PS1-06-16: FES PET/CT Imaging in Estrogen Receptor-Positive Breast Cancer: Implications for Clinical Management

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Background

- ^{18}F-Fluoroestradiol (FES) is a synthetic estrogen analog labeled with the positron-emitting radioactive isotope fluorine-18.[1]
- FES binds to estrogen receptors (ERs) in tissues, allowing the localization of ER+ tumors via positron emission tomography (PET).[1]
- In contrast, ^{18}F-Fluorodeoxyglucose (FDG) PET utilizes the uptake of glucose into cancer cells for tracer accumulation.
- FES-PET is approved as an adjunct to biopsy in patients with recurrent or metastatic breast cancer, and recent updates to the National Comprehensive Cancer Network clinical practice guidelines include FES PET/CT for staging recurrent or metastatic invasive lobular carcinoma (ILC).[2]
- We reviewed the management of ER+ breast cancer patients after FES PET/CT at Mayo Clinic to study the clinical utility and changes in management associated with the utilization of this imaging modality.

Methods

- We identified 166 patients who underwent at least one FES-PET scan across all Mayo Clinic sites from April 2021 to June 2025. (**Table 1**)
- Management changes after FES PET/CT were categorized as affecting breast cancer (BC) or non-BC care, in a non-mutually exclusive manner.
- For patients who also underwent FDG PET/CT and had a discrepant result with FES PET/CT, we assessed the cause and impact of these discrepancies.
- We examined the change in clinical management when FES PET/CT was ordered to investigate the rising tumor marker CA 15-3.

Demographics	
Median age (range), yr	56 (24-85)
Female	99%
White	86%
Black	5%
American Indian	1%
Histology at Diagnosis	
Invasive Ductal Carcinoma	33%
Invasive Lobular Carcinoma	57%
Mixed	5%
ER High (76-100%)	79%
PR High (76-100%)	48%
HER2 Positive	1%

AJCC 8ed Prognostic Stage at Diagnosis	
I	34.9%
II	17.5%
III	13.9%
IV	15.1%
Unknown	18.7%
FES-PET Clinical Context	
Initial Staging	45.2%
Local Recurrence	11.4%
Metastatic	43%
FES PET/CT Scans Per Patient	
1	75.9%
≥2	24.1%

Table 1. Demographics, breast cancer histology, prognostic stage, FES PET/CT clinical context, and number of FES PET/CT scans per patient.

Management Changes After FES PET/CT

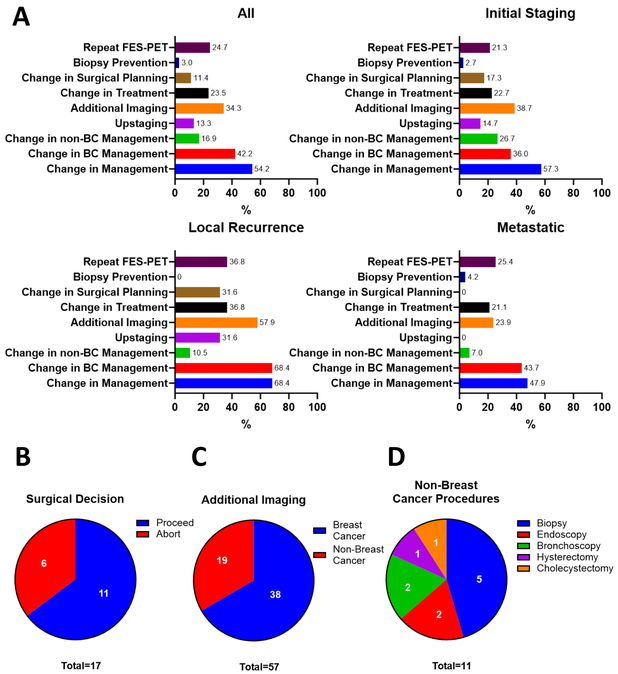


Figure 1. BC and non-BC management changes after FES PET/CT in different clinical contexts. A- Frequency of change in clinical management after FES PET/CT by clinical context with subcategories (non-mutually exclusive) of types of management changes. **B**- Changes in surgical planning for initial staging and local recurrence breast cancer patients after FES PET/CT. **C**- Categories of additional dedicated imaging obtained after FES PET/CT. **D**- Non-breast cancer related procedures obtained after FES PET/CT.

FDG/FES PET/CT Discordance

FDG-/FES+ (n=19)

Clinical Outcomes	
Upstaging	9 (47.4%)
Serial FES-PET Restaging	13 (68.4%)

FDG+/FES- (n=18)

Clinical Outcomes	
Downstaging	10 (55.6%)
Proceeding with curative intent surgery	6 (33.3%)
Avoidance of endocrine therapy	2 (11.%)

Table 2. Clinical impact of FDG/FES PET/CT discordance.

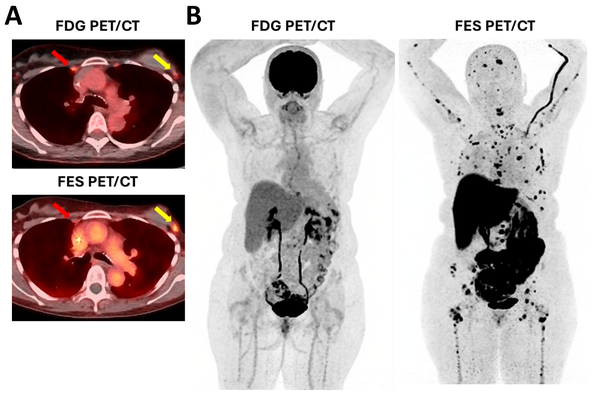


Figure 2. Two cases of FDG/FES Discordance. A- Staging FDG PET/CT for a left breast carcinoma (yellow arrow) showed a contralateral FDG avid mediastinal lymph node (red arrow) that was negative on FES PET/CT, downstaging and leading to curative-intent surgery. B- Staging FES PET/CT revealed osseous metastases not present on prior FDG PET/CT..

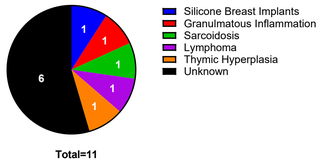


Figure 3. Attributions for false positive FDG-PET scans.

FES PET/CT For Rising CA 15-3 Tumor Marker

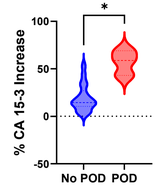


Figure 4. FES PET/CT for rising CA 15-3. 21 FES PET/CT scans were ordered for rising CA 15-3 levels. 6 patients (28.6%) had metastatic disease at time of scan. 3/21 (14.3%) had upstaging/progression (POD) identified on FES PET/CT. Mean % increase in 15-3 from previous measurement was 19.0% in the No POD group versus 57.0% in the POD group. * p = 0.02 by two-tailed Student's t-test with Welch's correction.

Discussion

- This multi-site, single-institution retrospective study provides the most in depth analysis, to our knowledge, of the clinical utility of FES PET/CT across different contexts of ER+ breast cancer treatment.
- FES PET/CT altered clinical management in 54% of BC cases, with the highest rate of BC management changes in the setting of local recurrence, followed by metastatic disease and initial staging.
- FES PET/CT was also associated with non-BC management changes including additional imaging and invasive procedures to investigate incidental findings, with the highest rate when utilized for initial staging.
- FES PET/CT helped downstage multiple patients with FDG+ foci that were attributed to false positive FDG avidity.
- FES PET/CT also led to upstaging and avoidance of futile surgeries in a fraction of patients, including some who had prior negative FDG PET/CTs.
- FES PET/CT was rarely helpful when employed for rising CA 15-3 levels, though higher increases were associated with positive FES PET/CT scans.
- Limitations of this study include the single-institution patient population and small numbers in certain patient subgroups.

Conclusions

- FES PET/CT imaging can contribute meaningfully to the care of ER high-expressing breast cancer across multiple treatment contexts .
- Clinicians should be familiar with strengths and limitations of both FES PET/CT and FDG PET/CT imaging, and should be aware of the potential implications of FDG/FES discordancy.
- FES PET/CT should not be routinely ordered for small increases in CA 15-3.
- Further research on FES PET/CT imaging is merited to more fully delineate specific scenarios of significant clinical benefit.

Please visit PD9-09 for a companion poster focusing specifically on FES-PET in patients with ILC.

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References

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2. National Comprehensive Cancer Network Clinical Practice Guidelines in Oncology: Breast Cancer Version 5.2025 – October 16, 2025. Available at <https://www.nccn.org/professionals/physician_gls/pdf/breast.pdf>

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