

Emerging trends and technologies in radiation protection

With the increased deployment of imaging equipment comes an increased risk for healthcare professionals getting exposed to scattered radiation over an extended period of time. **Satyaki Banerjee**, CEO, Medical Imaging, Kiran Medical Systems, a division of Trivitron Healthcare, expands on the various trends in radiation protection gear

Over the years there has been a significant increase in the use of medical imaging equipment like radiography, mammography, computed tomography systems for accurate diagnosis and C-Arms and Cath Labs for image guidance during minimally invasive surgical procedures. While such an increased deployment of imaging equipment has phenomenally enhanced diagnostic confidence and has made complex surgical procedures minimally painful for the patient and has greatly increased positive surgical outcome, it does pose a risk for healthcare professionals getting exposed to scattered radiation over an extended period of time.

Overexposure to radiation leads to a multitude of health effects that can range from burns, radiation sickness, to permanent damage to the skin, bone-marrow, genetic mutation and cancer.

The manifestation of such

health effects is dependent on the nature of exposure. Exposure to a high dose of radiation over a short time span can produce acute effects such as skin redness, hair loss, radiation burns, or acute radiation syndrome. These are known as the deterministic effects of radiation exposure.

Exposure to low dose scatter radiation over an extended period of time may lead to a significant risk of long-term effects such as cancer, which may appear years or even decades later. These are known as the stochastic effects of radiation exposure. It is the stochastic effects of radiation that pose the greatest risks for healthcare professionals.

Radiology centres across the world use multiple approaches for minimising radiation levels that include installation of lead glass windows between the CT room and console room, beam collimators to limit the X-ray beam to precisely the required area,



lead partitions, ceiling suspended lead glass shields around Cath labs, lead shields around surgical tables etc.

To augment and further optimise radiation protection for the healthcare professionals personal radiation protection gear like radiation attenuating apparel, thyroid shields, gonad/ovarian shields, radiation attenuating gloves, and eye-wear are needed. It is very important to monitor the radia-

tion dose exposure levels by carefully placing dosimeters within the room and on the person of healthcare professionals.

Extensive research is being performed globally to design personal radiation protection gear that can effectively attenuate scatter radiation and cover all vital body parts; be lightweight and comfortable to wear incorporating nano-tech core materials using bismuth and antimony and functional fabrics incorporating phase-change technology to effectively regulate the body temperature during extended periods of apron wear.

Considering the fact that an interventional surgeon and supporting healthcare professionals would generally need to wear radiation protection gear for long durations during a day, it is important that these products are tested not only for radiation attenuation effectiveness but also for biocompatibility, skin sensitivity, and skin irritation as specified in the

ISO 10993 standard.

Kiran Medical Systems, a division of Trivitron Healthcare has been at the forefront of research and development in the field of radiation protection offering a wide portfolio of products featuring cutting edge technology like ZeroLead Air microparticle core material technology; biocompatibility certified radiation protection aprons; smart aprons with integrated dosimeters and RFID chips; phase change technology-based fabrics originally developed for space suits etc.

Trivitron's Kiran portfolio of radiology products include a comprehensive range of radiation protection products, Ultisys range of mobile and fixed digital radiography systems, Infinity and Elite series surgical C-Arm systems featuring Flat Panel Detector technology, Felicia Digital Mammography, contrast media, anti-scatter X-ray grids and a wide range of imaging accessories and consumables.

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