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First results of molecular imaging (FDG and FES) in prospective study for selecting second line hormonotherapy in estrogen receptors positive metastatic breast cancer patients

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Aim/Introduction: About 70% of primitive breast cancers had positive estrogen receptors (ER) and may benefit from hormonotherapy. However, ER expression in breast cancer metastases is heterogeneous and about 15% of metastases lost this expression over time. Biopsies were not possible systematically. $^{16}\alpha$ - 18 Fluoro- $^{17}\beta$ -Oestradiol (18 FES) is a radiopharmaceutical which predict the response to the first line hormonotherapy. The aim of this prospective study (NCT03442504) was to determine the predictive value of PET at the patient level, before a second line hormonotherapy (2nd-HT) on the FDG response obtained at 6 weeks of treatment.

Materials and Methods: We prospectively included 12 ER+ metastatic breast cancer patients, HER2 negative, in progression despite first line hormonotherapy. For the complete study, 60 patients will be included. Due to 2nd-HT proposed by oncologist, we performed 18 FES PET-CT (18 FES-BL) and 18 FDG PET-CT (18 FDG-BL) at baseline in the month before the new treatment introduction. Follow-up with 18 FDG PET-CT and CT

were performed to detect treatment response, particularly with a first FDG PET-CT at 6 weeks (^{18}F FDG-6W). Semi-quantitative data were extracted from ^{18}F FES-BL, ^{18}F FDG-BL and ^{18}F FDG-6W, and compared to the progression free survival (PFS) during the 2nd-HT treatment, among which SUVmax and adapted thresholded Total Tumour Volume (TTV). **Results:** At breast cancer diagnosis, 6 patients (50%) had lymph node metastases and 5 (41,6%) had visceral metastases. After first line hormonotherapy, only one patient had no positive FES (FES+) lesion while more than 40 FDG positive (FDG+) lesions were detected. Eleven patients (91,6%) had between 3 and more than 40 FES+ lesions. Three patients (25%) had more FES+ lesions than FDG+ lesions, 4 patients (33,3%) had more FDG+ lesions than FES+ and 5 patients (41,7%) had as many FES+ lesions as FDG+. Despite the 2nd-HT started, no significant result was found for the semi-quantitative data outside a likely poor prognosis of ^{18}F FDG-BL TTV ($p=0.079$). We noted a trend for a better PFS when the ^{18}F FES-BL TTV was greater or equal to the ^{18}F FDG-BL TTV. Comparing ^{18}F FDG-BL and ^{18}F FDG-6W, a ^{18}F FDG-BL TTV greater or equal to the ^{18}F FES-BL TTV seemed predict the stability or progression of the ^{18}F FDG-6W TTV. **Conclusion:** ^{18}F FES PET-CT seemed to be interesting for the 2nd-HT response prediction. These results must be confirmed with the the following study patients. **References:** None.