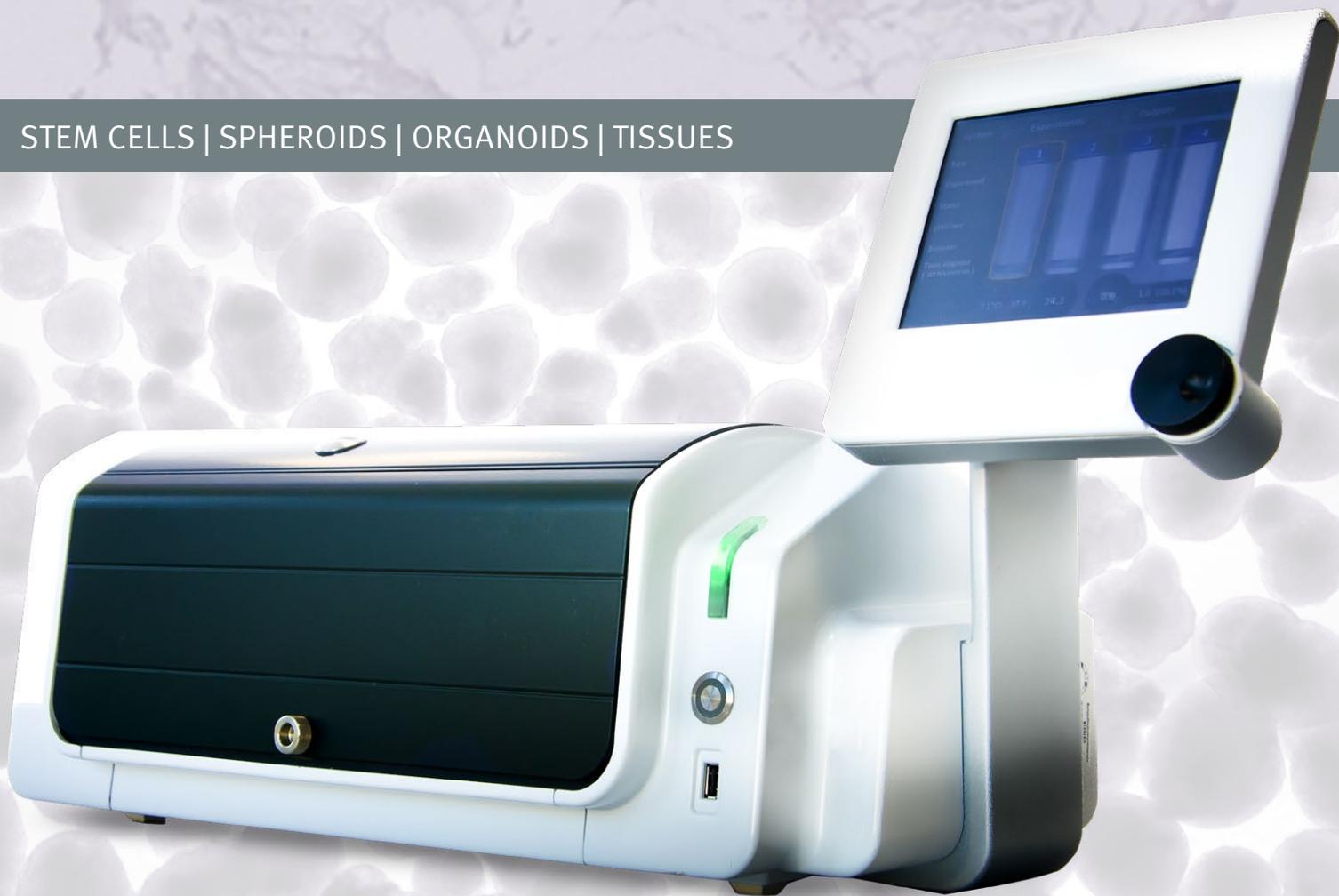


STEM CELLS | SPHEROIDS | ORGANOIDS | TISSUES



Innovating 3D Cell Culture

CERO 3D Incubator and Bioreactor

Your Partner in Cell Research

OLS[®]
OMNI Life Science

Break the limits in 3D Cell Models

Stem Cells – Spheroids – Organoids – Tissues

The CERO 3D Incubator and Bioreactor offers a unique 3D cell culture technology to boost your research in stem cells, spheroids, organoids and tissues. Highest levels of homogeneity and viability in long term cultures are just two benefits provided.

Major benefits:

- Improved viability and maturation
- No embedding substrate required
- Significantly reduced apoptosis & necrosis
- No shear forces
- Long-term cultivation for > 1 year
- Significantly reduced running costs

The CERO 3D Incubator and Bioreactor is a novel, standalone incubator that monitors and controls temperature, pH and CO₂ levels. One to four independently controlled, 50ml CEROTubes provide high biomass yields in a standardized way, with minimum handling requirements. The CEROTubes, with small fins and a flat bottom, are perfectly designed to reduce stress to your samples and create optimal culture conditions.



Made in Germany

Pluripotent Stem Cells

The CERO 3D Incubator and Bioreactor provides the solution for scale-up and automation platforms, simplification and cost reduction of stem cell expansion projects in biobanks, cell based drug discovery, toxicity testing and regenerative medicine.

Benefits:

- Microcarrier-free
- Stable pluripotency over many passages
- Easy to set-up and simple workflow
- Free-floating 3D aggregates
- Able to differentiate in 3 germ layers
- Homogeneous iPS cell and ES cell aggregates

Pluripotent stem cells are directly inoculated as single cells into the CEROTube. They form homogeneous aggregates during a process called “autoadhesion”.

Expansion continues for 5-9 days during which biomass will significantly increase. Only appr. 2min hands-on time is required per day. The resulting stem cell aggregates can be used directly for differentiation in organoids.

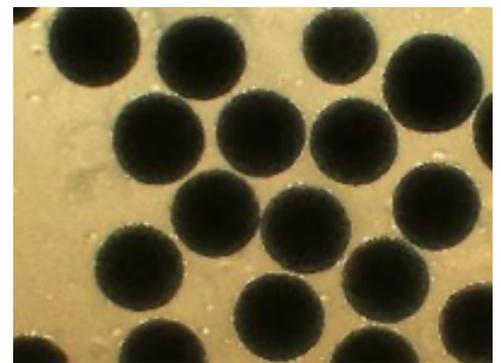


Fig 1: Human iPS cell after expansion in CERO 3D Incubator and Bioreactor

Pluripotency

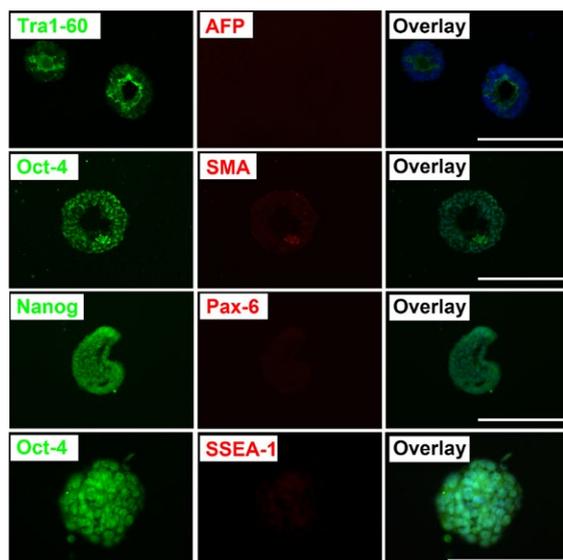


Fig. 2: Human iPS cell after expansion in CERO 3D Incubator and Bioreactor tested for pluripotency

Differentiation

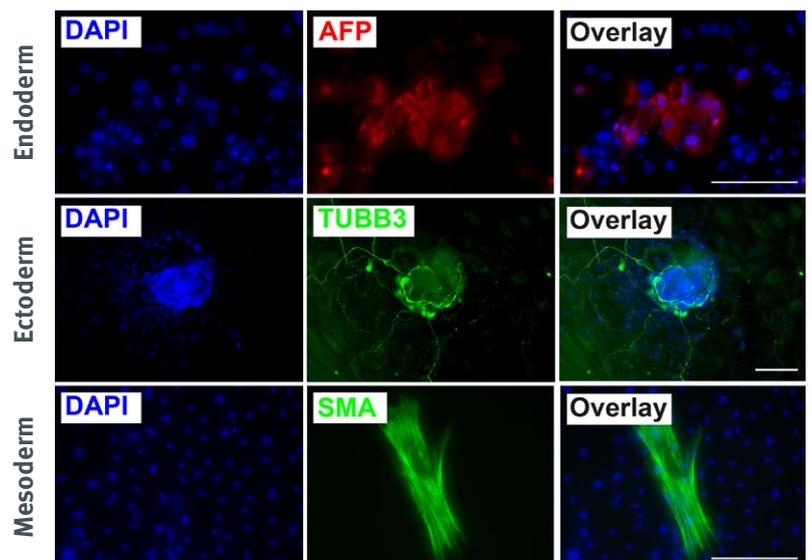


Fig. 3: Human iPS cell after expansion in CERO 3D Incubator and Bioreactor tested for differentiation in different germ layers

Pluripotent stem cells expanded in CERO 3D (former name “BioLevigator”) will maintain pluripotency and can be differentiated into all 3 germ layers, as described by Elanzev et. al. 2015; Biotechnol. J. 2015, 10, 1589–1599.

Spheroids as disease models

Three-dimensional spheroids have great importance as in vitro disease models. They allow to imitate in vivo microenvironments not found in traditional 2D monolayer cultures. However, many scientist experience limitations when working with spheroids.

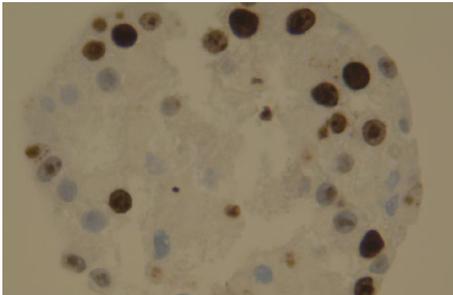
The CERO 3D Incubator and Bioreactor is the solution to many existing limitations and even enables scientists to perform experiments they were not able to do before.

Benefits

- No apoptosis and necrosis
- Viability in long term culture > 80 days
- More than sufficient time for maturation
- Long term proliferation
- High homogeneity
- High yield

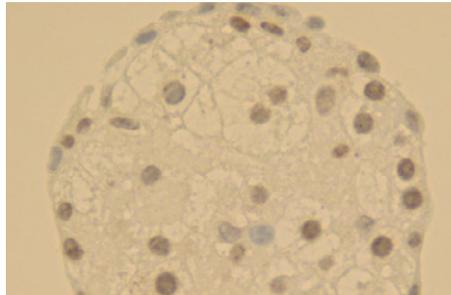
Spheroid cultivation in CERO 3D for >80 days

Proliferation



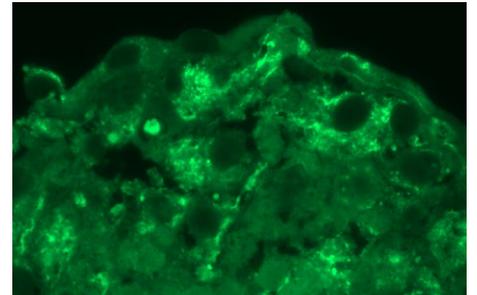
Cells are positive for cell proliferation marker KI67

No Apoptosis



Cells are negative for apoptosis marker Casp.c1.3

100% Albumin

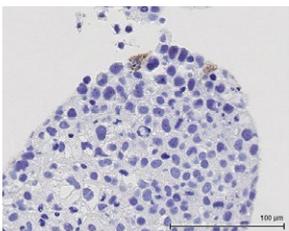


All cells are positive for albumin marker

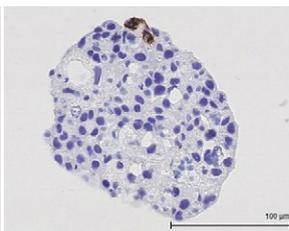
Virus Research

The CERO 3D Incubator and Bioreactor allows maturation of spheroids without necrosis and apoptosis while other technologies fail. Therefore, CERO 3D maintains state-of-the-art 3D cultures (see figure below). The disposable CEROTubes with HEPA filter allows safe virus experiments.

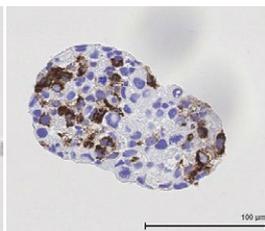
24 hrs



48 hrs



72 hrs



Prof. Dr. Heikenwalder, German Cancer Research Center (DKFZ), Heidelberg, Germany
“Our research takes advantage of healthy cells even from long-term cultures in CERO 3D. Moreover, we are now able to perform 3D long-term culture of human tissue specimen in CERO 3D – a paradigm shift.”

Spheroid from hepatocyte cell line was matured for 20 days prior to exposure to HCV. Spread of infection was controlled after 24, 48 and 72hours (brown staining)

Cardiac Bodies – a complete workflow

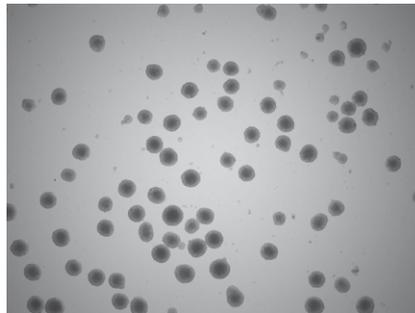
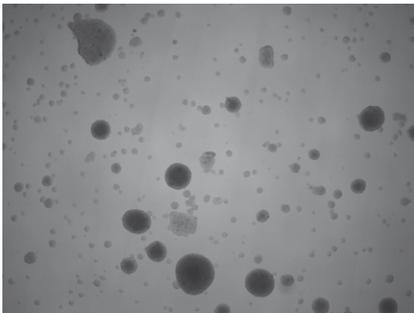
Stem cell derived cardiomyocytes are getting more and more attention in the field of cardiovascular science and therapies.

The CERO 3D Incubator and Bioreactor enables scientists to start the workflow with stem cell expansion in homogeneous aggregates followed by direct induction and the cultivation of cardiac bodies. As a result, within a short period of time, a high number of beating cardiac bodies can be generated. Compared to induction and cultivation in orbital shakers, results in CERO 3D deliver much higher quality, homogeneity, vitality and yield.

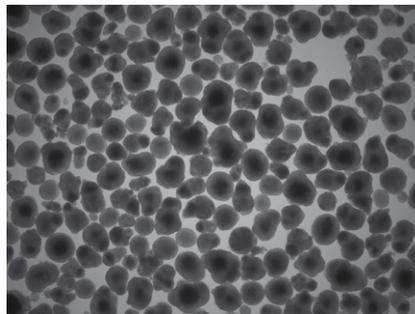
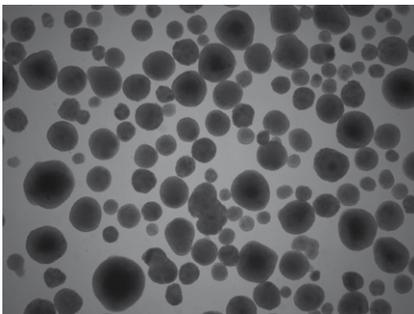
Orbital shaker

CERO 3D

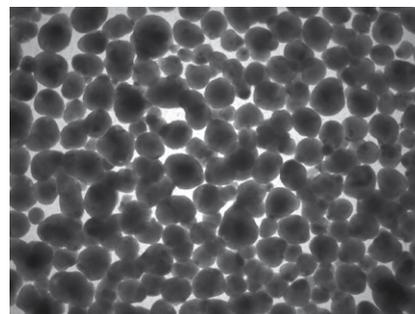
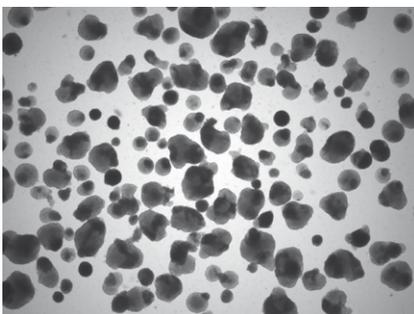
Day 3



Day 8



Day 13



Benefits

- Homogeneous 3D aggregates in suspension
- Expansion and differentiation in the same CEROTube
- Easy to handle and standardize
- Highest yield
- No embedding substrate required
- Immediate reaction to drug treatment

Yvonne Eibach, Max Planck Institute, Bad Nauheim:

“Moreover this 3D cultivation system substantially improves viability, maturation and contractility, therefore provides a reliable tool for cardiovascular therapies.”

Fig. CERO 3D versus Orbital shaker - cultivation of murine embryonic stem cell derived cardiomyocytes 3, 8 and 13 days after induction of differentiation

Vital and homogeneous cardiac bodies generated in CERO 3D Incubator and Bioreactor are perfect for drug testing as immediate reactions to drug treatments can be observed. Cells can also be used for 2D downstream applications, such as 2D monolayers.

From Adult Stem Cells to Organoids

The CERO 3D Bioreactor and Incubator provides a unique approach for lab scale production of organoids from pluripotent and adult stem cells. As an efficient tool for cancer research, it offers a standardized way to generate and maintain high yields of homogenous organoids.

Benefits:

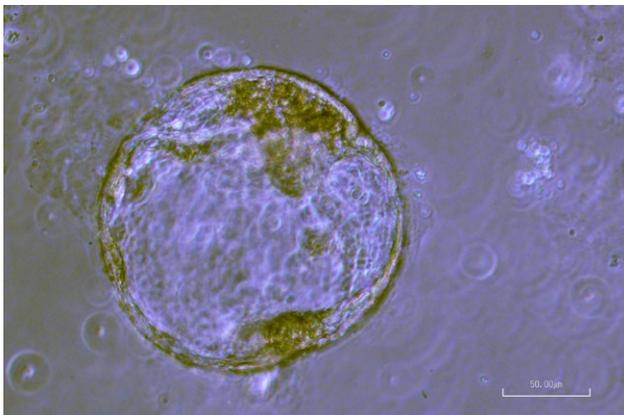
- Reduced cost and time
- Improved differentiation and polarity
- Standardizable workflows
- Free floating, no stress
- High homogeneity and yield
- Real long term cultivation

Gastric Carcinogenesis Research

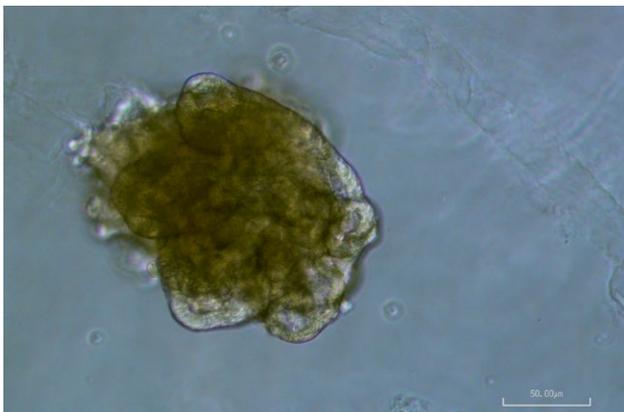
The generation of gastric organoids is a crucial step in the study of *Helicobacter pylori* infection and gastric carcinogenesis.

The CERO 3D Incubator and Bioreactor allows generation in a much more efficient, reproducible, physiological and cost efficient way compared to other approaches.

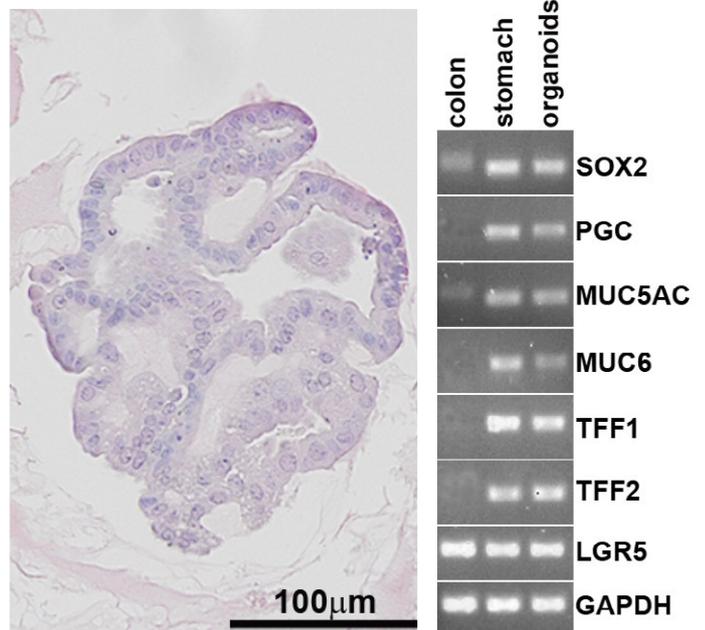
Day 7



Day 22



Gastric organoids (bright field) at day 7 and after splitting on day 22 expanding from small cysts that expand to bigger spheres



HE staining of gastric organoids showing single layer of epithelia cells composed of the different cell types found in the stomach. PCR results show expression of: 1) gastric mucins MUC5AC AND MUC6, 2) trefoil factors and pepsinogen, and 3) stem cell markers such as Lgr5 and Sox2.

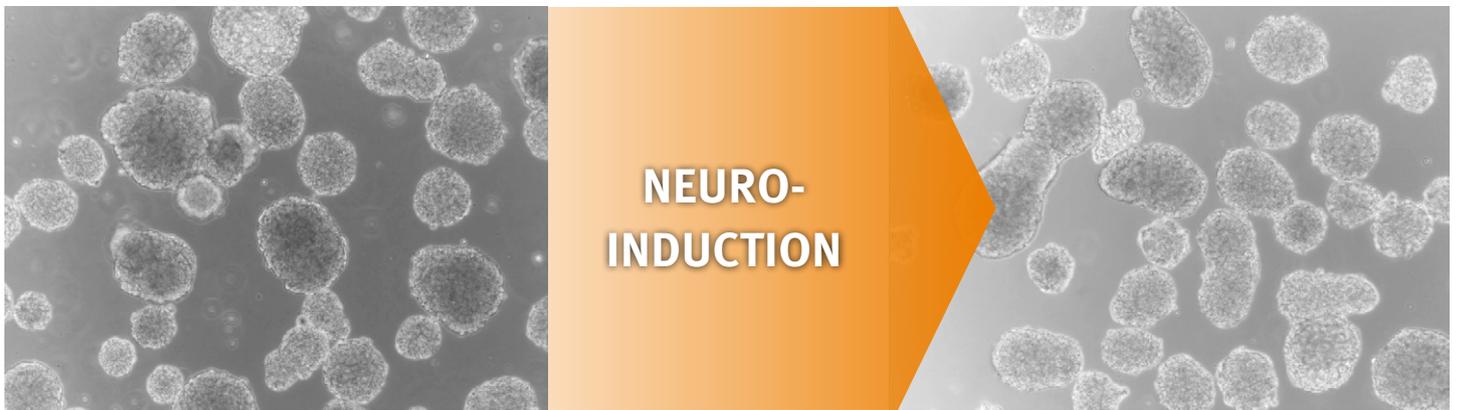
Dr. Mejias-Luque, Technical University Munich (TUM), Germany

“With CERO we can generate gastric organoids more efficiently, while maintaining their morphology and genetic characteristics in long-term cultures. This is a perfect system to study gastric carcinogenesis.”

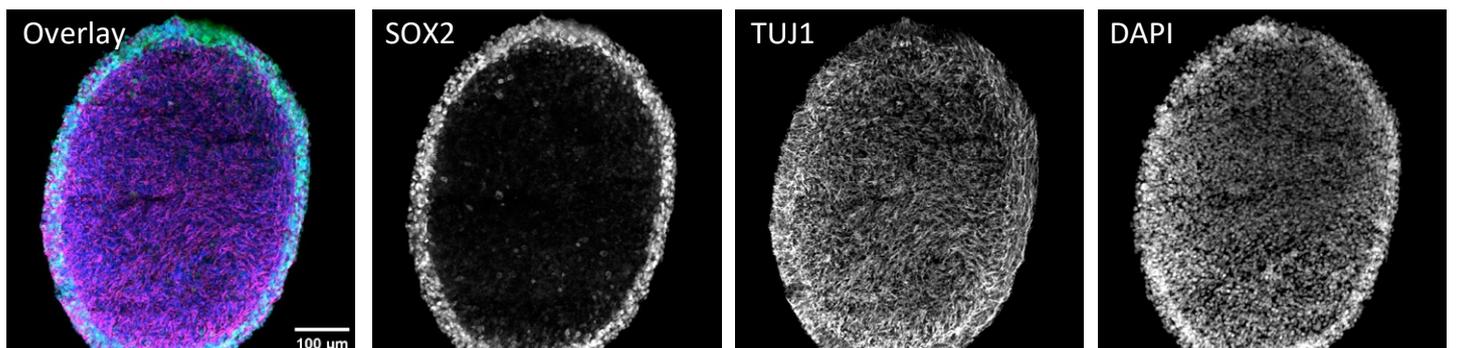
From Pluripotent Stem Cells to Organoids

The CERO 3D Incubator and Bioreactor combines expansion of pluripotent stem cells with the induction of differentiation and cultivation of organoids. Normally, this is a time consuming, multistep process and almost impossible to standardize. The CERO 3D helps you to overcome these challenges.

Neuronal Stem Cells



Pluripotent stem cells form homogeneous embryoid bodies in CERO 3D. After induction they form 100% homogeneous Neurospheres.



Immunostaining of neurospheres 5 days after induction. The picture shows SOX2 as marker for proliferation at the outer layer of the spheroid while the signals of TUJ1 (pan-neural) and DAPI are equally spread. By Dr. Chong GAO, Dr. Kai LEI, School of Life Science, Westlake University, Hangzhou China

The CERO 3D Incubator and Bioreactor is easy to operate and generates homogeneous aggregated NSC in high biomass (~1g per tube) in short time frame.

CERO 3D Incubator and Bioreactor

at a glance

Order information

2800000	CERO 3D Incubator and Bioreactor	2800002	HEPA Filters (pack of 24)
2800005	CEROtubes (pack of 48)	2800004	Adaptor Kit for CEROtubes (pack of 4)
2800006	MICROLAB® Disinfectant Spray Kit	2800107	TYGON S3™ Tube E-3603, DEHP-free, 4,8 x 8,0 mm (price per meter)
2800003	Convection Channel		

Meet the OLS experts

- **Instrument Service:** Our service team will provide timely technical assistance for all questions during and after purchase process. During installations our technical experts can be on site to guide and train you.
- **Technical Service:** The OLS scientists on the technical support team support you professionally with their broad level of experience. They can assist you to optimize your experiments and workflows.
- **Consulting:** Individual consultation is based on your specific needs. Our consultants support you in finding the best instrument solution for your lab and your workflow. Let us discuss and find smart, customized solutions that meet your specific needs.
- **Training, seminars and workshops:** Meet our experts during training events, webinars or workshops and learn more about the applications, trends and tips & tricks in cell analysis. Check out our website for upcoming training events.

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