Radiolabelled Trastuzumab Fab as a theranostic molecule for HER2 positive breast cancers
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Introduction
In breast cancer patients, the assessment of HER2 receptor and their targeted treatment plays a significant role. Nowadays, molecular imaging is an emerging field for the detection of HER2 expression in-vivo. The HER2 receptor targeting molecular imaging is turning out as an alternative of biopsy, owing to its undue advantages such as: non-invasive, not painful for the patients, and better selection for HER2 receptor targeted therapy. The aim of study is to develop the radiolabelled trastuzumab (TZM) Fab and compare it with whole mAb TZM using the in-vitro and in-vivo experiments.

Methods
1. TZM-Fab was produced by papain digestion of mAb trastuzumab
2. After purification, TZM-Fab was characterized by SDS-PAGE and MALDI-TOF apparatus
3. TZM and TZM-Fab were conjugated with bifunctional chelating molecule (p-SCN bn-DTPA)
4. Radiolabelling were standardized with 68Ga and 177Lu radionuclides
5. After purification of 68Ga/177Lu TZM-Fab-DTPA, the HER2 receptor target efficacy were determined by Radio-immuno assay and bio-layer interferometry technique (BLI)
6. The quality control performed were: sterility, pyrogenicity test, stability in human serum as well as in PBS
7. The radiolabelled TZM-Fab-DTPA was then subjected to molecular imaging in histopathological proven HER2 breast carcinoma patients and compared with F18-FDG PET/CT imaging

Results

Conclusion
Our Results demonstrate that both TZM and TZM-Fab have target specificity to HER2 receptor in-vitro as well as in-vivo
The 68Ga-TZM-Fab-DTPA as well as 177Lu-TZM-Fab-DTPA can be use as a promising tool in molecular imaging for diagnosis of HER2 receptor expression in breast cancer patients