BIOIMAGING & EMBRYOLOGY UNIT OF CZECH CENTRE FOR PHENOGENOMICS

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WHAT WE STUDY?

Primary:

Functional morphology of 3D objects by states of art imaging technologies to describe anatomical annotation of skeleton dysmorphologies and developmental disorders. Secondary:

- 2D localization of biofluorescence and bioluminescence
- 3D guantification of structure and biomineralization •
- conditional gene inactivation during development
- embryonic tissue isolation and dissections for OMICs procedures
- establishment of primary cell cultures

WHAT ARE OUR POSSIBILITIES?

- high-speed in-vivo scanning (up to 30s/mouse): Bruker Skyscan 1278
- high-resolution in-vivo scanning (up to 9µm/mouse): Bruker Skyscan 1176 •
- . high-resolution ex-vivo scanning of tissue ultrastructure (down to 0.5 µm): Bruker Skyscan 1272
- Contrast Enhanced µCT of soft tissues (Lugol, PTA, PMA staining) •
- Phase Retrieval reconstruction of µCT scans: NRecon2
- histological tomography reconstructions: Imaris
- advance 3D analysis of 3D objects: Amira
- whole body imaging of fluorescence and bioluminescence reporters in-vivo e.g. for imaging of cancer models, inflammation, kidney function or specific enzyme activity: LagoX Aura, Bruker Xtreme
- functional assays on primary cells or their isolation for multiOMICs •
- dissection of embryonic tissues
- establishment of primary cell lines or organ cultures
- delivery of immortalized cell lines

WHAT ARE OUR OBJECTS?

- adult mice
- adult rats •
- murine embryos
- separated organs
- any biological object brought by user from insects to mammalian skulls or ancient museum samples





(A) Overlay of several volumes from X-ray reconstruction revealing skeleton, lungs, visceral fat, and body muscles.



ED9.0.

kidnev 3D reconstruction by Imaris from 500 histological sections.

(F) RFP detection of showing localization progression in mouse.

(B) Skeleton segmentation of the youngest stage of known the extinct Tasmanian wolf.

(C) Virtual section of mouse embryo at ED18.0.

WHAT ARE OUR RESULTS?

collection, conditional gene inactivation and embryonal tissue dissection

- Kaiser et al. 2019. WNT5A is transported via lipoprotein particles in the cerebrospinal fluid to regulate hindbrain morphogenesis. Nat. Commun. 10(1): 1498
- Dani et al. 2021, A cellular and spatial map of the choroid plexus across brain ventricles and ages. Cell 184(11): 3056-3074

imaging and functional analysis of tooth enamel

Wald et al. 2017. Intrinsically disordered proteins drive enamel formation via an evolutionarily conserved selfassembly motif. PNAS 114(9); e1641-e1650

imaging and functional analysis of bones

Gewartowska et al., 2021. Cytoplasmic polyadenylation by TENT5A is required for proper bone formation. Cell Rep. 35(3): 109015

imaging and quantification of arthrosis progression in mouse model

Kralova et al. 2020. Dysregulated NADPH Oxidase Promotes • Bone Damage in Murine Model of Autoinflammatory Osteomyelitis. J. Immunol. 204(6): 1607-1620

imaging and segmentation of rare museum samples

Newton et al. 2018. Letting the 'cat' out of the bag: pouch young development of the extinct Tasmanian tiger revealed by X-ray computed tomography. R. Soc. Open Sci. 5(2): 171914







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(D) Mouse embryo at

(E) Adult mouse

tumor and