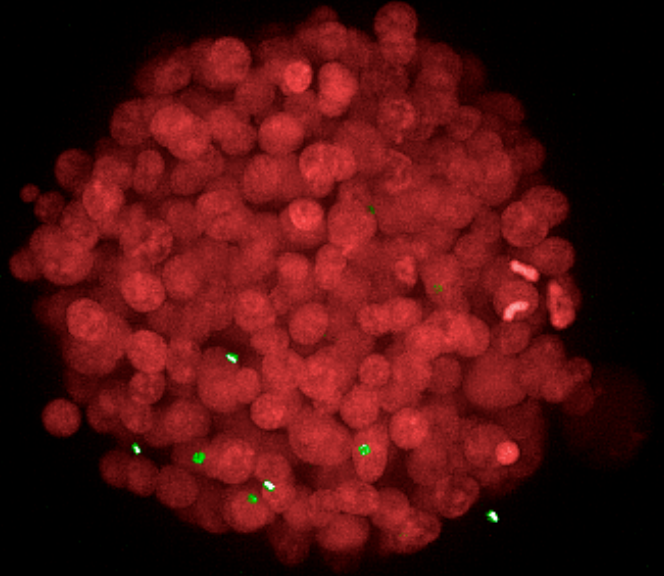


# Studying cancer and metabolic diseases using spheroids



Spheroids are simple 3D structures, composed of typically one type of cell aggregates, that exhibit extensive cell-cell adhesion and have properties that mimic in vivo tissues and tumor behavior more effectively than 2D cell cultures.

Combining novel SPACHIP® technology with spheroids allow researchers to gain a deeper understanding of cancer and metabolic diseases, accelerate drug discovery, and develop more targeted and personalized treatment approaches. 3D cell cultures bridge the gap between traditional cell culture systems and in vivo models, providing a more representative and functional model for current research focused on several disorders such as cancer and neurodegenerative diseases.

**SpheroCHECK SPACHIP® pH Green Single-Detection Kit** 



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## 01 CANCER PROGRESSION AND METASTASIS

To investigate the mechanisms of cancer progression, invasion, and metastasis.

## 02 TUMOR MICROENVIRONMENT

Spheroids can be co-cultured with immune cells, fibroblasts, or endothelial cells to study the interactions between tumor cells and the microenvironment.

## 03 DRUG TESTING AND TOXICITY SCREENING

To provide a 3D platform to test the efficacy and safety of drug candidates for metabolic diseases.

## 04 STUDY OF DISEASE MECHANISMS

Spheroids are great models to unravel molecular and cellular processes underlying metabolic diseases.

# Real-time monitoring of intracellular changes in spheroids to mimic real biological processes

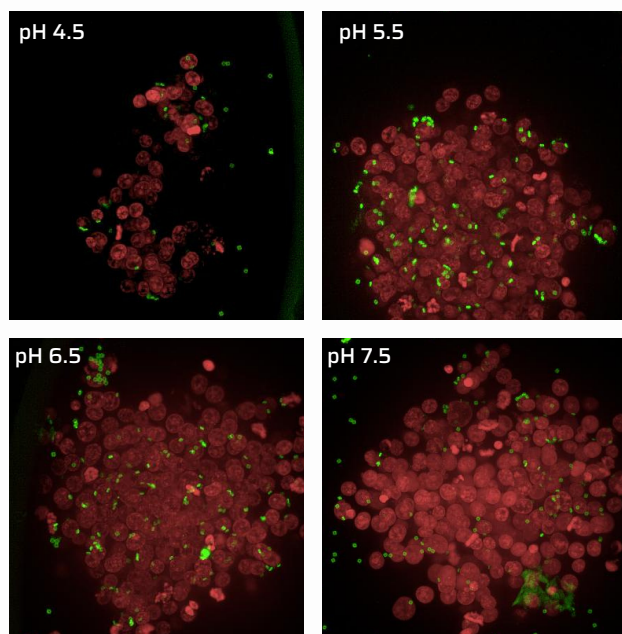
## Analysis of imaging and quantification data to study spheroid condition and activity as well as pH changes using SpheroCHECK SPAchip® pH Green Single-Detection Kit

Spheroids are simple 3D clusters of single or multi cell types. Three-dimensional cell aggregates provide a more accurate representation of in vivo conditions than traditional two-dimensional cell cultures. Thus, spheroids have become a new cell culture model due to their superior capacities for differentiation compared to 2D culture systems. In addition, the study of spheroid formation gives us insight into disease modelling, including imitating tumours, tissue engineering, and stem cell research in drug discovery.

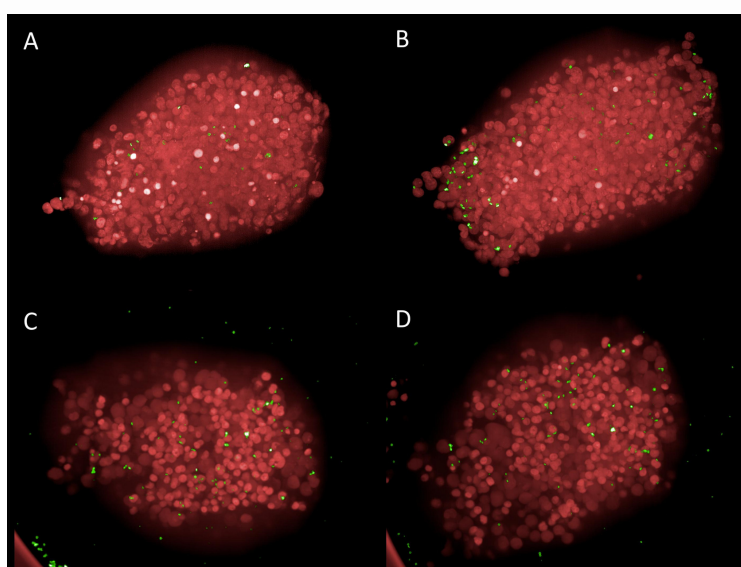
Spheroid's morphology and cellular behavior are greatly affected by pH during spheroid formation. pH fluctuations directly affect cell viability, proliferation rates, and metabolic activities, ultimately affecting spheroid formation and condition. It is essential to maintain an optimal pH environment to ensure reproducibility and reliability as well as to accurately assess the efficacy and toxicity during drug testing in 3D cell culture.

### The study of physiological processes in living cells requires intracellular pH monitoring.

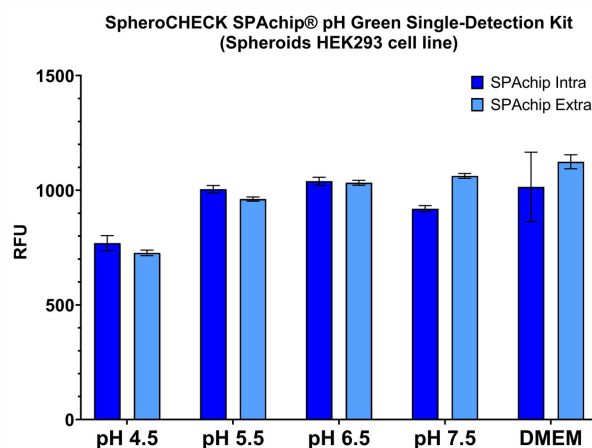
With our SPAchip® technology for pH monitoring, we can monitor intracellular signaling processes even inside three-dimensional cell aggregates over a period of minutes, hours, or even days. The SPAchip® technology revolutionizes dynamic, real-time assays. Single cells can be analyzed under conditions that closely mimic their natural environment, ensuring the preservation of their physiological state.



**Figure 2:** HEK293 (Human Embryonic Kidney cell line) spheroid formation. HEK293 cells were incubated with SpheroCHECK SPAchip® pH Green Single-Detection Kit at different pH conditions using commercial calibrators. DRAQ5™ in red stained live nuclei. SPAchip® technology allows pH measurement at the different time points of spheroid formation.



**Figure 1:** HEK293 spheroid formation. Timelapse of HEK293 cell line (from Human Embryonic Kidney) spheroid formation with internalization of SpheroCHECK SPAchip® pH Single-Detection Kit Green. DRAQ5™ in red stained live nuclei. SPAchip® technology allows pH measurement at the different time points of spheroid formation. HEK293 cells were incubated with SpheroCHECK SPAchip® pH Single-Detection Kit to allow spheroid formation at 24 **A**), 28 **B**), 48 **C**), and 52 hours **D**).



**Figure 3:** SpheroCHECK SPAchip® pH Green Single-Detection Kit at different pH conditions using commercial calibrators. Graph showing fluorescence intensity values (RFU) of SpheroCHECK SPAchip® pH Green Single-Detection Kit at different pH conditions using intracellular calibrators in HEK293 cell line (from Human Embryonic Kidney) spheroids. Images and RFU values were obtained in HCS-Operetta equipment. Mean values for each condition were represented and error bars correspond to SD.

**Product name:** SpheroCHECK SPAchip® pH Green Single Detection Kit  
**Reference:**SS-001-PG

*Dynamic Film about cell sensing*