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# Personal on line dosimetry using computational methods: the PODIUM Project and the future of active dosimetry

Individual monitoring of workers exposed to external ionizing radiation is essential to allow application of the ALARA principle and follow up of the official dose limits. However, large uncertainties still exist in personal dosimetry, especially for neutrons and for inhomogeneous fields. Also, many practical problems exist for personal dosimetry, with many dosemeters getting lost and the reluctance of many workers to wear one or more dosemeters.
The objective of the PODIUM project is to improve personal dosimetry by an innovative approach: the development of an online dosimetry application based on computer simulations without the use of physical dosemeters. Operational quantities, protection quantities and radiosensitive organ doses (e.g. eye lens, brain, heart, extremities) will be calculated based on the use of modern technology such as personal tracking devices, flexible individualized phantoms and scanning of geometry set-up. When combined with fast simulation codes, the aim is to perform personal dosimetry in real-time. Parallel to this, a different approach was planned with pre-calculated fluence to dose conversion coefficients for phantoms of different statures and postures.
We applied and validated the methodology for two situations where improvements in dosimetry are urgently needed: neutron workplaces and interventional radiology. An online application in which we calculate individually the level of occupational exposure is developed. For that purpose, the spatio-temporal radiation field, including its energy and angular distribution, needs to be known. We use input from dose monitors in the neutron workplace and radiation dose structured reports (RDSR) from the x-ray machine used in interventional radiology and we capture real movements of exposed workers and transfer this to the calculation application.
This paper will describe the achievements of the PODIUM projects in this new approach for personal dosimetry. We will show the results from the validation and test measurements in different hospitals, and in 2 workplace fields with significant neutron exposure.
The availability of the proposed online personal dosimetry application shall overcome the problems that arise from the use of current passive and active dosemeters. Such limitations include the uncertainty in assessing neutron and photon doses when part of the body is shielded, the delay in calculating the doses and the situation where workers position dosemeters incorrectly. In addition, it will increase awareness of radiation protection among workers and will improve the application of the ALARA principle.

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