Imaging on a large scale: Dealing with Expansion Microscopy, Spatially Resolved transcriptomics and other omics.

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Recent advances in science and technology point towards the "omics" world. Omics-related sciences aim to gather information about X^n biological molecules to characterize and quantify the full pool of molecules. Not surprisingly, microscopy is also evolving to incorporate Omics-related technologies with spatially resolved transcriptomics being the latest cutting-edge microscopy approach to "Omics".

Spatial transcriptomics (or multiplex imaging) evolved as a group of methods that deliver information at the single-molecule level of RNA expression of numerous genes. Importantly these methods deliver single-molecule expression information in the context of the full organism, offering a powerful tool to identify key distinguishing genetic or protein signals underlying development, diseases, or responses to injury, and so new potential targets for therapeutic intervention.

Concomitantly, there is an urge to gather super-resolved information to capture the detail at a single-molecule level with light microscopy imaging. Expansion microscopy has evolved from that need and is a powerful technique that allows localization at the single-molecule level in confocal microscopes.

Both technologies, spatial transcriptomics and expansion microscopy, need specific features in a microscope with the requirement being high-contrast imaging of large samples at high resolution and speed. These techniques require a highly productive workflow if they are to deliver on their promise. This translates to 1) highly sensitive imaging, 2) fast multi-dimension capture, 3) large Fields of View, 4) extremely uniform illumination and 5) exceptionally high background rejection (mainly in thick samples).

This poster will present data positioning Andor Dragonfly as the ideal microscope solution for spatial transcriptomics and expansion microscopy imaging. We will show how the REST-API integrated into Fusion software allows the communication of Dragonfly with the microfluidic devices to deliver multiple rounds of imaging.

Using the Dragonfly for expansion microscopy and in-situ multiplex imaging allows researchers to acquire faster results-driving discoveries both in basic and applied biomedical research.