3D models related to the publication: Morphogenesis of the inner ear at different stages of normal human development

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Abstract: The present 3D Dataset contains the 3D models analyzed in: Toyoda S et al., 2015. Morphogenesis of the inner ear at different stages of normal human development. The Anatomical Record. doi : 10.1002/ar.23268.

Key words: human inner ear, human embryo, magnetic resonance imaging, phase-contrast

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SPECIMEN LIST

The morphogenesis of the human inner ear membranous labyrinth was visualized using images derived from human embryo specimens between Carnegie stage (CS) 17 and post embryonic phase from the Kyoto Collection, which were acquired with a phase-contrast X-ray CT (PCXT) and a magnetic resonance (MR) microscope.

Specimen ids	Species	Developmental stage (Crown Rump Length)
M3#36_KC-CS17IER29248	*Homo sapiens*	Carnegie stage 17 (07.0 mm)
M3#37_KC-CS18IER17746	*Homo sapiens*	Carnegie stage 18 (12.0 mm)
M3#38_KC-CS19IER16127	*Homo sapiens*	Carnegie stage 19 (13.0 mm)
M3#39_KC-CS20IER20268	*Homo sapiens*	Carnegie stage 20 (13.7 mm)
M3#40_KC-CS21IER28066	*Homo sapiens*	Carnegie stage 21 (16.7 mm)
M3#41_KC-CS22IER35233	*Homo sapiens*	Carnegie stage 22 (22.0 mm)
M3#42_KC-CS23IER15919	*Homo sapiens*	Carnegie stage 23 (32.3 mm)
M3#43_KC-FIER52730	*Homo sapiens*	Post embryonic phase (43.5 mm)

METHODS

Well-preserved human embryos between Carnegie stage (CS) 17 and the postembryonic phase during trimester 1 (approximately 6–10 weeks after fertilization) were selected from Kyoto Collection for MR microscopic imaging and phase-contrast X-ray CT (Nishimura et al, 1968; Shiota et al, 2007; O'Rahilly & Müller, 1987).
The 3D PCXT image acquisition conditions are described elsewhere (Yoneyama et al., 2011). Briefly, specimens were visualized with a phase-contrast imaging system fitted with a crystal X-ray interferometer. The system was set up at the vertical wiggler beam line (PF BL14C) of the Photon Factory in Tsukuba, Japan.
MR images were acquired using a 7T MR system (BioSpec 70/20 USR; Bruker Biospin MRI GmbH; Ettlingen, Germany) with a 35-mm-diameter 1H quadrature transmit-receive volume coil (T9988; Bruker Biospin MRI GmbH).
PCXT and MRI data from selected embryos were analyzed precisely as serial 2D and reconstructed 3D images. The structure of the inner ear was reconstructed in all samples using Amira software version 5.4.5 (Visage Imaging; Berlin, Germany). The 3D surface models were then processed with ISE-MeshTools (Lebrun, 2014); each model was orientated, tagged and labelled using this software. All tagged surfaces are provided in .vtk format, and labels in .flg format. The 3D surface models are also provided in .ply format, and can therefore be opened with a wider range of freeware.
This study was approved by The Committee of Medical Ethics of Kyoto University Graduate School of Medicine, Kyoto, Japan (E986).

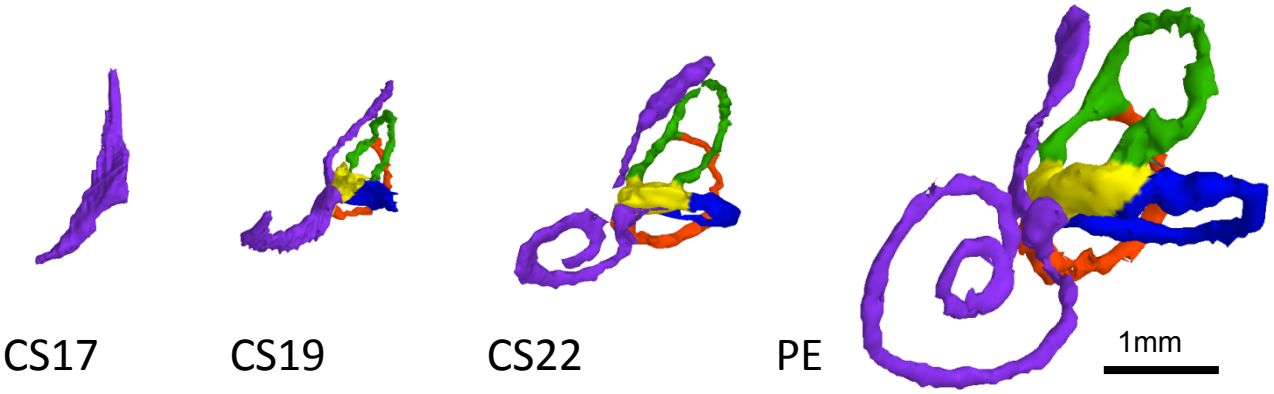

Figure 1: Representative image of the inner ear membranous labyrinth at Carnegie stage (CS)17, CS 19, CS22, and post embryonic phase (PE) (crown-rump length = 43.5mm). Purple: cochlear duct and lymphatic duct, Yellow: vestibular system, Blue: lateral semicircular duct, Green: anterior semicircular duct and common crus, Red: posterior semicircular duct. scale bar = 1 mm.

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