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Micro–CT Mouse Phantom

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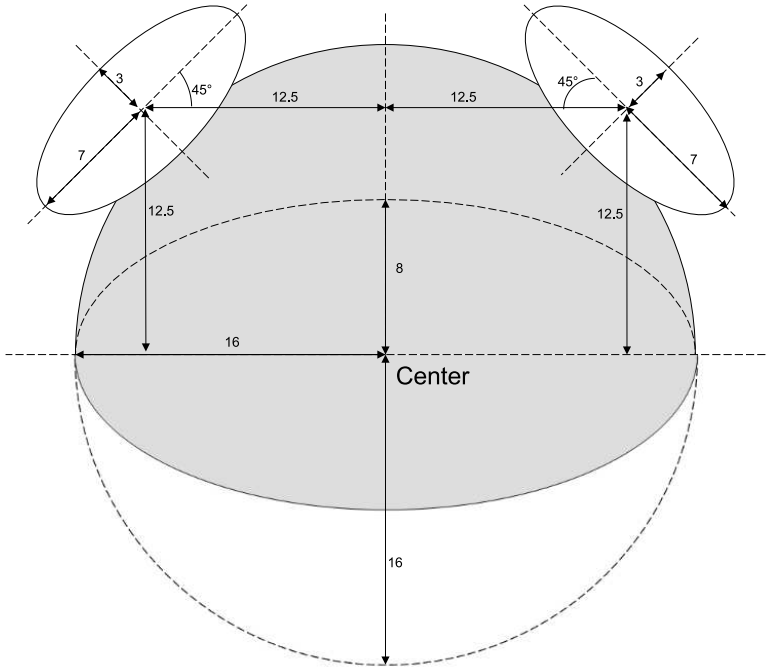
The mouse phantom was designed to verify the Empirical Dual Energy Calibration (EDEC)[1] in the scale of micro–CT.

Phantom body

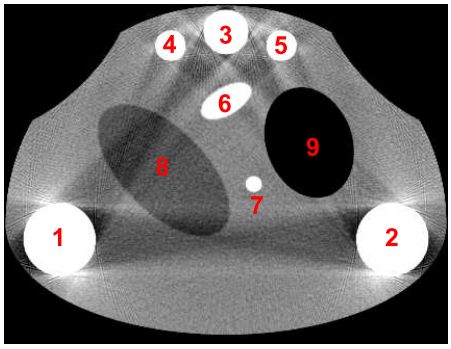
The phantom has a width of 32 mm, a height of 24 mm and a length of 40 mm. The lower part of the phantom body is half of an elliptic cylinder (semi–major axis a and semi–minor axis $b = \frac{a}{2}$). The upper part is half of a cylinder with radius r that satisfies the requirement $r = a = 16$ mm. Two smaller elliptic cylinders have been cut out of the latter at an angle of 45°. The phantom is translationally invariant in the z–direction. The phantom body is made up of water equivalent plastic. The unit for the lengths in the image below is mm.



[1] Philip Stenner, Timo Berkus and Marc Kachelrieß: *Empirical Dual Energy Calibration (EDEC) for Cone–Beam Computed Tomography*, Medical Physics, Vol. 34., in press, 2007.

Inserts

There is a total number of nine inserts: five bones (1–5), two high contrast (6 and 7) and one low contrast insert (8) and a lung insert (9). All inserts have a length of 40 mm. The positions, orientations and materials of the inserts are described in table 1. The image shown to the right is a simulation at 65 kV and is windowed to ($C = 0$ HU / $W = 200$ HU).



Insert number	Position (x/y) / mm	Size (a/b) / mm	Angle α / °	Material	CT–Value at 120 kV / HU
1	(-12/-1)	(2.5/2.5)	n. a.	HA400	1110
2	(12/-1)	(2.5/2.5)	n. a.	HA400	1110
3	(0/14)	(1.5/1.5)	n. a.	HA400	1110
4	(-4/13)	(1/1)	n. a.	HA200	590
5	(4/13)	(1/1)	n. a.	HA200	590
6	(0/9)	(2/1)	30	Iodine1	100
7	(2/3)	(0.5/0.5)	n. a.	Iodine2	420
8	(-4.5/4)	(6/3)	135	soft tissue	-35
9	(6/6)	(4/3)	110	lung	-700

Table 1: The x– and y– coordinates indicate the position of the insert's center with respect to the center of the phantom body defined in the figure on page 1. The values for a and b represent the lengths of the semi–major and semi–minor axes of an elliptical insert. For circular inserts $a = b$. The insert's orientation with respect to the horizontal axis is given by the angle α. As for the materials HA is the abbreviation for hydroxiapatite with the density given in mg/mL. Iodine1, respectively Iodine2, is a mixture of Iodine and water with a density of 1.00265 mg/mm^3, respectively 1.01059 mg/mm^3. The CT–values are mean values taken from a simulation at 120 kV.

Figure 1: A physical phantom has been built by QRM (Möhrendorf) according to the same specifications.