Development of a Solid BOMAB Phantom for Whole Body Counting Calibration

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The calibration of whole body counting detection systems is usually made with physical anthropomorphic phantoms that reproduce the distribution of the radioactivity expected for each specific exposure situation and pattern. In the case of high energy photon emitters uniformly distributed in the whole body, a few phantoms are recommended by international metrology agencies. Among these, the BOMAB phantom has become one the most used. It comprises a set of plastic bottles filled with standard radioactive solutions or solid resins containing known amounts of the radionuclides of interest. The only drawback to this method is that for the calibration of NaI(Tl) based detection systems, it is necessary to have one phantom for each radionuclide. The BOMAB phantom presented in this work is made of a unique set of inert resin-made cylinders and ellipsoids representing the different sections of the human body. Each section is produced with longitudinal cylindrical holes in which solid radioactive inserts are positioned in such a configuration as to simulate a uniform distribution of activity within the body. The number of holes and their geometric position was defined by using a Monte Carlo code developed specifically for this application. The total cost of this phantom is much lower than the original BOMAB. It has also shown to be safe and practical for routine use and transportation since the absence of any liquid solution makes it completely leakage-proof.