon, we reviewed the whole series of 2,158 consecutive patients who had undergone  $^{18}\text{F}$ -FDG PET-CT at our centres during the period January to June 2004. To avoid potentially true

**Fig. 1.** CT scan (top left), PET image (top right), PET-CT fusion image (bottom left) and 3D imaging in the lateral view (bottom right), showing moderate and diffuse  $^{18}\text{F}$ -FDG accumulation in the distal oesophagus. Looking at axial images one might be misled into diagnosing a pre-vertebral hypermetabolic lymph node. However, PET-CT indicates that the radiotracer accumulation is limited to within the lumen of the oesophagus. This finding was interpreted as representing non-specific accumulation, and subsequent endoscopy did not reveal malignancy



pathological uptake, 47 patients who were known to have oesophageal cancer were excluded.

In our series,  $^{18}\text{F}$ -FDG accumulation, usually characterised by diffuse distribution and a mild to moderate or occasionally intense degree of activity, was observed in the distal part of the oesophagus in 135 patients (6.2% of cases). Typically, in non-neoplastic cases,  $^{18}\text{F}$ -FDG accumulation was evident on PET-CT fusion imaging either in the lumen of the oesophagus (Fig. 1) or as concentric, diffuse and homogeneous uptake in the oesophageal wall: this latter condition was observed with higher frequency in patients with gastro-oesophageal reflux (Fig. 2). In all these patients, endoscopic examination proved negative for malignancy. Finally, in three other patients an unknown oesophageal cancer was disclosed by  $^{18}\text{F}$ -FDG PET-CT performed for other reasons; in these cases eccentric and focal  $^{18}\text{F}$ -FDG uptake in the oesophageal wall was evident on PET-CT fusion imaging (Fig. 3).

In conclusion, diffuse accumulation of  $^{18}\text{F}$ -FDG in the distal oesophagus is not an unusual finding. However, accurate evaluation of PET-CT fusion imaging usually allows such accumulation to be localised to the oesophageal lumen or (in cases of concentric, diffuse and homo-

geneous uptake) to the oesophageal wall. Accordingly it can be correctly attributed to either physiological uptake or inflammation due to gastro-oesophageal reflux. By contrast, when PET-CT fusion imaging reveals eccentric and focal  $^{18}\text{F}$ -FDG uptake in the oesophageal wall, a tumoural lesion should be suspected and endoscopy is strongly recommended.

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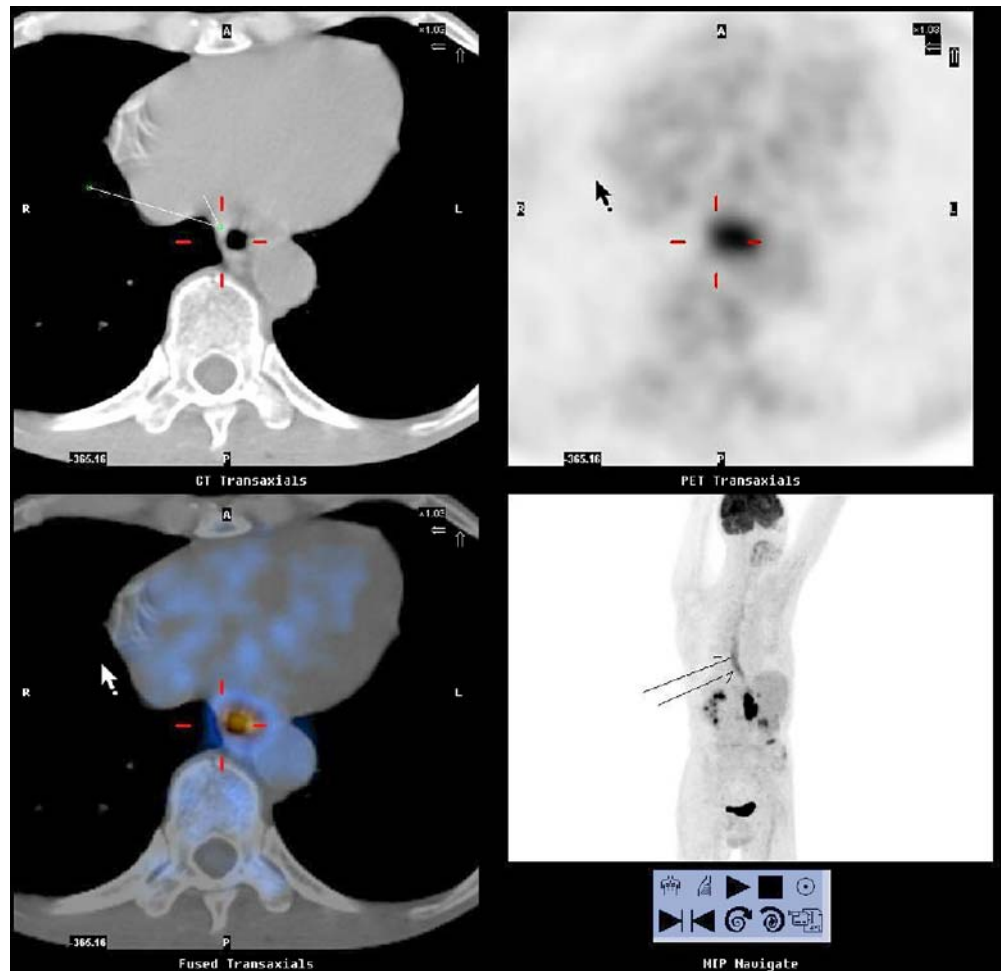
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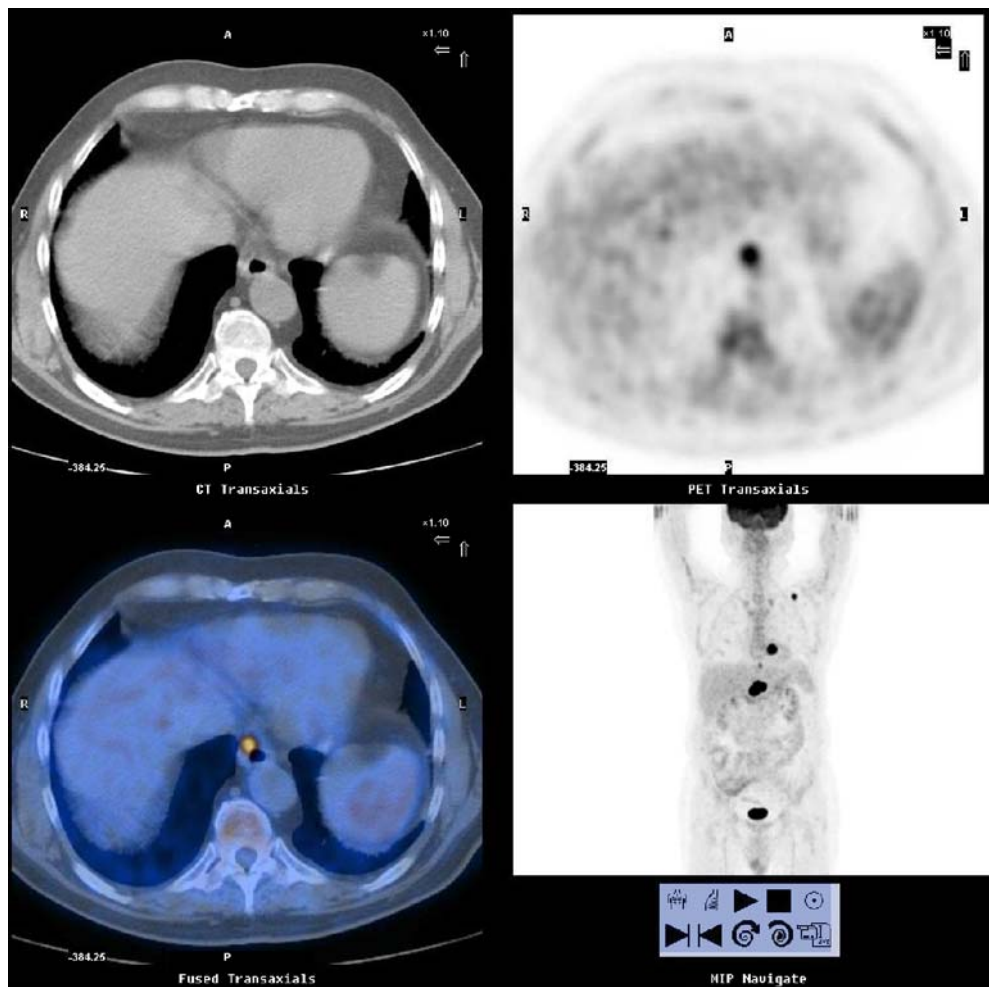
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**Fig. 2.** CT scan (*top left*), PET image (*top right*), PET-CT fusion image (*bottom left*) and 3D imaging in the posterior right oblique view (*bottom right*), showing intense and diffuse  $^{18}\text{F}$ -FDG accumulation both within the lumen and in the wall of the distal oesophagus. The uptake showed a concentric pattern, as well visualised by PET-CT. This finding was interpreted as indicative of potential inflammation, and was subsequently proven by endoscopy to be related to gastro-oesophageal reflux



**Fig. 3.** CT scan (top left), PET image (top right), PET-CT fusion image (bottom left) and 3D imaging in the anterior view (bottom right). There is focal and intense  $^{18}\text{F}$ -FDG uptake in the lateral wall of the distal oesophagus, as well depicted on PET-CT. Moreover, an area of intense uptake is visualised in the left supraclavicular region. Subsequent endoscopy demonstrated the presence of a squamous cell carcinoma of the oesophagus, and the area of focal uptake in the left supraclavicular region was found to be a metastatic lesion



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