Occupation Radiation Doses from Therapeutic, Interventional and Diagnostic Radiology

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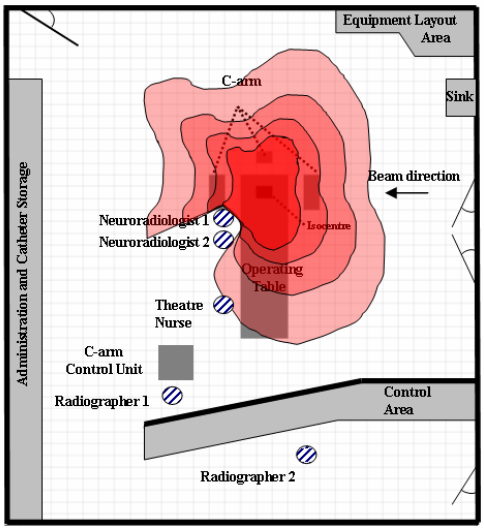
Research findings in molecular-level radiation damage may have valuable future application in hospitals where there is occupational exposure to ionizing radiation. While radiation dose to staff must be controlled and minimized through EU member state legislation and guidance, there remains the potential to apply new knowledge to refining hospital radiation protection practices so to keep occupational risk as low as practicable. This is particularly so for working areas with low x-ray photon energies or low fluence rates, where commonly applied LNT models of risk[1] may be less relevant. Moreover, new clinical procedures such as interventional neuroradiology deliver an altered distribution of radiation exposure to staff. Current guidance[2] and specialist training may not extend fully to explore the consequences of such radiation environments.

This work quantifies occupational radiation dose levels around three new-build clinical facilities in East Anglia, UK, from different modern clinical applications. The implication of such clinical work to the energy and dose-rate profile of occupational exposure will be discussed.

1) a new radiotherapy linear accelerator, featuring 15 MV photon output that has potential to activate air particles or machine components through an (x, n) reaction[2]
2) a therapeutic neuroangiography suite with x-ray-guided interventional treatments for brain aneurysm and arteriovenous malformations
3) a fully equipped diagnostic imaging suite for trauma investigation



References

[1] – ICRP Report 60 Recommendations of the International Commission on Radiological Protection. Elsevier Press, USA, 1990.
[2] - IPEM Medical and Dental Guidance Notes. IPEM Publishing, UK, 2000.

0.5 µSv / Gy.cm^2
1.0 µSv / Gy.cm^2
4.0 µSv / Gy.cm^2
8.0 µSv / Gy.cm^2

Figure - Operating theatre isodose distributions (normalized to machine Dose Area Product) during glue, stent or coil loading in therapeutic neuroangiography.