

Comparison of Breast radiation dose for Digital Breast Tomosynthesis Estimated according Compressed Breast Thickness by Using Breast Phantoms

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Purpose

To compare the surface radiation dose (ESD) and Average Glandular Dose (AGD) of digital breast tomosynthesis (DBT) examination according compressed breast thickness by using breast phantoms.

Methods

Because of mammary glands have relatively high radiation sensitivity, that breast dose evaluation for mammography was using entrance surface dose (ESD) and average glandular dose (AGD).

Many studies were proven that radiation dose from DBT was higher than that of Digital mammography.

The DBT system determines target material, filtration and tube voltage by compressed breast thickness and adjusts to exposure output (mAs) using an automatic exposure control (AEC) system to obtain appropriate image density in clinical practice. An automatic exposure control (AEC) is proposed for ESD and AGD measurements during DBT exposure.

AGD and ESD were estimated using breast phantom thickness categories: 22mm, 32 mm, 45mm and 55mm in clinical practice.

Results

On DBT examination of 55mm breast phantom, the mean ESD and AGD were 6.37 mGy and 1.95 mGy, respectively. The mean ESD and AGD values for DBT in 45mm were 4.32 mGy and 1.43mGy. The mean ESD and AGD values for DBT in 32mm were 2.72 mGy and 1.08 mGy. The mean ESD and AGD values for DBT in 22mm were 1.92 mGy and 0.91 mGy. The ESD was 2-3 times higher compared with the AGD.

Conclusions

In DBT examination, The ESD and AGD were descending as breast phantom thickness decreases. This study suggests that it is useful for the quality control in DBT examination to mention values of ESD for each breast thickness as well as AGD.

