

Integration of Positron Emission Mammography (PEM) in a Clinical Breast Center

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Purpose:

Positron Emission Mammography (PEM) is the newest molecular imaging technology for breast cancer. It uses intravenous injectable fluoro-deoxyglucose (FDG), a glucose analog, which accumulates in glucose avid cells. This modality has shown promise in initial staging of breast cancer patients and for evaluating their response to therapy, recurrence and restaging at a much higher resolution than with Whole Body (WB) PET (Figure 1). Implementing this new technology into a large, busy mammography department requires considerable investment and planning. The purpose of this exhibit is to demonstrate how PEM can be seamlessly integrated into clinical practice.

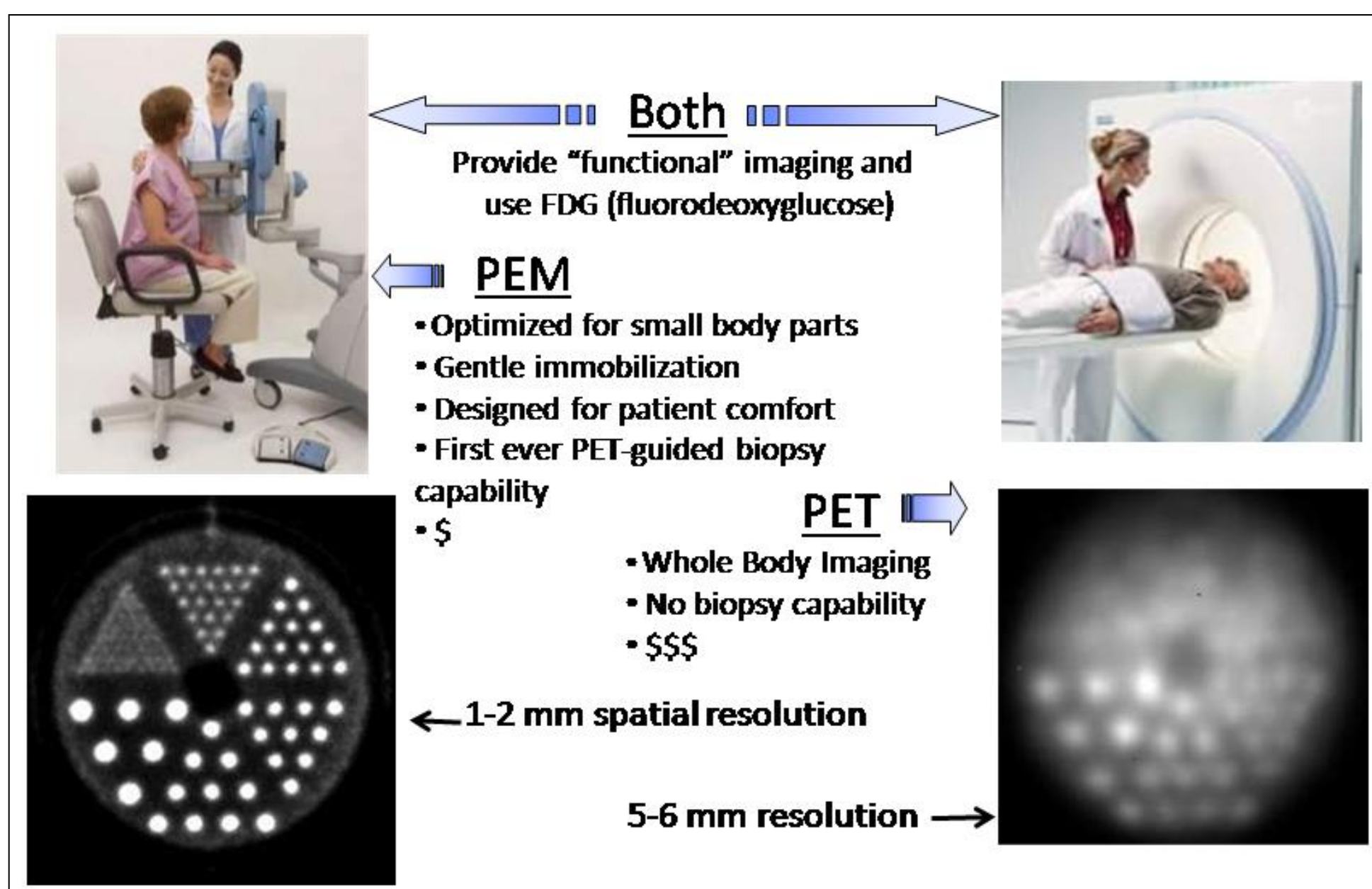


Figure 1: Comparison of PEM and WB PET

Integration:

Since both PEM and MRI are adjunct modalities used for similar indications, it is important to first identify which patients would benefit from PEM (Figure 2) and PEM versus MRI (Figure 3).

The steps required to integrate PEM into a clinical breast center are similar to those used when Breast MRI was introduced a decade ago. At that time, Breast MRI was a cross-over modality which brought together MRI and breast imagers as well as technologists from the two areas. Similarly, PEM also requires cooperation across disciplines. Our preliminary experience has been successful because we took the time to set up a primary team which includes a nuclear medicine technologist, a mammography technologist with experience in stereotactic procedures as well as a nurse and a radiologist.

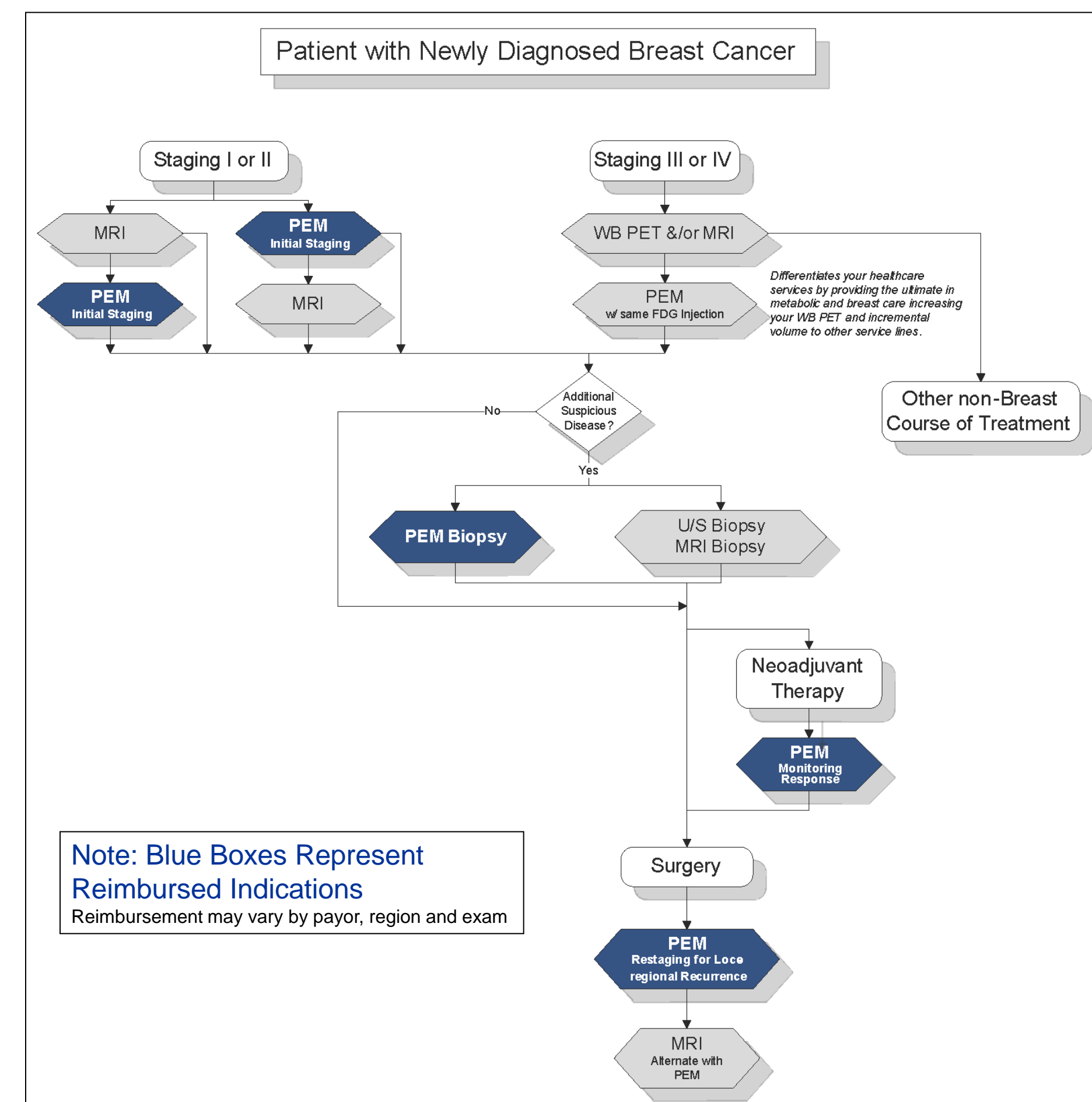


Figure 2: PEM Patient Algorithm for Newly Diagnosed Breast Cancer

PEM or Breast MRI?

At our facility, we have created referring physician guidelines for when to consider PEM rather than Breast MRI:

- Interpretation of findings is independent of menstrual cycle; pre-post-or perimenopausal changes affect ability to determine hormonal modulation of the breast. For younger patients, PEM is a better option because of hormonal changes.
- Patient is challenged to fit in other modalities; high body habitus or weight precludes MRI.
- Patient is claustrophobic.
- Patient is kyphotic (curvature in upper spine).
- Metal implants limit use in MRI.
- Patient has adverse gadolinium/contrast reaction.
- Patient has renal disease.

	MRI	PEM
RENAL – POOR GFR		(+)
CLAUSTROPHOBIA		(+)
MENSTRUAL CYCLE		(+)
MORE SPECIFIC		(+)
RESPONSE TO CHEMO		(+)?
SENSITIVITY	(+)	(+)
BIOPSY CAPABLE	(+)	(+)
BREAST IMPLANTS	(+)	(+)
SURVEILLANCE CA PTS		
LOWER KI-67	(+)	
FAT NECROSIS	(+)	
RADIATION EXPOSURE	(+)	
ASSESS CHEST WALL	(+)	
HIGH RISK (NON CA) SCREENING	(+)	

Figure 3: Referring Physician Guidelines for Deployment of PEM and Breast MRI

Reimbursement:

Medicare covers PEM for the following cancer indications:

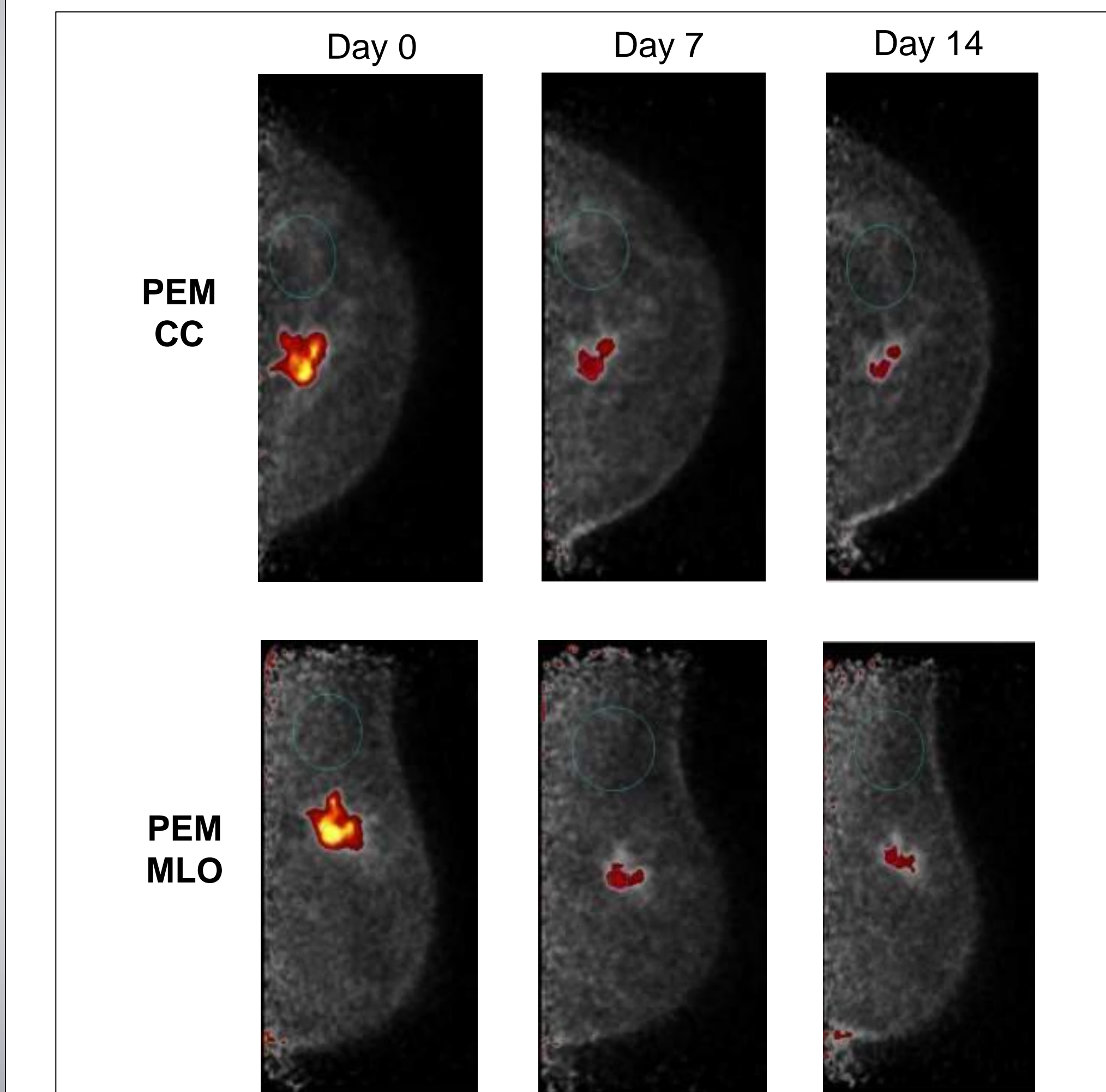
- **Staging** patients preoperatively
 - PEM or WB PET - cannot bill for both if done on the same day
 - Can be reimbursed for both MRI and PEM
- **Restaging** patients with loco-regional recurrence.
- **Monitoring** response to treatment (Figure 5)
- Average reimbursement at our facility:
 - PEM Uni- or Bilateral: **\$1,890.00 technical**
\$ 133.16 professional
 - PEM-Guided Biopsy: **\$7,175.00 technical**
\$ 432.12 professional.
 - Bill third party payors using the CPT codes in Figure 4:

CPT Code	Description	Procedure
78811	Limited PET Scan	PEM Uni- or Bilateral
78999	Nuclear Medicine Guided Procedure	PEM-Guided Biopsy
19103	Vacuum-Assisted Breast Biopsy	PEM-Guided Biopsy

Figure 4: CPT Codes for PEM and PEM-Guided Biopsy

Clinical Cases:

To date, we have performed PEM scans on 51 patients and done PEM-guided biopsies on 10 at our facility. We are also conducting a clinical trial on PEM for Response to Neoadjuvant Chemotherapy.



PEM Findings: PEM imaging performed after 1st cycle of chemotherapy (Taxotere, Carboplatin, Herceptin and Neulasta) at day 0, 7, and 14.

PEM shows significant reduction in lesion size two weeks following start of therapy indicating partial response to therapy.

Figure 5: PEM Measuring Response to Neoadjuvant Chemotherapy

Conclusions:

In our clinical experience with PEM as well as in going research, it has shown promise in the diagnostic algorithm in breast imaging.