

Purpose: This study's aim was to develop an easily reproducible clinical protocol to predict the average glandular dose (AGD) delivered to patients during routine mammography screening. It incorporates an evaluation of patient specific features, including glandularity, to predict the clinically delivered dose for both the cranio-caudal (CC) and the medio-lateral oblique (MLO) views.

Method and Materials: The development of a modified homogenous dosimetric breast tissue equivalent phantom series (BRTES-MOD) based on anthropomorphic measurements of the screening mammography population is central in evaluating the patient's fibroglandular content. It has been constructed with reference to the breast tissue elemental composition tabulated in the International Commission on Radiation Units and Measurements - Report 44, and simulates the compression and variable content of patient's tissue characteristics. This study calculates the average glandular dose using entrance skin exposure and dose conversion factors based on fibroglandular content, compressed breast thickness, volumetric and anatomical factors, mammographic unit parameters and modifiable parameters of the BRTES-MOD phantom.

Results: Dose conversion factors were successfully calculated from the patient's fibroglandular content, compressed thickness, unit parameters, and spectral half value layer. An anthropometric population study facilitated the derivation of clinically usable equations to determine patient whole breast area, estimate patient skin layer thickness, and assess optimal placement for the automatic exposure control ionization chamber location. Dose distributions for the study population are presented for both CC and MLO views and compare well with those derived from previous population studies.

Conclusion: The designed protocol can be performed within the time of a typical mammography screening appointment, and allows the determination of patient-specific average glandular dose. The BRTES-MOD method also provides a quantitative measure of patient specific AGD for the multiple projections comprising screening mammography examinations.

Conflict of Interest (only if applicable):