

## FDG-PET/CT is accurate in diagnosing breast cancer recurrence

### recurrence

A woman with a substantial risk of breast cancer recurrence experiences worry and anxiety, and a correct diagnosis is relevant in order to make well-founded decision on treatment strategy. It is then crucial to provide accurate diagnostic work-up in such patients with suspected recurrent disease.

Although current guidelines do not recommend imaging other than mammography after primary treatment of breast cancer, diagnostic work-up is recommended when clinically indicated. There have been no clear recommendations about which imaging procedure is best for detecting recurrence.

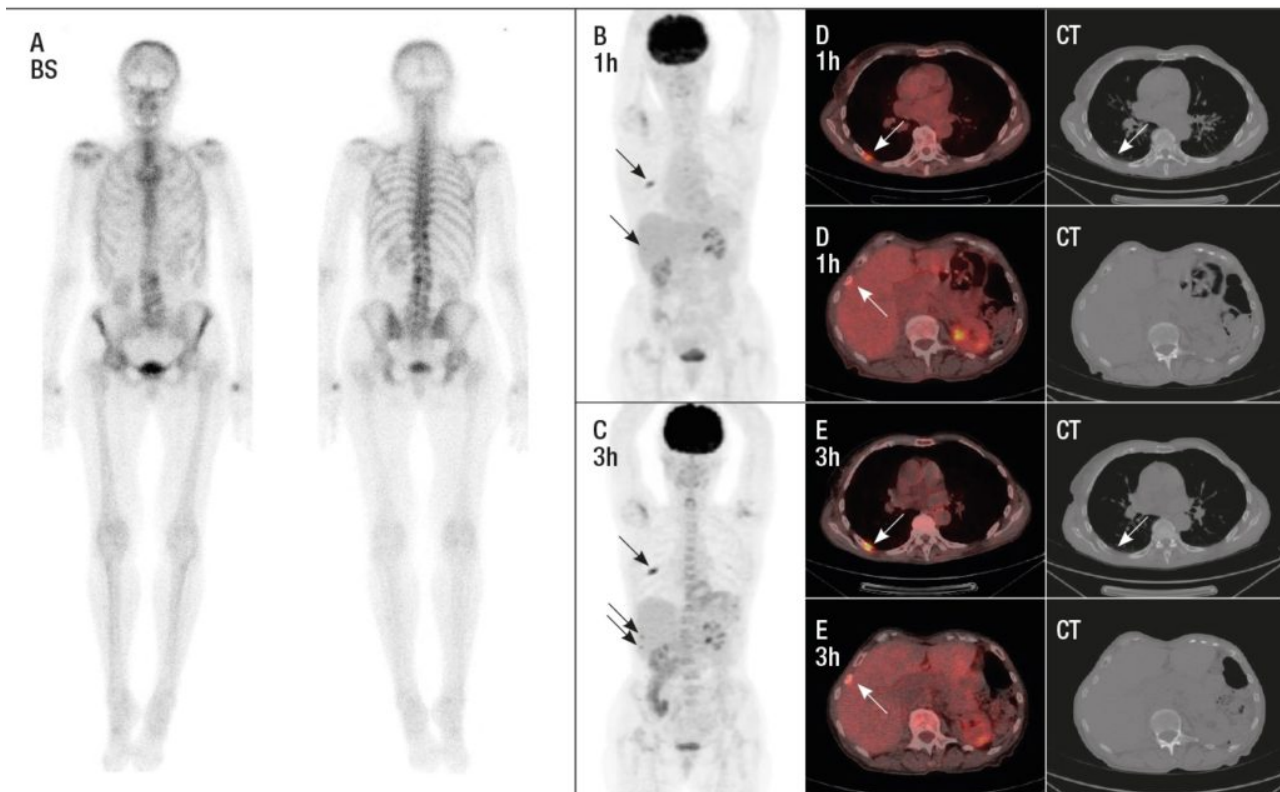


Fig. 1. A patient with verified bone metastases detected by FDG-PET/CT only. The arrows show lesions in the ribs diagnosed as bone recurrence on FDG-PET/CT. The bone scintigraphy (BS) and CT were both false negative. The patient was confirmed to have bone metastases on follow-up with further imaging that showed progression of bone metastases. (A) BS in anterior and posterior projection. FDG-PET/CT at (B) 1 hour (1h) and (C) 3 hours (3h) after FDG injection. Transaxial images of at (D) 1 hour after injection, (E) 3 hours after injection, and low-dose CT scans.

Conventional diagnostic work-up often includes combined imaging procedures, but a modern stand-alone-procedure may provide more accurate diagnostic information. BS (bone scintigraphy) and CT (computed tomography) are conventional procedures, and FDG-PET/CT is a modern imaging procedure that stands for 18F-fluorodeoxyglucose-positron emission tomography/computed tomography. FDG-PET/CT is a functional imaging procedure that uses radioactively labeled sugar molecules to detect cancer.

We performed a diagnostic study of 100 patients with suspected recurrent breast cancer. FDG-PET/CT was compared to conventional work-up procedures. A comparison was also made for FDG-PET/CT between imaging at one hour and three hours after injection of the radioactive sugar, FDG. Biopsy and clinical follow-up determined whether patients had recurrence or not.

Of 100 women, 22 endured distant recurrence, 19 had local recurrence only, and 59 women experienced no recurrence.

When we obtained a negative test result on FDG-PET/CT, we were able to rule out distant recurrence, since all patients with distant recurrence were detected by FDG-PET/CT. In comparison conventional work-up overlooked distant recurrence in two patients. An example of a patient with bone recurrence who had false negative test results on conventional work-up has been shown in Figure 1.

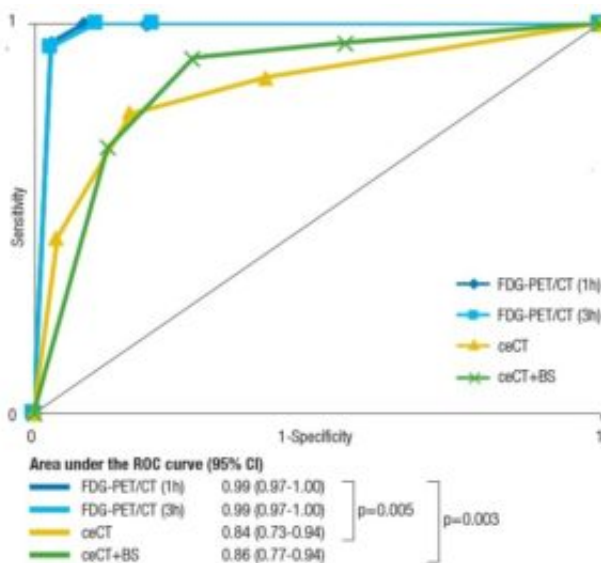


Fig. 2. Receiver operating characteristic (ROC) curves and area under the ROC curve (AUC-ROC) for imaging modalities in the diagnosis of distant recurrence (n = 100).

The diagnostic accuracy of a test can be estimated by the area under the ROC curve; hence a perfectly accurate test is running in the upper left corner. The figure shows that FDG-PET/CT very accurately confirms and excludes distant recurrence, and that FDG-PET/CT does this significantly better than the other modalities. The two blue curves have almost identical patterns meaning that

one hour and three hour imaging of FDG-PET/CT express no difference in diagnostic accuracy.

Seven women were falsely diagnosed with disease recurrence by FDG-PET/CT. In contrast conventional work-up resulted in 22 patients with false positive test results; these were mainly caused by false positive liver lesions on the CT scan and false positive bone lesions on the BS.

FDG-PET/CT proved to be significantly more accurate in diagnosing distant recurrence than conventional work-up as illustrated by AUC-ROC curves in Figure 2. Surprisingly, however, one hour and three hour imaging results of FDG-PET/CT were almost identical.

We conclude that FDG-PET/CT did well in diagnosing breast cancer recurrence and better than conventional work-up. Since FDG-PET/CT serves as a stand-alone-procedure, it may also be advantageous to conventional work-up that requires more than one procedure.

Our study was carried out in a single institution with experience in performing PET since 2006, and caution should be made when generalizing from our results. A synthesis of results from proper diagnostic studies along with economic and organizational assessments is needed before generalized conclusions should be drawn. Furthermore, the patients' perspective on implementing FDG-PET/CT should also be taken into account.

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## **Publication**

[\[18F\]Fluorodeoxyglucose \(FDG\)-Positron Emission Tomography \(PET\)/Computed Tomography \(CT\) in Suspected Recurrent Breast Cancer: A Prospective Comparative Study of Dual-Time-Point FDG-PET/CT, Contrast-Enhanced CT, and Bone Scintigraphy.](#)

Hildebrandt MG, Gerke O, Baun C, Falch K, Hansen JA, Farahani ZA, Petersen H, Larsen LB, Duvnjak S, Buskevica I, Bektas S, Søe K, Jylling AM, Ewertz M, Alavi A, Høilund-Carlsen PF  
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