RADAR Develops New Generation of Dosimetry Phantoms

Michael G. Stabin, PhD, RADAR, Inc., Nashville, TN; Jeffry A. Siegel, PhD, Nuclear Physics Enterprises, Marlton, NJ; X. George Xu, PhD, Rensselaer Polytechnic Institute, Troy, NY; for the RAdiation Dose Assessment Resource Committee of the SNMMI

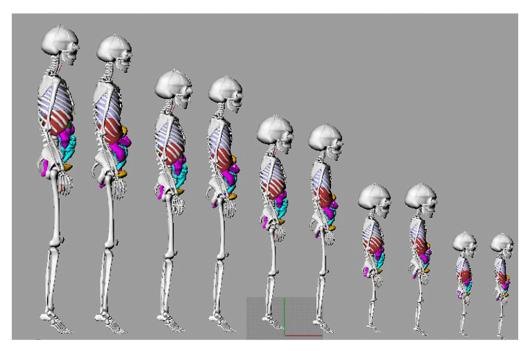


FIGURE 1. Male (left in pairs) and female (right in pairs) adult-to-pediatric dosimetry phantoms.

he RAdiation Dose Assessment Resource (RADAR) Committee of the SNMMI has developed a new generation of anthropomorphic phantoms for radiation dosimetry. New adult, pediatric, and fetal dose estimates have now been generated using these new reference models (1) (Figs. 1 and 2), based on reference data in International Commission on Radiological Protection Publication 89 (2) and as implemented in the OLINDA/EXM 2.0 software (3,4). The complete tables of dose estimates will be maintained in electronic form on the RADAR website (www. doseinfo-radar.com) and can be updated or added to as needed. Most of the numerical values will also be made available in the SNMMI web lookup tool (http://www.snmmi.org/dosetool). These phantoms serve as a gener-

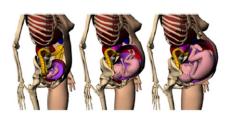


FIGURE 2. Pregnant female dosimetry phantoms (7).

ational update on the Oak Ridge phantom series of the 1980s and 1990s (5,6).

REFERENCES

- Stabin MG, Xu XG, Emmons MA, Segars WP, Shi C, Fernald MJ. RADAR reference adult, pediatric, and pregnant female phantom series for internal and external dosimetry. J Nucl Med. 2012;53:1807–1813.
- International Commission on Radiological Protection. ICRP Publication 89: Basic Anatomical and Physiological Data for Use in Radiological Protection: Reference Values. Amsterdam, The Netherlands: Elsevier Health, 2003.
- Stabin MG, Siegel JA. RADAR Dose Estimate Report: A compendium of radiopharmaceutical dose estimates based on OLINDA/EXM version 2.0. J Nucl Med. 2018;59:154–160.
- Stabin MG. New generation fetal dose estimates for radiopharmaceuticals. J Nucl Med. E-published ahead of print on December 21, 2017.
- Cristy M, Eckerman K. Specific Absorbed Fractions of Energy at Various Ages from Internal Photon Sources. ORNL Report ORNL/TM-8381 V1–V7. Oak Ridge, TN: Oak Ridge National Laboratory; 1987.
- Stabin M, Watson E, Cristy M, et al. Mathematical Models and Specific Absorbed Fractions of Photon Energy in the Nonpregnant Adult Female and at the End of Each Trimester of Pregnancy. ORNL Report ORNL/TM 12907. Oak Ridge, TN: Oak Ridge National Laboratory; 1995.
- Xu XG, Taranenko V, Zhang J, Shi C. A boundary-representation method for designing whole-body radiation dosimetry models: Pregnant females representing three gestational periods—RPI-P3, -P6 and -P9. *Phys Med Biol*. 2007;52:7023-7044.