
Tefor core facility: an electronic atlas of standardized Zebrafish neuroanatomy

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Abstract

With the growing interest on Zebrafish as a model organism the need for precise anatomic data arose. The evolution of microscopic techniques enabled already precious atlases of the Zebrafish. However, while these atlases are valuable to learn the general neuroanatomy, their image data only has limited use during the analysis of phenotypes in new specimens. With ViBE-Z (Ronneberger et al. (2012) an electronic atlas exists of 3days old Zebrafish, however for research in the juvenile or adult Zebrafish these data are not relevant.

Our approach tries to overcome this shortcoming by imaging complete brains in high resolution 2-photon-microscopy together with their fluorescent expression patterns. Pivotal parts are the CLARTIY protocol (Deisseroth et al., 2013) and the VibMic (Tefor Core Facility and Leica Microsystems).

The CLARITY protocol facilitates good antibody penetration and enhances accessibility of deep structures while the VibMic enables imaging of structures outside the reach of a normal microscope objective in high resolution by the combination of a conventional vibratome with an IR equipped confocal microscope. Mechanic sectioning and successive block face imaging under the surface of the specimen allows us to image specimens of very large z-dimension as wholemount fish.

The high density of the image data results in big file sizes. Since we are aiming to provide data in highest resolution we are currently developing a data management system for 3D and serial 2D display with subcellular resolution.

The goal of the Tefor core facility is to generate neuroanatomic data under standardized conditions for the expression patterns of all intensively used Zebrafish lines and register them into an electronic atlas of the Zebrafish neuroanatomy. Since this atlas is foreseen to be shared with and annotated by its users we hope to provide a backbone for the discussion and distribution of neuroanatomic data to the Zebrafish community.

Keywords: zebrafish, neuroanatomy, vibmic, clarity, data management, high resolution

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