Carl Zeiss Microscopy

Imaging and Analysis of 3D cell cultures using ZEISS microscope systems and Arivis

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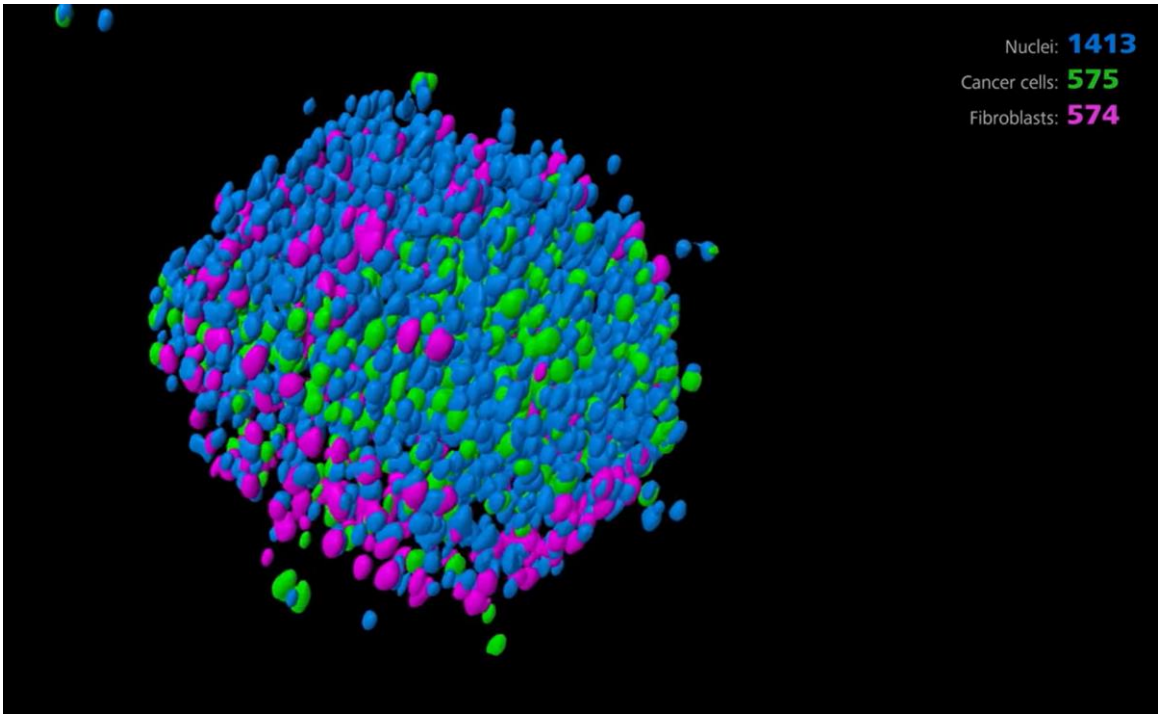
Image and therefore data acquisition of three-dimensional cell cultures like organoids, spheroids, and organ-on-a-chip designs can be particularly challenging. These biological specimens can be or grow to quite a large size (up to several mm) paired with potentially being optically very dense. Culturing organoids introduces other factors that hamper imaging even further, such as opaque embedding media and scaffolds or optically inaccessible chip designs. In the first part of this workshop, we will talk about these challenges and have a look a selection of the imaging technologies that ZEISS Microscopy has to offer to generate data from organoids – like light sheet based imaging (Lightsheet 7, Lattice Lightsheet /) and the new LSM 9 with Lightfield 4D technology for instant volume acquisition. In addition, workflows and setups for improved throughput or automated imaging (Celldiscoverer 7) will be presented..

When working with 3D cell cultures – the next crucial step is image analysis to extract meaningful data and therefore answers to your scientific questions. Analyzing 3D data sets comes with its own set of challenges. Raw data that can be 10 to 100 times larger than common datasets requires software solutions optimized for these large datasets and that enable easy, correct, and robust image analysis. Arivis software suite of software solutions handles is optimized to deal with large data sets, extracts meaningful data easily and fast and allows automation and upscaling to standard operating procedures. In the second part of our workshop, we will talk about the capabilities of Arivis in the light of 3D cell culture image analysis and present examples highlighting the power of this software.



Cleared spheroid of a co-culture of HCT-116-GFP (colon cancer) / NIH-3T3-RFP (fibroblasts) cells stained with Hoechst for nuclei. Imaged in an InSphero Akura plate. Dataset was segmented using arivis Pro. Sample courtesy of InSphero AG. Schlieren, Switzerland