

4D EXTENDED CARDIAC-TORSO (XCAT) PHANTOM

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Technology description

The 4D XCAT phantom provides a realistic and flexible model of the human anatomy for use in high-resolution medical imaging research of the entire human body. Existing computerized phantoms involve trade-offs between realism and flexibility, based on patient data or mathematical equations, respectively. The 4D XCAT uniquely combines the anatomical realism of a voxelized phantom with the flexibility of a mathematical phantom.

The 4D XCAT phantom has become a standard in nuclear medicine applications and provides the anatomical detail for x-ray CT and MRI applications. Based on segmented Visible Human CT data and high-resolution multi-slice CT data, it provides realistic image data that is closer to an actual patient compared with other phantoms currently available. This includes small anatomical details distinguishable in x-ray CT such as surface structure of tissue organs, pulmonary artery tree in the lungs and vasculature in the head and abdomen regions. The 4D XCAT phantom further simulates cardiac motion and respiratory motion, using data from 4D cardiac gated tagged MRI and 4D respiratory gated CT.

The 4D XCAT phantom provides a unique model for both nuclear medicine applications and high-resolution imaging research to investigate acquisition strategies, image processing and reconstruction methods, and image visualization and interpretation techniques. Furthermore, it has great potential as an educational aid for human anatomy and physiology.

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