

# Graves Phantom

## Quantitative SPECT Tissue Characterization



### Description

Accurate dosimetry in radiopharmaceutical therapy (RPT) is only possible with proper equipment and calibration of systems used for quantitative SPECT (qSPECT). With the Graves Phantom, system sensitivity can be measured for each radionuclide, supporting the accurate conversion of counts to radioactivity. This allows for streamlined qSPECT calibration workflows that can be practically implemented in clinics, or within RPT trials.

### Enabling Realistic Scatter

Developed in collaboration with Stephen Graves, Ph.D., of the University of Iowa, the Graves Phantom is a simple-to-use, water-equivalent phantom that includes a range of standard lab bottles.

The Graves Phantom design provides significant advantages over basic methods such as point source for planar or SPECT sensitivity calibration. In addition, compared to more complex methods like a 3D-printed organ within an anthropomorphic water phantom, the Graves Phantom delivers similar benefits with less complexity. The key advantage over point or line source methods is that the phantom and bottle provide realistic scatter, which is not fully corrected for using conventional SPECT imaging reconstruction techniques like dual- or triple-energy window (TEW) scatter correction.

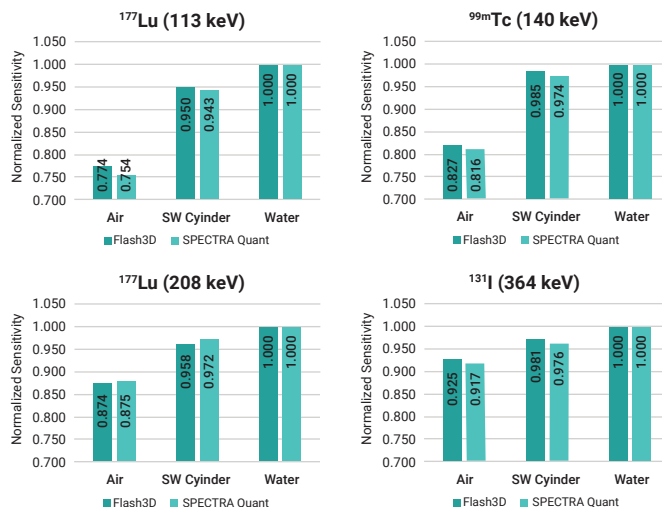
### Benefits

- Quantify SPECT system sensitivity factors
- Mimic patient size, attenuation, and scatter conditions with water-equivalent cylindrical geometry
  - Phantom size significantly impacts apparent SPECT sensitivity when using the triple-energy window scatter correction method<sup>1</sup>
  - Constructed from proven Sun Nuclear water-equivalent plastic
- Allows radionuclide interchangeability via lab bottles
  - Avoid long-lived phantom contamination
  - Only the lab bottle requires storage
- Ease-of-Use
  - Solid phantom design retain measurement conditions
  - Fill and calibrate individual lab bottles for each radionuclide
  - Includes 6 standard-size lab bottles
- Follow AAPM Task Group 417 guidance to calibrate scanners for RPT dosimetry.

<sup>1</sup> Stephen Graves et al. Evaluation of a scalable qSPECT calibration method for radiopharmaceutical dosimetry. J Nucl Med 2021;62:1433



The central cavity accepts a standard 8 oz (250 ml) lab bottle with a tight, slip fit. When fully inserted, the bottle rests flush within the phantom, with the cap at or below the surface.



Sensitivity factors obtained as a function of emission energy, phantom geometry, and reconstruction algorithm. Solid Water™ cylinder proves to be nearly equivalent to use of water-filled IEC body phantom and more practical due to contamination challenges of an IEC phantom.

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## Specifications

### Dimensions:

**Diameter x Depth:** Φ200 mm x 200 mm

**Material:** XL Solid Water™

**Nominal Physical Density:** 1.03 g/cm<sup>3</sup>

**Nominal Electron Density :** 3.35 x 10<sup>23</sup> e-/cm<sup>3</sup>

**Crosshair Scribe Lines:** 50 mm Anterior (1x), Lateral (2x)

**Weight:** 13 lb (6.1 kg)

## Ordering Information

5230-0015 Graves Phantom  
Includes: 6 Bottles, each 8oz (250 ml)  
C3683 Extra Bottles (Set of 6)