

### The Reference Phantoms: Voxel vs. Polygon

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The ICRP reference male and female adult phantoms, described in *Publication 110*, are voxel phantoms based on whole body computed tomography scans of a male and female patient, respectively. The voxel in-plane resolution and the slice thickness were of the order of a few mm; thus, smaller tissues, like the lens of the eye, skin or the walls of some organs, could not be properly segmented. The calculated doses for these tissues have therefore some limitations, particularly for weakly-penetrating radiation. Similarly, the *Publication 110* phantoms cannot represent micron-thick target tissues in respiratory and alimentary tract regions. Consequently, separate stylised models have been used to represent these tissues for the calculation of the ICRP reference dose coefficients. In this context, ICRP Committee 2 recently initiated a research project to convert the *Publication 110* phantoms into polygonal-mesh format. The ultimate goal of the conversion project is to produce an exact replica of the *Publication 110* phantoms in a high-quality polygonal-mesh format, including all source and target regions, even those of the alimentary and respiratory tract organs with micron resolution. It is expected that the converted phantoms would lead to the same, or very similar, dose coefficients as the *Publication 110* reference phantoms for penetrating radiation. At the same time, it would provide more accurate dose coefficients for weakly penetrating radiation and small tissues. In addition, the reference phantoms in polygonal-mesh format would be easily deformable and could serve as a starting point to create phantoms of various postures to be used, for example, in accidental dose calculations. In this presentation, we will report the current progress of the phantom conversion project and discuss its significance for the ICRP dose calculations and radiation protection dosimetry in general.