

RADIATION DOSE REDUCTION IN X-RAY-BASED IMAGING TECHNIQUES USED IN OSTEOPOROSIS

Malinko A.V., student, Antonyk V.S., professor, doctor of tech. sciences
National Technical University of Ukraine
«Kyiv Polytechnic Institute»

Osteoporosis is a systemic disorder of the skeleton that is characterised by a reduction in bone mass and deterioration of bone micro-architecture. The importance of osteoporosis lies in the fact that osteoporotic bones are more fragile and susceptible to fracture than normal bones.

A wide variety of methods for the non-invasive assessment of skeletal status have been developed, most of which are based on the use of ionising radiation. Although the ionising radiation doses incurred during X-ray-based imaging techniques used in osteoporosis are relatively low, the use of radiological methods for the assessment of bone status has increased rapidly, and therefore merits attention with regard to radiation protection.

Spinal radiography is the most widely used imaging method for identification of vertebral fractures. Vertebral fractures on radiographs are not always reported and remain under-diagnosed radiologically with false negative rates up to 45%. The assessment of vertebral fractures is possible using visual, morphometric and semiquantitative methods. The method for identification of vertebral fractures using computational techniques has also been applied to spine images acquired by dual-energy X-ray absorptiometry. Vertebral fracture assessment developed by dual-energy X-ray absorptiometry manufacturers provides information on the vertebral body heights and their ratios and the patient's fracture status is given. Using quantitative computed tomography, bone mineral density measurements can be obtained in central and peripheral skeletal sites. Examinations are performed using an application-specific software package and a dedicated bone-equivalent calibration phantom imaged simultaneously with the patient to convert the computed tomography numbers into bone-equivalent values.

Literature

1. John Damilakis, Judith E. Adams, Giuseppe Guglielmi, and Thomas M. Link. Radiation exposure in X-ray-based imaging techniques used in osteoporosis // PubMedCentral-2010. - V.20. - №11. - P.2707-2714.