

FACTORS INFLUENCING THE RESULTS FROM BREAST DOSIMETRY ON PATIENTS AND STANDARD PHANTOM

J. Vassileva, S. Avramova-Cholakova, R. Borisova, I. Atanasova
National Centre of Radiobiology and Radiation Protection, Sofia, Bulgaria

This study is aimed to develop a national protocol for dosimetry in mammography. The European Protocol recommends the measurement of entrance surface air kerma (ESAK) without backscatter on patients or a standard phantom and the subsequent calculation of average glandular dose (AGD) by means of conversion coefficients. The results from phantom and patient dose study are compared and sources of uncertainty influencing the dose results are investigated. The patient study was performed in two stages – first, exposure settings and data for the compressed breast thickness were recorded for 120 patients for cranio-caudal and medio-lateral views with three clinical mammography systems – two screen-film and one CR system. Breast thickness was found to vary between 2 and 8.5 cm with average value of 4.5 cm. The ESAK for each patient was calculated from the exposure parameters and from the tube output measured with calibrated ionization chamber free in air. The phantom study included three methods for ESAK measurement on PMMA phantom with thickness between 2 and 6 cm – direct measurement with solid state detector placed on the phantom in the reference point; calculation from the tube loading and tube output measured free in air with mammography ionization chamber, and direct measurement by TLD. Optical density was taken into account. The influence of detector energy dependence as well as the backscatter both from the table and the compression paddle was explored. The conclusion was that at ESAK measurements with phantom the compression plate should be in close contact to simulate realistically the clinical situation. HVL measurements were performed with ion chamber and with semiconductor detector. It was found that whenever solid state detector is used the HVL value the energy dependence correction should be applied; otherwise the HVL would be overestimated up to 17%. Difference was found between the mean dose measured on patients and that with a standard phantom. The reasons are under estimation and will be also presented. The effect of discussed factors on AGD will also be commented.

E-mail presenting author:

j.vassileva@abv.bg