32

Augmenting the Range of Compatible Clearing Protocols for the Zeiss Lightsheet Z.1

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Abstract Text

When deciding on a microscope to purchase, a Core must make considerations regarding the needs of its user base. Generally, the imaging system needs to be compatible with the variety of samples that users may bring in without compromising image quality. The Zeiss Lightsheet Z.1 was originally designed for imaging live specimens in aqueous media. The fast acquisition speeds and low phototoxicity make the system ideal for in-vivo imaging of sensitive samples such as C. elegans or D. melanogaster embryos. The wider adoption of tissue clearing has renewed interest in the lightsheet imaging modality and the Z.1, configured as-is, is only compatible with a select range of refractive indices. Advancements in tissue clearing techniques have introduced more efficient clearing methods and media with higher indices of refraction. The optics and fixed working distance of the Lightsheet Z.1 impose a limit to the clearing methods compatible with the system. By using an imaging chamber with an adjustable working distance the system can be made compatible with higher RI media. Our lab has made use of the Translucence Biosystems Mesoscale Imaging System which includes a sample chamber with an adjustable working distance to augment the range of cleared tissue our system can successfully image. This has allowed us to accept samples processed with a broader gamut of protocols that make use of higher RI media than the original specifications of the Z.1 allowed.