

CHIROPRACTIC DR, COMPUTED RADIOGRAPHY, FLAT PANEL DIGITAL X-RAY BLOG, MEDICAL DR DETECTORS, ORTHOPEDIC DR, PODIATRY DR, VET DR

Radiation Dose Levels between CR, DR and Film Screen

by Ryan Everhart



X-ray imaging is a diagnostic procedure that is known to expose patients to a certain amount of radiation. Excess radiation doses can be dangerous and can even be the cause for certain diseases like cancer in some patients. The level of radiation, however, may depend on the X-ray imaging technique being used – conventional radiographic film, Computed Radiography (CR) or Digital Radiography (DR). While some speculate that CR has increased the

dose of radiation that a patient is exposed to, some believe that these methods are still far safer than the conventional film-screen X-ray method.

X-RAY TECHNIQUE AND DOSAGE

Patient exposure to radiation depends not just on the technique used, but also on the imaging protocols of the particular institution. However, multiple studies conducted in the past few years have revealed that generally, in comparison to CR and the conventional X-ray methods, Digital Radiography systems can lower the radiation doses that patients are exposed to.

A study in the past has revealed that radiation exposure was decreased from 7.5 mSv to 2.2 mSv after a transition from the screen-film to the Digital Flat Panels. The reduction was almost three-fold, when the digital techniques were optimized to reduce the exposure. Another study by Italian researches had also concluded that the overall effective dosage through DR was around 43% lesser than the dosage in CR and 29% lesser than film-screen X-ray techniques.

IMAGE QUALITY AND RADIATION DOSE

The quality of the images and the radiation dose that the patient is exposed to, are closely related. This is because Digital Radiography equipment like the screen detectors can be adjusted for speed and wider exposure for obtaining quality images. At times, the routine system adjustments can lead to overexposure in some cases, with or without the knowledge of the operator. Also, operators try to improve the image quality and reduce the image noise by increasing the radiation doses, which can become a habitual practice and result in exposing patients to greater doses.

The only way to avoid this is by ensuring that the staff and the radiologists who operate the digital equipment are properly trained before making transition from Film-screen Radiography to Digital

Radiography. Also, vigilance through quality assurance and quality control measures, along with standardized imaging protocols can help in preventing this problem.

OPTIMIZING DIGITAL IMAGING

Loss of X-ray films, closeness to the X-ray machine and the duration for which the patient has to be exposed for capturing the image are factors that can impact the levels of radiation doses in the conventional method. Also, the exposure time in the conventional X-ray method could be longer to obtain better quality images. Also, loss of the film would mean repeated exposures, and an overall increase in the dosage.

But in DR, the time taken for acquiring the image is much less when compared to CR or the film-screen techniques. Flat panel DRs have better Detective Quantum Efficiency (DQE), which helps in reducing patient dosage without affecting the quality of the image. Also, the Digital Post-processing Techniques can help in manipulating the image for better contrast, in case the images are obtained by lower mAs and higher tube potentials or lesser radiation doses.