

Entrance surface dose measurement and lifetime attribute risk analysis from postero-anterior chest x-ray imaging via direct and indirect measurement

ABSTRACT

This study aimed to estimate the entrance surface dose (ESD) of routine chest X-ray (CXR) examination and to compare the direct and indirect measurement. The work also extended to relate with the patients body thickness and the lifetime attributable risk of the examinations. A total of 101 CXR examinations in posteroanterior (PA) projections are selected as subjects and recorded the data, such as scanning acquisition parameter and patient habitus. The mean ESD value obtained from the TLD-100 and the software calculation was 0.31 mGy and 0.17 mGy, respectively. The percentage deviation obtained ranged from 25.5% to 61.3%. In comparison with the national diagnostic reference level, 0.90 mGy (MOH), the mean values of ESD obtained from this study were lower. Furthermore, it was observed that the mean absorbed dose of the adrenals, kidneys, lungs, oesophagus, and heart walls were lower as compared to the ESD value. The examinations were only associated with very low risk of cancer incidence and mortality. The results of this study also suggested a need for standardizations of the personnel training to perform X-ray examinations according to ALARA principles.

Keyword: Chest X-ray examinations; Entrance surface dose; TLD-100; Radiation risk