

# New mesh-type phantoms and their dosimetry applications including emergencies

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**Abstract**—Mesh-type adult reference computational phantoms have been constructed in Committee 2 of the International Commission on Radiological Protection (ICRP) by converting the voxel-type *Publication 110* adult reference computational phantoms to a high-quality mesh format and adding those tissues that were below the image resolution of the voxel phantoms and could not therefore be represented in the *Publication 110* phantoms. The new mesh phantoms include all the necessary source and target tissues for effective dose calculations, including the 8–40- $\mu\text{m}$ -thick target layers of the alimentary and respiratory tract organs, thereby obviating the need for supplemental stylised models (e.g. respiratory airways, alimentary tract organ walls and stem cell layers, lens of the eye and skin basal layer). To see the impact of the new mesh-type reference phantoms, dose coefficients for some selected external and internal exposures were calculated and then compared with the current reference values in *Publications 116* and *133* which were calculated by employing the *Publication 110* phantoms and the supplemental stylised models. The new mesh phantoms were also used to calculate dose coefficients for industrial radiography sources near the body, which can be used to roughly estimate organ and effective doses of the worker who is accidentally exposed by an industrial radiography source; in these calculations, the mesh phantoms were deformed to reflect the obesity of the worker and also to evaluate the effect of the posture on dose coefficients.