Fast whole organ imaging with light sheet microscopy

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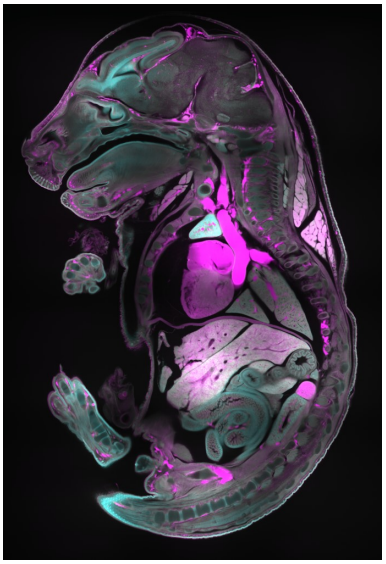
Abstract

Light sheet microscopy is the method of choice when imaging large, fluorescently labelled biological samples. Key features of this technique are the extremely minimized photo bleaching, the high speed image acquisition, and the large imaging depth.

Imaging large (i.e. mesoscopic) samples with optical methods requires the tissue to be transparent. As most of the biological tissues are not transparent by default, optical clearing is a necessary prerequisite. The combination of cleared tissues with lightsheet microscopy is an ideal synergy that allows non-destructive volumetric imaging, and therein for addressing new questions in biology.

Minimizing sample mounting time, and a fast acquisition followed by a robust processing pipeline is important, especially as the desire to image ever larger samples becomes more and more common. In this session, we will explain tissue clearing, and the preparation of large biological samples. An exemplary acquisition of a large sample on the LCS-SPIM (Large Cleared Sample – Selective Plane Illumination Microscope) will be performed. Participants will learn how to mount the sample and adjust all necessary parameters to achieve the best image quality. Then we will acquire a tiled acquisition, process (i.e. stitch), and visualize the data.



Sample courtesy of Montserrat Coll Llado, MIF, EMBL Barcelona, Spain