Author's response to reviews

Title: Case report: PET/CT, a cautionary tale.

Authors:

Jayson Wang Dr (jwang@hhnt.nhs.uk)
Gary Cook Dr (gcook@icr.ac.uk)
John Frank Dr (jfrank@hhnt.nhs.uk)
Roberto Dina Dr (r.dina@imperial.ac.uk)
Naomi Livni Dr (nlivni@hhnt.nhs.uk)
John Lynn Prof (j.lynn@imperial.ac.uk)
William Fleming Mr (w.fleming@imperial.ac.uk)
Michael Seckl Prof (m.seckl@imperial.ac.uk)

Version: 2 Date: 12 December 2006

Author's response to reviews: see over
Dear Dr Pemberton,

Case Report: PET/CT, a cautionary tale.

Thank you for your email dated 15 November 2006. We are very grateful for the reviewers comments and feel they have substantially improved the quality of the manuscript. Enclosed please find our specific responses to these comments.

Reviewer 1.

This reviewer notes ‘Excellent case report from an excellent group. Concise and very readable. A very important case to report with good suggestions for causes of the mal-alignment. This report definitely needs to be in the public domain as there are lessons to be learned as this new technology is introduced’.

As no specific changes have been requested no responses are made.

Reviewer 2

In marked contrast, reviewer 2 felt that a number of issues needed to be addressed:

1) In the Abstract background the reviewer notes ‘On the contrary, mis-registration has been well reported in the literature. Therefore, I would like to restrict this to just state: “Mis-registration errors are increasingly….. of PET/CT studies.”

We agree and have modified the abstract background section accordingly.

2) In the case presentation the reviewer correctly indicates that we should abbreviate PET/CT after its first use in the background and we have made this change. The reviewer also asks us to state whether PET, CT as well as PET/CT mis-localized the lesion and to state if we used trans-esophageal US or otherwise. The isolated PET placed the lesion correctly in front of the vertebral body whilst the PET/CT mislocalized the lesion in the vertebral body. The isolated CT could not identify the lesion. These points were made clear in the text of the original manuscript on page 3 lines 31-32. The
ultrasound was transoesophageal and this point was made clear in the original manuscript on page 4 line 4. We wish to emphasize that the isolated CT and PET images as well as the images from the CT/PET were reviewed by 5 different radiologists in 3 different MDTs.

3) In the Background section of the paper, the reviewer makes the following comments: ‘There is a lot of background stuff which seems like redundant as this is a case review and not a review article or original research article. Accordingly, I believe that much of the first paragraph can be deleted. The message in the background should highlight the following: PET functional information- poor spatial resolution, CT- anatomic information minus functional information- so PET/CT complement each other initial image fusion resulted in lot of mis-registration of PET-CT data, with “hardware fusion” registration has improved. Some limitations of PET CT among them image alignment still continues to be an issue with this promising modality’.

The background section has been condensed as recommended.

4) In the Case presentation section of the paper the reviewer asks the following:
   a. Editors: Please confirm the accuracy/appropriateness of Chemotherapy regime as this is not my area of specialty

   We have therefore inserted references for BEP and POMB/ACE chemotherapy regimens.

   b. For imaging description: State that whole body CT (instead of CT body- or was it neck chest abdomen and pelvis- if so specify regions) was performed. Delete scan after MRI.

   These points have been addressed in the text of the new manuscript.

   c. What is the pattern of reporting in your institution: who reports CT component of PET CT? Is PET/CT with contrast or without? Please state if radiologists reviewed the CT component of PET CT as well.

   We have indicated in the text of the new manuscript that the reporters of the PET/CT scans are dual accredited in radiology and nuclear medicine, and trained specifically in PET/CT, and the CT component of PET/CT scans are also reviewed. The CT component of PET/CT images is acquired routinely without contrast (as we believe is the case in most departments throughout the world).

5) In the Conclusions section of the paper the reviewer notes ‘Good review of salient points. I would like to add here that in most places nuclear medicine physicians report PET/CT and they may not have been trained specifically in CT interpretation. Therefore, it is important also that radiologists be consulted for interpretation of the study particularly for the CT portion to avoid misinterpretation.

This point has been addressed above.

The reviewer also asks us to specify from where we found 0.5 cm movement in our case.
The 0.5 cm movement was postulated as a possible explanation for the mis-registration. The estimated distance was how much the patient would have had to move to cause the mis-registration from next to the vertebra to within the anterior edge.

6) In the Figures the reviewer asks:
   a) ‘It is the image section that I have some concern about. The CT image shows some soft tissue attenuation tissue in the pre-vertebral region’.

As discussed in the text, the scar artifacts from previous surgery in the same area was thought to account for the soft tissue attenuation in the pre-vertebral region. A discrete mass could not be clearly defined on CT with or without contrast

   b) ‘The fused images also show that part of the lesion in the subsequent PET was in the prevertebral region. Please explain if the reporting of PET CT could have been erroneous rather than the finding seen on images. I also consulted another radiologist with much experience in this field as well about this matter- he agreed.’

While the fused images may show part of the lesion was in the prevertebral region, nevertheless, the lesion was obviously seen in the fused images to be *predominantly* in the vertebra. Thus, the report that the lesion appeared within the vertebral body was correct based on the images.

   c) ‘I would also like to see MR image of this region included in the report’.

This has been included in Figure 1D.

   d) ‘The reasons for my request are manifold: CT and MR are both superior to endoscopic US and PET for localization of lesion to paravertebral region. Absence of marrow signal intensity on MRI in this region should have provided clue to its extra-vertebral location. Was MR and or CT contrast enhanced or not? A non-contrast CT would not be as sensitive. Who reviewed CT and MR images- Nuclear medicine physicians or radiologists? If nuclear medicine physicians- please state if they were trained in cross-sectional radiology as well. Were there artifacts on CT and MR from metal clips? If yes, were these artifacts in any way in the region of soft tissue lesion? Was CT performed twice- CT and then with PET/CT as well? Please state why?’

The CT scan was contrast enhanced, while the MRI scan was not. These scans were reviewed by 5 different radiologists, both within and outside the contexts of three different multidisciplinary meetings and also in two different hospitals (Hammersmith Hospitals and The Royal Marsden Hospital). There were both metal clips and soft tissue changes in the prevertebral region which were thought to be scarring from previous surgery. A contrast-enhanced CT scan was firstly performed after the PET scan, and a separate PET/CT scan was performed, as the first CT did not localize the lesion seen on PET scanning.

Finally, the reviewer suggests that the article be rejected because the case represents too small an advance to publish, with insufficient interest to warrant publication in a scientific/medical journal. We strongly disagree. Although mis-
registration errors of PET/CT scans are well-known to our radiological colleagues, this pitfall is not well recognized by other clinicians. Moreover, radiologists/PET ologists reporting PET/CT do not currently routinely insert disclaimers to their reports indicating the potential risk of mislocalisation. If we had believed the PET/CT we might have ended up cutting out the vertebral body of D2 which would clearly have not been in the patients best interests. Consequently, this case report is vital for the attention it brings to clinicians who read PET/CT reports.

We therefore believe that this revised paper merits consideration for publication in the BMC Cancer. Should you require any further information, please do not hesitate to get in touch with us. Thanking you in advance for your kind help and attention in this matter,

Yours sincerely,

Michael J Seckl, Corresponding Author.