

# What Life Scientists Should Know About Molecular Imaging

## Optical Imaging, Ultrasound, Photoacoustics

### Advanced Microscopy Technologies

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#### Learning Objectives:

- Effects of scattering in microscopy
- Light Sheet Microscopy
- Optical Projection Tomography

In this educational session we will be presenting the basis of light propagation and how these affect image formation in microscopy. We shall cover new advances in microscopy such as Laser Sheet Microscopy and Optical Projection Microscopy which are capable of generating 3D images in-toto of organs and small specimens. The effect of scattering will be discussed in the context of these techniques with specific examples and applications.

#### Relevant Publications:

1. Colas, J.-F., & Sharpe, J. (2009). Live optical projection tomography. *Organogenesis*, 5(4), 211-6.
2. Sharpe, J., Ahlgren, U., Perry, P., Hill, B., Ross, A., J., H.-S., Baldock, R., et al. (2002). Optical projection tomography as a tool for 3D microscopy and gene expression studies. *Science*, 296(5567), 541-545.
3. Huisken, J., Swoger, J., Del Bene, F., Wittbrodt, J., & Stelzer, E. H. (2004). Optical sectioning deep inside live embryos by selective plane illumination microscopy. *Science*, 305(5686), 1007-1009.
4. Huisken, J., & Stainier, D. Y. R. (2009). Selective plane illumination microscopy techniques in developmental biology. *Development (Cambridge, England)*, 136(12), 1963-75. doi:10.1242/dev.022426
5. Keller, P. J., Schmidt, A. D., Santella, A., Khairy, K., Bao, Z., Wittbrodt, J., & Stelzer, E. H. K. (2010). Fast, high-contrast imaging of animal development with scanned light sheet – based structured-illumination microscopy. *Nature Methods*, (July). doi:10.1038/nmeth.1476

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