Abstract

Cardiological multidetector computed tomography studies (cardiac MDCT) allow heart imaging and diagnosis of coronary desease, but they are associated with higher doses compared to chest scans. Therefore, it is necessary to have an *in vivo* dosimetry system. This system must not alter nor interfere with image quality.

Optically stimulated luminescent dosimeters OSLD nanoDot were used. This dosimeters were characterized in the tomography dose and energy range for measuring surface dose ($\overline{DS}$) on the chest. Tests were carried out on anthropomorphic CIRS phantom for the evaluation of surface dose distribution, dose estimation in chest organs and the detector's dependence on beam quality changes. Measurements were acquired in 30 cardiac MDCT patients and compared with 10 conventional chest tomography patients, using three detectors per patient.

The *in vivo* dosimetry system with OSLD nanoDot makes it possible to measure surface dose with an uncertainty of $\pm 5.0\,\%$ at $95\,\%$ confidence level. Detector response was linear with dose from 20 to 200 mGy at 80, 100 and 120 kVp beams. OSLD nanoDot detectors overestimate dose by $12\,\%$ due to spectral changes introduced by the patient's presence regarding calibration in terms of free air kerma. Dispersion from three surface dose measurements was $7.8\,\%$. $\overline{DS}$ range was 34.10 mGy to 101.44 mGy averaging 67.31 mGy, being three times higher than the dose average in chest tomography. Factors were determined to estimate dose in chest organs with respect to $\overline{DS}$: esophagus $-1\,\%$, heart $+8\,\%$ and lung $-10\,\%$.

OSLD nanoDot detectors have the neccesary characteristics to perform *in vivo* dosimetry in cardiac MDCT, allowing quality control and practice optimization.

Key words: OSLD nanoDot, calibration, cardiac tomography, surface dose.