

**Purpose:** Breast expanders are made of silicone elastomere filled with silicone gel or saline that is electively used for cosmetic purposes in conservative breast surgery. Some expanders may contain a steel port embedded for saline injection (metallic breast expander, MBE). Electron beams are used for radiation treatment due to sharp dose fall off and limited range to minimize dose to underlying structures like lung and heart. However the presence of MBE produces dose perturbation which is investigated in this study.

**Materials & Methods:** An MBE was acquired from the manufacturer (Mentor, Santa Barbara, CA) for the electron dose distribution study. A small water phantom with the MBE mounted at a depth of 2 cm was scanned on a GE CT simulator with a slice thickness of 2.5 mm and the CT dataset was sent to an Eclipse treatment planning system (TPS) with Monte Carlo (EMC) algorithm. Electron beams of 9-22 MeV were used in this study from a Varian accelerator. Measurements were performed and compared with calculations.

**Results:** The measured dose has pronounced backscatter (5%) at the entrance and significant dose reduction up to 70% on the exit side of the MBE respectively. On the other hand, Monte Carlo calculation did not show backscatter and the magnitude of the dose reduction was limited to only 30%. The differences between measured and TPS is energy dependent that varied between -140% to -80% for 9MeV-22MeV beam.

**Conclusions:** The dose perturbation in the presence of MBE is significant and cannot be predicted accurately by EMC. The differences could be due to CT-electron density calibration and probably poor modeling of the MC for high-Z materials. Based on these finding, it could be concluded that high-Z materials in electron beam should be avoided or measured data should be incorporated in the TPS for actual dose.