

## Japanese pediatric and adult atomic bomb survivor dosimetry: potential improvements using the J45 phantom series<sup>1</sup> and modern Monte Carlo transport<sup>2</sup>

A multi-institutional working group, including RERF, has recently conducted work to improve the human anatomical models (numerically expressed, three-dimensional figures obtained by computer calculations based on the digitized human body) currently used by RERF in estimating organ doses for atomic bomb survivors in Hiroshima and Nagasaki. RERF scientists investigated the possibility of enhancing the accuracy of its dose estimates using new human models called the J45 phantom series.

The study assumed five shielding conditions at two distances from the hypocenter — 1,000 meters and 1,500 meters (but mainly 1,000 meters) — in Hiroshima and Nagasaki separately in the case of radiation exposure while facing the hypocenter. Based on our analysis, the updated phantom series was found to improve dose estimates for several important organs, including the active bone marrow, colon, and stomach wall, for organ dose estimates for the skin, esophagus, and prostate, which were undefined in the previous phantom series and required use of radiation-dose and organ substitutes, and in particular for neutron organ dose estimates.

\* This research is part of an effort over many years by a US-Japan joint research group that includes RERF aimed at developing and improving A-bomb survivor dose estimates based on use of the latest technology available at the time.

### Notes

<sup>1</sup>J45 phantom series:

A new series of human anatomical models for describing a range of average Japanese body types at the time of 1945 was produced by a multi-institutional working group, including RERF. The new series improves accuracy of organ dose estimates by incorporating age-based precision, sex characterization, and anatomical realism.

<sup>2</sup>Monte Carlo transport:

A worldwide-standard computer code for calculating a broad range of radiation doses. The software was developed by the U.S. Los Alamos National Laboratory.

**doi. 10.1007/s00411-021-00946-2**

(Doi are permanent, content-specific numbers assigned to most digital information and, in this case, can be used to link to published abstracts and/or full papers.)

RERF's objective with this brief outline is to succinctly explain our research for the lay public. Much of the technical content of the original paper has been omitted. For further details about the study, please refer to the full paper published by the journal.