Survey: PET/CT Imaging Improving Patient Diagnosis

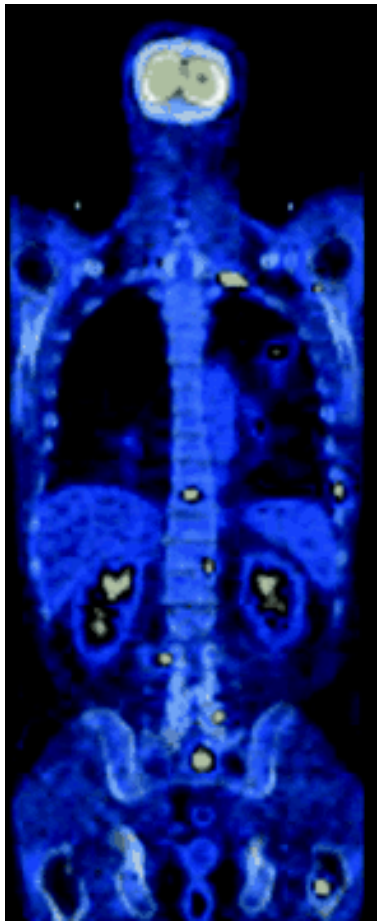
Jessica J. Tran

EE/CSE 577

12/12/2011

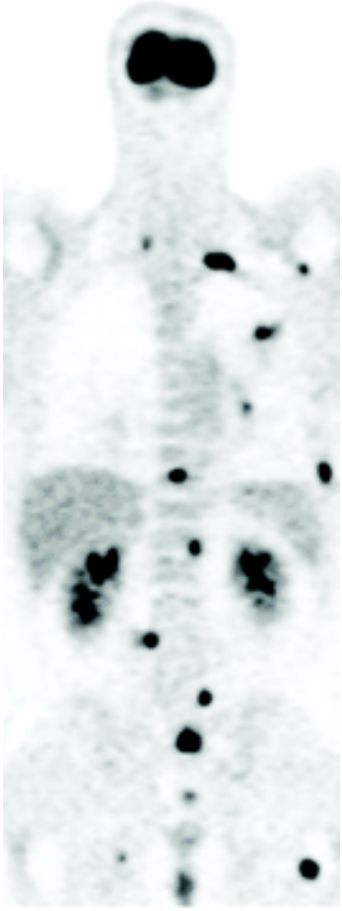
Combined PET/CT

- New medical imaging technique
- Combines two high-quality imaging techniques into one machine
- Structural and metabolic information under almost the same conditions



Positron Emission Tomography (PET)

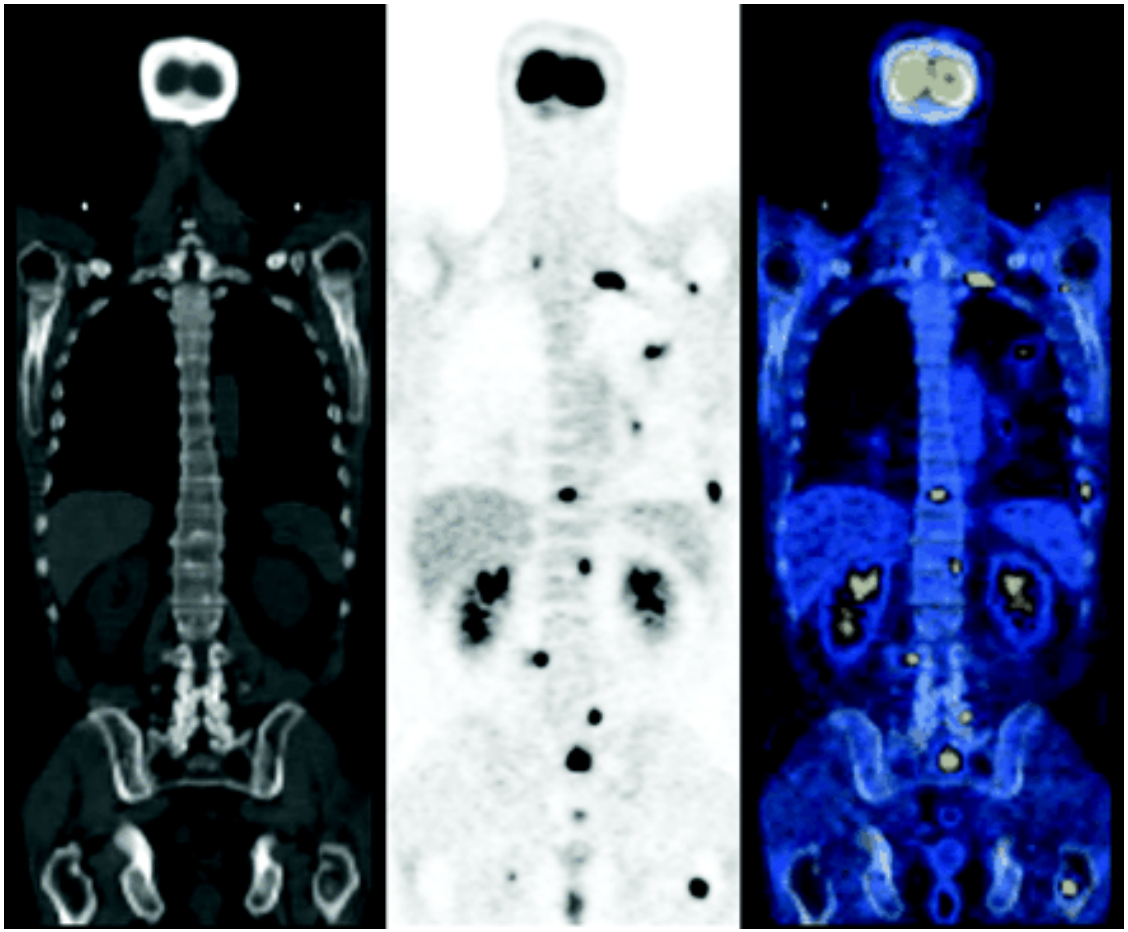
- Examines chemical activity in parts of the human body
- Nuclear medicine



Computed Tomography (CT)

- Provides anatomical structural information
- Uses x-rays to generate cross-sectional views or 3D images

CT, PET, and PET/CT images



Literature Review

Head & neck malignancy

Non-small lung cancer

Liver metastases from colon cancer

Staging Hodgkins and non-Hodgkin lymphoma

Differentiated Thyroid Cancer

Breast cancer

Ovarian cancer

Prostate cancer

Select Results

- Liver Metastases from colon cancer[1]
  - lack of identifying hidden tumors spurred development of new methods
  - PET scans allowed new diagnostic method to monitor metabolic activity
    - poor resolution
  - PET/CT enables exact identification of lesions which allows for accurate biopsies and targeted surgery

[1] M. Selzner, T. Hany, P. Wildbrett, L. McCormack, Z. Kadry, and P. Clavien, "Does the Novel PET/CT Imaging Modality Impact on the Treatment of Patients With Metastatic Colorectal Cancer of the Liver?," *Annals of Surgery*, vol. 240, no. 6, pp. 1027-1036, 2004.

Select Results

- Differentiated Thyroid Cancer[2]
  - PET and fused PET/CT images
- Overall staging of patients
  - PET/CT (sensitivity (95%) & specificity (91%))
    - 121 true lesions
  - PET-only (sensitivity (79%) & specificity (76%))
    - 79 true lesions

[2] H. Palmedo, J. Bucerium, A. Joe, and E. Al, "Integrated PET/CT in Differentiated Thyroid Cancer: Diagnostic Accuracy and Impact on Patient Management," *Journal of Nuclear Medicine*, vol. 47, no. 4, pp. 616-624, 2006.

Summary

- Diagnostic accuracy and staging malignancies
- Improves patient management
- Improved accuracy, sensitivity, specificity in detection in thyroid cancer, ovarian cancer
- Future of medical imaging in diagnosis of various cancers