A CASE BASED APPROACH TO THE ROLE OF PET/CT IN BREAST CANCER
IPET 2015, VIENNA

Dr. Andrew Ross M.D. FRCP
Professor, Dalhousie University
Division Head, Nuclear Medicine,
QE2 Health Sciences, Centre, Halifax Nova Scotia, Canada
Halifax
Question 1

Do you currently perform FDG PET for breast cancer evaluation?

Answer:
A. No
B. Rarely
C. Occasionally
D. Regularly

Answer
Question 2

FDG PET is recommended in the primary diagnosis and staging of Breast Cancer?

Answer

A. True

B. False
FDG PET in Staging

- A somewhat controversial area however not recommended as a routine primary tool
- SNMMI
  - Initial staging of patients with locally advanced or metastatic breast cancer when conventional staging studies (e.g., CT or bone scan) are equivocal or suspicious.
  - Follow-up or surveillance patients with breast cancer when conventional studies (e.g., CT or bone scan) are equivocal or suspicious.
“PET or PET/CT scanning is not indicated in the staging of clinical stage I, II, or operable III breast cancer. FDG PET/CT is most helpful in situations where standard staging studies are equivocal or suspicious, especially in the setting of locally advanced or metastatic disease.

may also be helpful in identifying unsuspected regional nodal disease and/or distant metastases in locally advanced breast cancer when used in addition to standard staging studies”
Case 1

70 year old with biopsy proven breast cancer
Back pain with equivocal bone scan
Question 3
Regarding nuclear medicine procedures and bone metastasis in Breast Cancer

A. FDG PET is superior and should be viewed as the gold standard
B. Bone Scanning is superior and should be viewed as the gold standard
C. PET and Bone scanning are complimentary in this clinical scenario
D. MRI is superior to both bone scanning and FDG PET
Bone Metastasis

- Bone metastasis are most common and occur in up to 70% of patients with metastatic disease.
- Bone scanning and FDG are complimentary.
- Evidence that bone scan is more sensitive to osteoblastic disease (more bone reaction).
- FDG is more sensitive to osteolytic disease (more aggressive and therefore higher cell metabolism).
- Both have role to play.
- Some have shown feasibility of combined FDG NaF (bone PET) scanning at same sitting.
Peggies Cove Nova Scotia
Case 2

52 year old palpable abnormality right breast

Axillary  CC
Case 2: PET/CT
Question 4

What is your interpretation of these images?

A. Breast Cancer
B. Benign findings
C. Need further imaging with MR
D. Would like to know pathology to evaluate
FDG PET in Breast Cancer Diagnosis

- No proven role in utilizing routine whole body PET/CT to diagnose cancer
- No organizations advocate
- Other imaging including mammography; ultrasound; MR considered first line evaluation tools
- Core biopsy for definitive pathology diagnosis
False Negative FDG PET

- pathology with low or no uptake
  - Lobular
  - Tubular
  - DCIS
  - Low grade
- necrosis
- Small anatomic size
- Technical
  - Eg blood glucose
False Positives

- Benign tumors
  - Ductal hyperplasia
  - Fibroadenoma
  - Fibrous dysplasia
- Fat Necrosis
- Infection
- Post surgical or other inflammation
Quebec City
Case 3

49 year old lady with prior history of breast cancer
Now ? New node on CT

Post radiation 4 months; elevated liver enzymes
Question 5
What is your interpretation of this final follow up scan?

Answer
A. Total response; clear of disease
B. Residual metastatic L axilla but clear liver
C. Residual diffuse metastatic disease
FDG PET for Treatment Response

- Most Studies have been in the neoadjuvant setting with reference to pathologic response at surgery
- Changes in uptake are a strong indicator of response by following serial SUV’s
- Can be performed as soon after as early as after the first cycles to help differentiate responding and not responding
- Can help avoid unnecessary chemotherapy and also identify advancing disease
- Still not a universally accepted indication
Toronto
Case 4

Question 6: What tracer do you think this is in lower image?

Answer
A. FDG
B. NaF
C. F-Choline
D. FES

Case Courtesy of Dr. Eric Turcotte
Sherebrooke, PQ, Canada
FES PET in Breast Cancer

- Approximately 2/3 of breast cancers are estrogen, progesterone or both dependent for growth
- Estrogen receptors are important for prognosis (indicate less aggressive tumor)
- Heterogeneity of receptor content within the same lesion as well as variations between primary and metastatic sites and can change over time
- FES shows promise as a noninvasive method to assess ER expression, response and changes
The Praries
Positioning similar to mammography

- In plain resolution less than 2 mm (Versus 5)
- Early evaluation demonstrates sensitivity of 87% and specificity 85%
- Sub 1 cm and DCIS 73%; 88%
- Roll yet to be defined but potential for high-risk patients and dense breasts
Question 7
Likely diagnosis?

Answer:
A. Bilateral Inflammatory Breast Carcinoma
B. Normal
C. Physiologic uptake
Thank you
References

- Ong LC, Jin Y, Song IC, et al. 2-[18F]-2-deoxy-D-glucose (FDG) uptake in human tumor cells is related to the expression of GLUT -1 and hexokinase II. Acta Radiol 2008;49:1145–53
- 18F]Fluorodeoxyglucose PET/Computed Tomography in Breast Cancer and Gynecologic Cancers A Literature Review Malene Grubbe Hildebrandt, MD, PhD, MSc (Clinical Epidemiology)a,*, Annette Raskov Kodahl, MDb, Dorte Teilmann-Jørgensen, MDC, Ole Mogensen, MDC, Pernille Tine Jensen, MD, PhDc PET Clin 10 (2015) 89–104