abstract

Assessment of Average Glandular Dose Determinants and Breast-Thickness–Specific DRLs in Digital Breast Tomosynthesis

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Introduction: This study aims to quantify how exposure/technical parameters influence average glandular dose (AGD) in digital breast tomosynthesis (DBT) across cranio-caudal (CC) and mediolateral oblique (MLO) views for screening and diagnostic mammography, and to establish local diagnostic reference levels (DRLs) stratified by compressed breast thickness (CBT).

Methodology: This is a single-centre retrospective study at SQCCCRC, Muscat, Oman, including 549 patients and 1,618 projections (Jan 2024–Feb 2025). The examinations were divided into eight categories based on compressed breast thickness (CBT), ranging from 20 to 109 mm. Variables recorded included compressed breast thickness (CBT), compression force (CF), tube voltage (kVp), tube load (mAs), entrance skin dose (ESD), and average glandular dose (AGD). Associations were assessed with Spearman tests. Group comparisons between CC and MLO views, as well as between screening and diagnostic groups, were conducted using the Mann–Whitney U test. DRLs were derived per CBT groups and views.

Results: CBT showed strong positive correlations with kVp, mAs, and AGD (all $p < 0.005$), confirming higher dose requirements with increasing thickness. MLO views had consistently higher kVp, mAs, ESD, and AGD than CC (all $p < 0.05$), reflecting larger effective tissue volume and oblique compression. Screening examinations exhibited higher doses than diagnostic studies due to higher mean CBT in the screening cohort. DRLs increased progressively with CBT. Local DRLs were relatively higher compared to regional reports from Malaysia, Greece, and the UAE, and a previous dataset from Oman. However, they stayed within international reference limits for CBT ranges, except for the 20–29 mm range, which slightly exceeded the benchmark values.

Coclusion: CBT is the primary factor influencing the average glandular dose in digital breast tomosyn-

thesis. While DRLs established here fall within international standards, their relative elevation highlights the need for further protocol and system optimization.