

The Effectiveness of Thermoluminescent Crystals for calculation of required barrier against radiation at the diagnostic x-ray units

Concerning the importance of radiography techniques for diagnosis of disease and considering daily application and emerging new techniques in radiography from one hand and potential misuse of radiation and exposure to patients and personnel from other, it seems necessary the measure the amount of received radiation in current radiography procedures. The aim of this research is to determine the surface dose to patients in chest and skull radiography procedures in the hospitals of Mazandaran medical science university and compare those to given standards for such examinations from national and international recommendations.

The study was based on the procedures, performed at six x-ray machines in six hospitals of the medical science university. Totally 120 patients with normal BMI, undergoing prescribed chest and skull examinations were involved. The exposure parameters, such as kVp –mAs product, film-screen combination and overall procedure setup at the all 6 x-ray machines were similar, thus provided unbiased evaluation of the surface dose. Surface dose was measured, using LiF thermoluminescent dosimeters (TLD). TLD after calibration was attached to the back and front skin surface of patients and after exposure TLD5 radiance was read with TLD reader.

The average surface dose, measured for patients undergoing examinations of posterior –anterior view for pectoral, profile view for chest and posterior –anterior or anterior –posterior view of skull and profile view of s

Summary (Additional text describing your work. Can be pasted here or give an URL to a PDF document):

Background and purpose: Regarding the importance of radiographic techniques in diagnosis and increasing use of them and development of new techniques from one side, and inappropriate administration of these methods and patient and personnel exposure to undesirable effects of radiation from the other side, it seems that measurement of exposure dose in routine radiographic examinations and presentation of essential information and guidance are necessary. The aim of this research is to determine the entrance surface dose of patients in radiographic techniques of chest and skull and to compare it with standards for these examinations established by national and international organizations.

Materials and Methods: In this cross sectional study, six X-ray generators in six hospitals of Mazandaran University of medical sciences were included. A total of 120 patients referring to radiology wards for radiographic examinations of chest and skull with normal BMI were chosen. (20 patients for each radiography unit). In addition, the six generators were matched for mAs, kvp, the type of amplifier sheets, and technical conditions as much as possible so that the amount of surface dose would not depend on the mentioned items. We used thermo luminescence dosimeters in order to measure the surface dose (LiF-100). Thermo luminescence dosimeters (TLD) were placed on patients' back and skin after calibration and the results were read by TLD readers after radiation.

Results: The results of measuring surface skin dose were 0.51 m Gray for PA CXR, 3.36 m Gray for LAT CXR, 7.25 m Gray for AP or PA skull X-rays, and 7.59 m Gray for LAT skull X-rays. These results were higher comparing to established standards.

Conclusion: The results showed that to reduce the patients' surface dose, in addition to improve the conditions of radiographic units, there must be some educational courses. We can reach much more desirable results by continuous supervision and study on promotion of technical knowledge and protection and observance of radiation protection recommendations.

Keywords: Radiology standards, Dosimetry, Radiography, TLD.

Primary author: Mr RAHIMI, seyed ALI (Mazandaran University of Medical Sciences)

Presenter: Mr RAHIMI, seyed ALI (Mazandaran University of Medical Sciences)