CORNING

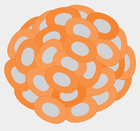
Spheroids vs. Organoids

What's the Difference?

Spheroids and organoids both offer you the opportunity to create more complex three-dimensional models with the power to more accurately recreate *in vivo*-like tissue and organ conditions. Each one offers advantages and disadvantages. Which model works best for you? It largely depends on the type of application you're working on and the ultimate goal of your research. In either case, both spheroids and organoids bring incredible promise and potential to many critical areas of research.

OVERVIEW

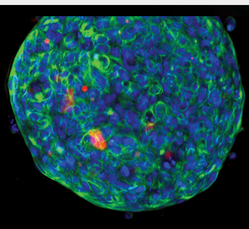
Spheroids are a simple, inexpensive, easy way to model cells in 3D. The ability of spheroids to replicate solid tumors helps to accelerate drug discovery programs and improve our understanding of cancer biology.



Organoids have become an increasingly popular option for scientists in disease modeling, cancer research, and drug screening because they resemble the composition and functionality of organs. These can lead to more *in vivo*-like results.

ORIGIN

Spheroids may be generated from a broad range of cell types resulting in tumor spheroids, embryoid bodies, hepatospheres, neurospheres, and mammospheres, among others. They may be made up of one cell type or multiple cell types.



Organoids may be generated from pluripotent stem cells and/or organ progenitors from normal or diseased adult tissue-specific stem cells.

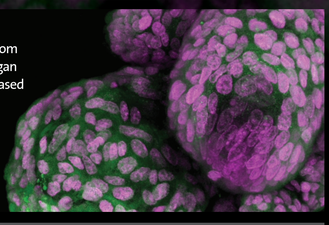
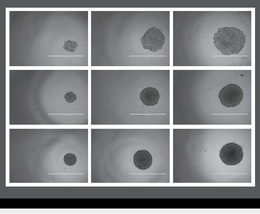


Photo Credit: MDI Laboratory, ME

MODEL ENVIRONMENT

Spheroids are typically created in a scaffold-free environment by placing cells into suspension colonies without the aid of extracellular matrices (ECMs) or other physical supports.



Organoids typically require a scaffold, such as a BME or ECM, which can be used to encapsulate cells to provide an ideal growth environment and supply biological cues to aid in self-organization.

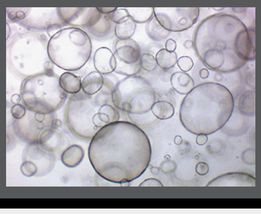
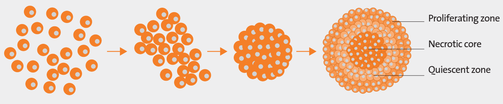


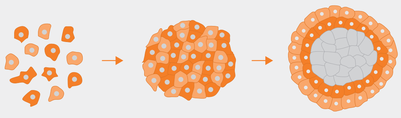
Photo Credit: L.A. Oosterhoff

POLARITY

Spheroids may or may not exhibit polarity.



Organoids exhibit polarity, cell migration, self-organizing into mini-organs.



APPLICATION AREA

Spheroid Research Areas

- Cancer biology
- Tumor modeling
- Stem cell research
- Immuno-oncology
- Liver toxicity modeling

Organoid Research Areas

- Organogenesis from stem cells
- Disease modeling including cancer
- Patient-specific therapies also known as personalized medicine
- CRISPR
- Immuno-oncology

Photo Credit: Lancaster, MA, et al., 2013

HOW TO GENERATE

Spheroids may be generated and cultured in suspension or in a low attachment culture environment such as Corning spheroid microplates or Corning® Elplasia® plates.

Organoids may be generated by mixing cells with an ECM such as Corning Matrigel® matrix and culturing in media containing specific growth factors to generate mini-organs of the kidney, thyroid, liver, brain, lung, intestine, prostate, and pancreas.

ADVANTAGES

Spheroids can develop metabolic gradients that create heterogeneous cell populations with superior cell-to-cell and cell-to-ECM interactions. They can also successfully mimic the microenvironment of a variety of diseased tissue types.

- High reproducibility
- Scalable to different plate formats
- High throughput screening (HTS) capability
- Co-culture ability

Organoids are more complex and *in-vivo*-like, resembling cell structures and microenvironments for more precise and targeted animal research and cell therapies. They are used for modeling cancer and organ development. Along with CRISPR, they allow for better genetic and drug screening disease models.

- Patient-specific
- *In vivo*-like complexity
- *In vivo*-like architecture
- HTS-enabled formats available

CORNING FEATURED PRODUCTS

Corning® Spheroid Microplates

Cat. No.	Description
4515	96-well spheroid microplate with ULA (Ultra-Low Attachment) surface
4516	384-well spheroid microplate with ULA surface
4617	1536-well spheroid microplate with ULA surface

Corning Elplasia® Plates

Cat. No.	Description
4440	6-well black/clear, round bottom, micro-cavity plate with ULA surface
4441	24-well black/clear, round bottom, micro-cavity plate with ULA surface
4442	96-well black/clear, round bottom, micro-cavity plate with ULA surface

Costar® Ultra-Low Attachment (ULA) Microplates

Cat. No.	Description
3471	Costar 6-well clear, flat bottom plate with ULA surface
3473	Costar 24-well clear, flat bottom plate with ULA surface

Corning Matrigel® Matrix for Organoid Culture

Cat. No.	Description
356255	Matrigel matrix for organoid culture
356231	Matrigel matrix, phenol red-free, LDEV-free
354234	Matrigel matrix, LDEV-free
354230	Matrigel matrix GFR (growth factor reduced), LDEV-free

Corning Matrigel Matrix-3D Plates

Cat. No.	Description
356259	96-well Matrigel matrix-3D plate
356256	384-well Matrigel matrix-3D plate
356257	384-well Matrigel matrix-3D plate

Corning Collagen Type I

Cat. No.	Description
354249	Collagen I
354236	Collagen I, HC (high-concentration)

Transwell® Permeable Supports

Cat. No.	Description
3392	HTS Transwell-96 permeable support, 1.0 µm pore, PET
3387	HTS Transwell-96 permeable support, 5.0 µm pore, PC
3382	HTS Transwell-96 receiver plate, clear

Corning Media and Reagents

Cat. No.	Description
10-013-CV	DMEM [+] 4.5 g/L glucose, L-glutamine, sodium pyruvate
17-305-CV	MEM [+] Earle's salts [-] L-glutamine, phenol red
10-040-CV	RPMI 1640 [+] L-glutamine
10-080-CV	Ham's F-12 medium [+] L-glutamine
35-010-CV	FBS (fetal bovine serum)

Other Supporting Products

Cat. No.	Description
T-200-C-L-R-S	Axygen® Maxymum Recovery® tips
354270	Cell recovery solution
354235	Dispase
6875-58	Corning LSE™ digital dry bath heater
3513	Costar clear TC-treated 12-well plates, individually wrapped, sterile
3578	Disposable spinner flasks
3303	Corning CellSTACK® 1-Chamber vessel with ULA surface
431751	Cell strainer

For additional product or technical information, visit www.corning.com/lifesciences or call 800.492.1110.
Outside the United States, call +1.978.442.2200 or contact your local Corning sales office.