

X-RAY MICROCOMPUTED TOMOGRAPHY

X4 POSEIDON – Mouse embryo

Innovation with Integrity

Mouse embryos are pivotal in biomedical research due to their genetic and physiological similarities to humans. They serve as models for studying developmental processes, genetic disorders, and congenital anomalies.

MicroCT imaging offers several advantages over traditional histology for studying mouse embryos. It provides non-destructive, high-resolution, three-dimensional datasets, allowing comprehensive visualization of the entire embryo. It also facilitates quantitative analysis of morphological phenotypes, which is more challenging with histological methods, and can be combined with other modalities for correlative studies, providing a more holistic understanding of embryonic development.

The mouse embryo is a prime example of the use of contrast agents. Chemical stains or contrast agents greatly enhance the imaging of soft biological tissues by conferring on different tissues, differing X-ray attenuation ("density"). This embryo was stained by phosphotungstic acid (PTA) in 70% ethanol.

References

Astanina et al. (2023). *Bio-protocol*, 13(9)

Metscher B. D. (2009). *BMC physiology*, 9, 1-14.

Scan parameters

- Detector: 16 MP sCMOS
- Voxel size: 3.7 μm (2x2 binning mode)
- Source: Transmission type
- Source settings: 50 keV, 10 W
- X-ray filter: 0.5 mm Al
- Rotation step: 0.225° over 360°
- Phase retrieval (Paganin) reconstruction, β/δ ratio 100

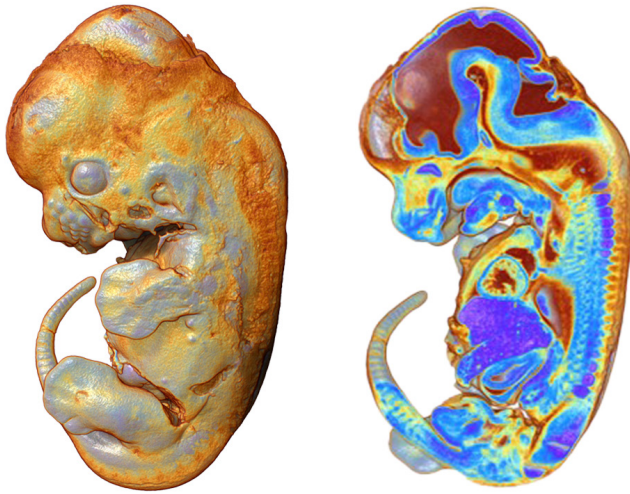


Figure 1: Volume rendered images of a mouse embryo, PTA-stained and imaged at 3.7 μm voxel size.



Figure 3: A mouse embryo shown to scale.



Figure 2: Sagittal and cross-sectional reconstructed images of a mouse embryo, PTA-stained and imaged at 3.7 μm voxel size.

The high resolution and low noise active pixel performance of the sCMOS detector in the X4 POSEIDON allows fine gradations of X-ray density related to tissue composition to be visually resolved, providing good anatomical detail, with no cutting required. For example, the notochord-vertebral segmented structure is clearly visible (figure 1, 2). Many soft tissue organs including regional white/grey matter within the developing brain, are effectively contrasted and resolved.

Note the good general contrast afforded by the phospho tungstic acid contrast agent, between diverse tissues such as neural, visceral, connective tissue and others, giving effective visualisation of the anatomy.

Bruker BioSpin is continually improving its products and reserves the right to change specifications without notice. BS-100035 01/2025 Bruker BioSpin.

Bruker BioSpin
info@bruker.com

Worldwide Offices
bruker.com/

X4 POSEIDON
bruker.com/

bruker.com

