**Clinical Area:** **FDG PET for Esophageal Cancer**
**Keywords:** **Cancer esophagus, FDG PET, metastases**
**Reference:** **Luketich JD, Friedman DM, Wiegel TL, Meehan MA, Et al. Evaluation of Distant Metastases in Esophageal Cancer: 100 Consecutive Positron Emission Tomography Scans. Ann Thorac Surg 1999; 68: 1133-7.**

**Study Type:** Comparison of diagnostic tests.
**Study Aim:** Evaluation of distant metastases in esophageal cancer, using FDG PET scan.

**Outcomes**

- *Primary:* Sensitivity and specificity.
  Change in patient management according to the PET results.

**Design**

- *Number of subjects:* N=91, N of PET scans= 100
- *Description of study population:* Gender: 16 women, 75 men. Average age: 65.5 years. (Range 39-89). These were patients referred to Pittsburgh Cancer Institute for consultation between July 1995 and August 1998.
- *Inclusion criteria:* Potentially resectable esophageal cancer based on clinical evaluation, barium esophagus, and CT of the chest and abdomen.
- *Exclusion criteria:* Biopsy proven distant metastases based on standard noninvasive scanning results, and fine needle aspiration.

**Validity**

- *Independent blind comparison with a gold standard or follow-up of those not receiving the gold standard test?* Apparently not. CT scans were used as a comparison for anatomic location and correlation. The gold standard was not clearly defined. Several standards were used: results of biopsy, minimally invasive surgical staging, surgical resection, or clinical evaluation.
- *Was "normal" defined?* No
- *Appropriate spectrum of disease?* Only patients with esophageal cancer were included.
- *Consecutive patients?* Yes.
- *Methods described in enough detail to enable you to replicate the test?* Yes.
- *Reproducible results?* Yes, if performed in the same center. The combination PET/CT scan was developed by this institute.

**Conclusions regarding validity of methods:**

Threats to validity include:

1. There were 100 PET scans preformed on these 91 patients. 13 of these scans were performed after the surgical treatment, when the main objective was preoperative evaluation of distant metastases.
2. PET scans were performed on either of two scanners, one of which was a PET/CT combination scan, which would provide a more accurate anatomic localization of the uptake. The results were combined and not analyzed separately. Values of sensitivity and specificity based on the results of this combination scan could be inaccurately higher.
3. The test results were unblinded and there was no specific gold standard used. PET and CT results were compared to the results of biopsy, minimally invasive surgical staging, surgical resection, or clinical evaluation.

**Results**
Sensitivity and Specificity for Metastases Detection

| | PET Scan | CT scan |
|---|---|---|
| Sensitivity | 69%* | 46.1% |
| Specificity | 93.4% | 73.8% |

* All metastatic sites missed were less than 1cm diameter.

The difference in accuracy between PET and CT scans was statistically significant. ($P<0.01$)

The management approach was changed for16 (15%) cases, after PET revealed unsuspected metatases.

**Authors' Conclusions:**
PET was more accurate than CT in detecting distant metastases, but only 69% sensitive compared to minimally invasive staging or clinical correlation. PET scan revealed unsuspected metastases in 16 (15%) patients, which led to nonsurgical treatment approaches to these patients. Combination PET/CT would improve anatomic localization of uptake, and give more precise results.

**Reviewer's Conclusions:**
PET scan results were significantly more sensitive and specific than CT. This changed the management approach in 15% of the patients. However due to the use of the combined PET/CT scan we cannot know for sure if this higher sensitivity was solely due to PET. The interpretation of PET results was not blinded, the gold standard was not well defined, and several standards were used. In addition, 13 of the PET scans were performed after surgery when they were intended to for preoperative evaluation.