IMAGING MOUSE EMBRYOS AND ORGANS OF ADULT MICE USING SINGLE PLANE ILLUMINATION MICROSCOPY (SPIM)

Klaus Greger¹, Emerald Perlas², Walter Witke², Ernst H.K. Stelzer¹
¹European Molecular Biology Laboratory, Meyerhofstr. 1, 69121 Heidelberg, Germany
²European Molecular Biology Laboratory, Adriano Buzzati-Traverso Campus, Via Ramarini 32, 00016 Monterotondo, Italy
E-mail: greger@embl.de

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Imaging large samples such as mouse embryos and organs of adult mice in three dimensions is of great interest, since the mouse model is widely used in medical research. Single Plane Illumination Microscopy (SPIM) [1] provides images with good three dimensional resolution inside the sample, optical sectioning capability, and very low background, even for samples in the centimetre range. Penetration was increased by clearing the samples with Murray Clear, a mixture of benzyl benzoate and benzyl alcohol. In comparison to MRI, which also allows very good penetration, our method provides better resolution. As it is a fluorescence based method, a wide variety of applications exists. We also compare our results to OPT [2].

Figure 1: Optical slices of a mouse brain (day four postnatal). The images show part of the cerebellum and the central brain. (a) – (d): The image quality in different depths does not decrease. Corresponding depths inside the sample are: (a) 62µm, (b) 1.24mm, (c) 2.27mm, (d) 3.73mm. (e) Lateral-axial plane out of the same stack along the detection axis, demonstrating the isotropic resolution. Directions of illumination and detection are indicated by the arrows. λill: 488 nm, detection filter: Chroma HQ 500 LP, detection lens: Carl Zeiss Fluar 2.5x/ 0.12