

Cancer Research: More reliable data by close to nature cell culture models

## Elucidate cancer development on sub-cellular level by *in-vivo*-like tumor spheroid models

Understanding the sub-cellular mechanisms in carcinogenesis is of crucial importance for cancer treatment. Popular cellular models comprise cancer cells grown as monolayers. But this approach disregards the three-dimensional (3D) interaction of tumor cells with their surrounding microenvironment. To understand the development and progression of malignancy in a close to nature context, the characterization of cancer microenvironments is crucial.

As a consequence, a constantly ascending number of culturing methods allows cancer cells to be grown as 3D spheres. These cellular spheroids mimic the properties of solid tumors and are well suited to model cancer development with physiological relevance. The complex 3D structure and volumetric size represents a challenge in conventional light microscopy. This can be overcome by light sheet-based microscopy, which allows tracking of sub-cellular changes in large samples within reasonable time.

The investigation of cellular spheroids with Leica's SP8 Digital Light Sheet (DLS) microscope reveals meaningful results of cellular and molecular processes in standard petri dishes and is very well suited for cancer research.



### Additional fields of research

- Tumor microenvironment
- Stem cell biology
- Organogenesis
- Personalized medicine

### References

- Ishiguro et al., Cancer Science, 2017, 108 (3)
- Halfter and Mayer, Biotechnol J, 2017, 12 (2)
- Shimokawa et al., Nature, 2017, 545
- Ke et al., Cell Reports, 2016, 14 (11)
- Sato and Clevers, Cell, 2015, 161 (7)

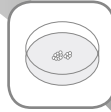


# DLS workflow for 3D cell culture models in cancer research



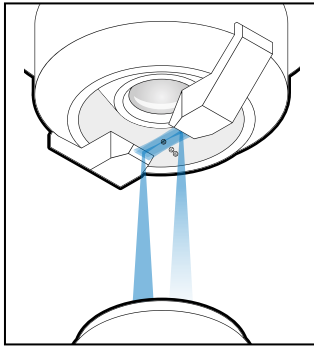
## Preparation

Grow cellular spheroids from single cells according to your protocol (liquid-overlay, hanging-drop, hydrogel etc.).



## Mounting

Transfer spheroids into suitable petri dishes. Immobilize spheroids in 1% low-melting agarose.



Digital Light Sheet set up with TwinFlect Mirror for fast spheroid acquisition.



## Light sheet-based microscopy

Observe multiple spheroids live or by end-time measurements. Acquire high spatial and temporal resolution with low phototoxicity.



## Data handling

Save your data during the acquisition via continuous streaming from temporary memory to final storage medium – no extra time for saving is necessary.



## Visualization

Visualize your large data sets after image acquisition by the LAS X 3D Visualization tool.



## Analysis

Quantify relevant parameters in your experiment (e.g. growth rate, volume change) by the LAS X 3D Analysis tool.

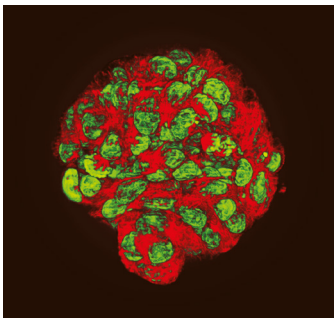


## Share

Export your imaging data rapidly using the LAS X movie editor and share your results with other scientists worldwide.



## Leica provides: New imaging solution for *in vivo*-like 3D cell cultures in cancer research



Tumor spheroids provide a more realistic model for cancer research. The Leica TCS SP8 DLS light-sheet microscope enables you high spatial and temporal resolution by low phototoxicity.

**Mammary epithelial micro spheroid cultured in matrigel. Courtesy of intelligent imaging group (B. Eismann/ C. Conrad) at BioQuant/DKFZ Heidelberg.**

