OVERVIEW OF DOUBLE DOSIMETRY PROCEDURES FOR THE DETERMINATION OF THE EFFECTIVE DOSE TO INTERVENTIONAL RADIOLOGY OPERATORS

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Double dosimetry procedures in interventional radiology were evaluated by Working Group 9 (Radiation protection dosimetry of medical staff) of the CONRAD project, which is a Coordination Action supported by the European Commission within its 6th Framework program. The measurement of personal dose equivalent $H_p(10)$ using a single dosimeter above the lead apron can lead to significant overestimations of the effective dose, while the measurement with dosimeter under the apron can lead to underestimations. To improve effective dose assessments, measurements with two dosimeters, one above and the one under the apron ("double dosimetry"), have been suggested. A number of algorithms have been developed for the calculation of effective dose from either single or double dosimeter readings, while no universal consensus exists about the best approach. This study investigated the applied practices and specific operating conditions relevant to double dosimetry by circulating a questionnaire in some countries involved in the CONRAD Working Group 9. An extensive literature search was also conducted on the algorithms used for the determination of effective dose. The replies to the questionnaire from seven countries indicated that regulations for double dosimetry do not exist in all countries and that experiences on the algorithms are often limited to pilot studies. The calculation of effective dose is mainly based on single dosimeter measurements, where either $H_p(10)$ directly or $H_p(10)$ divided by a certain number (when the dosimeter is used above the apron), is taken for effective dose. In Switzerland, special algorithms for double dosimetry have been introduced in the regulations. The literature review indicated that there is no firm consensus, yet, on the most suitable algorithms for the calculation of the effective dose. The algorithm by Niklason et al. (Health Physics 67, p.611-615, 1994) is amply accepted, but recent studies suggest that no single algorithm may be suitable for all IR procedures. Furthermore, the advantages of double dosimetry over simple single dosimetry are being questioned. In this context, further investigations are needed to evaluate the applicability of the proposed double dosimetry algorithms in several critical configurations of IR procedures.

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