

Focus on cell culture

How science grows



Optimised solutions for research

Introduction to cell and tissue culture

Life sciences have a rule: Cell biology is not everything, but without cell biology, everything is nothing. Because almost every scientific hypothesis, no matter how good, must first prove it is correct in the smallest unit of life which is the cell. Cell culture is therefore indispensable in basic and drug research. Elucidating complex signal pathways, drug development, efficacy and toxicity studies, or reducing animal testing according to the 3R rules? Almost impossible without cell models.

The variety of cell lines and culture systems available to you is now enormous. Primary and secondary cells or cell lines, suspended or adherent, 2D or 3D cultivation? The right choice is crucial for the success of your scientific work. What do you

need to consider? With SARSTEDT, you have a reliable partner at your side for all these questions. Our experienced specialists will work with you to identify your specific requirements and put together the optimal solution for your workflow from our extensive portfolio.

With our high-quality culture vessels, bioreactors, storage & filtration systems, we have the right tools for all tasks. Discover our innovative solutions and benefit from our expertise in cell biology.

“ Any living cell carries with it the experience of a billion years of experimentation by its ancestors. ”

Max Delbrück



The cell cultivation workflow

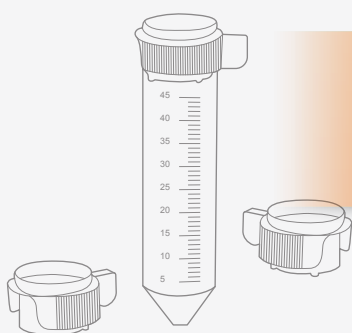
At a glance!

Cell cultivation is a fundamental process in cell biology that makes it possible to multiply and manipulate cells outside an organism under controlled conditions. This workflow includes several crucial steps that are essential for the successful growth and long-term maintenance of cell cultures.

The first step is cell multiplication, in which cells are cultivated in a suitable nutrient solution under sterile conditions in order to increase their number.

Another important step is subcultivation, also known as passaging, in which cells are diluted from their original culture in fresh medium and transferred to prevent overgrowth and maintain healthy cell growth.

This is followed by cryopreservation, a process in which cells are frozen at very low temperatures for long-term storage without affecting their vitality.



Cell isolation
(from animals/patients)

(New) start of cell
cultivation
(sowing)

Thawing

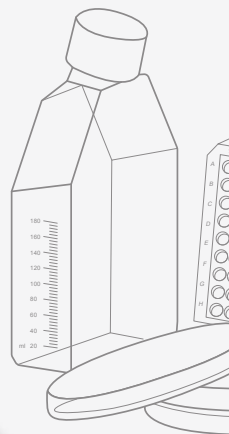
Preserved or newly obtained cells can be used to start the cycle again or from the beginning in order to cultivate and analyse certain cell types.

Each of these steps is essential to provide healthy, reproducible cell cultures for research or therapeutic applications.

Cell cult

Multip
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Subcult

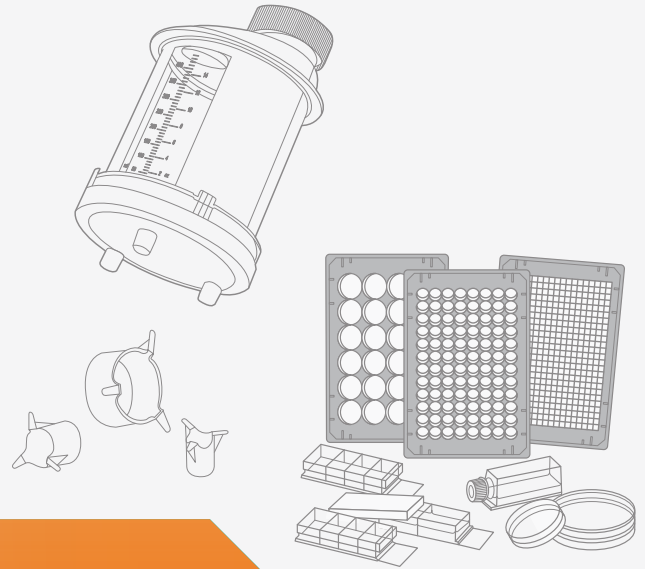
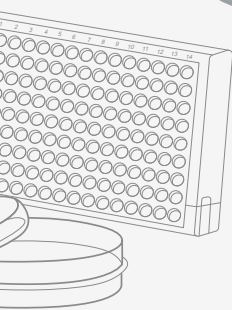
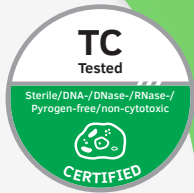


Activation

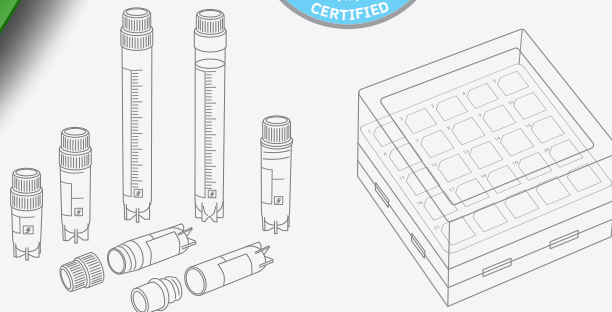
Application
of cells

Activation

Cryopreservation
(freezing)



Experiment/Analysis



**WANT TO FIND OUT
MORE?**

Download our free how-to poster here:
cellculture.sarstedt.com/en/poster



Our basics for reliable cultivation

Excellence in cell culture

Our extensive product line, consisting of flasks, dishes, plates, and extensive supplements, offers a variety of growth surfaces for a wide range of *in vitro* conditions and is customised to meet the needs of most cell types.

Through precise manufacturing and the highest quality standards, we pave the way for excellent science. Put your trust in the scientific expertise and product portfolio of SARSTEDT.

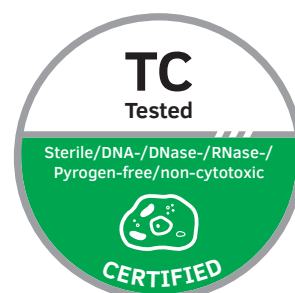
Time, money, energy, dedication and a lot of tolerance for frustration – those who work in science usually need all of these. Almost every researcher knows the feeling: Even at first glance through the microscope, it is clear that something has gone wrong. What are supposed to be adherent cells are floating dead in the medium or something is growing that

shouldn't be growing there. Unnecessary setbacks can be avoided by keeping an eye on the purity levels of your materials from the beginning for your cell culture work.

Our articles with TC Tested certification form the basis for the creation of cell cultures. We are convinced that products that come into contact with cells must not have any disruptive effects on the cells. That is why the manufacture of our products, which have been awarded the TC Tested quality seal for optimal cell culture safety, is subject to strict purity conditions.

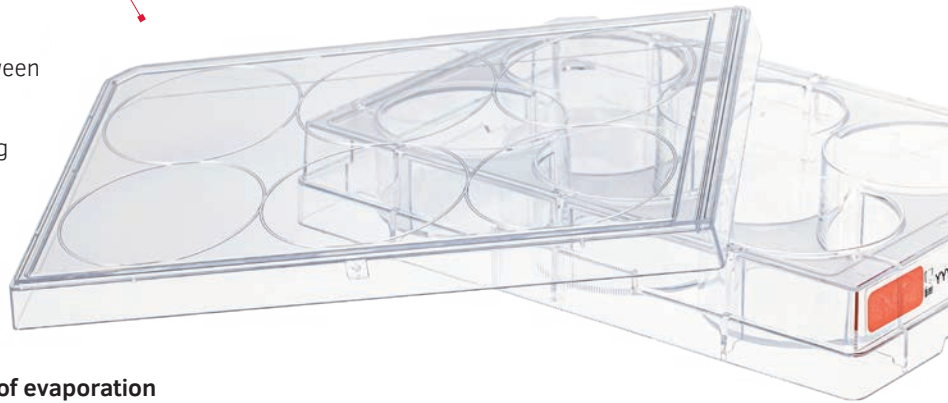


FIND OUT MORE?
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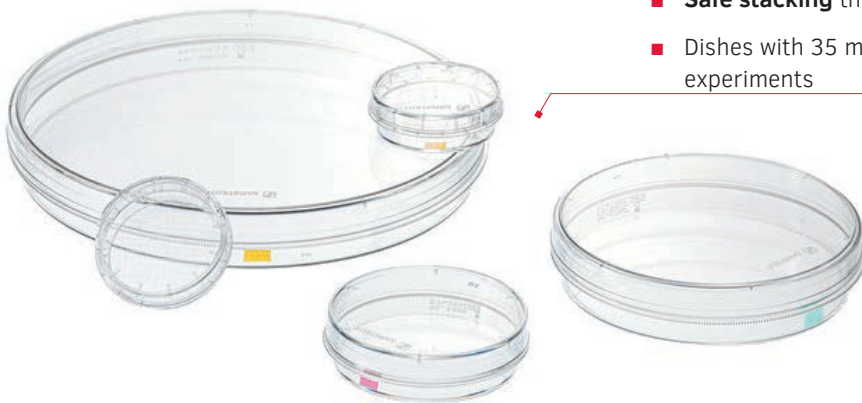
Cell culture plates

- Alphanumerical labelling on the edge and between the wells for **better orientation** when filling
- **Reduced risk of contamination** when pipetting thanks to free-standing wells
- **Secure hold** due to non-slip side grids
- Transparent side walls allow **visual inspection** of the medium
- Integrated air vents and condensation rings in the lid for **gas exchange** and **minimisation of evaporation**



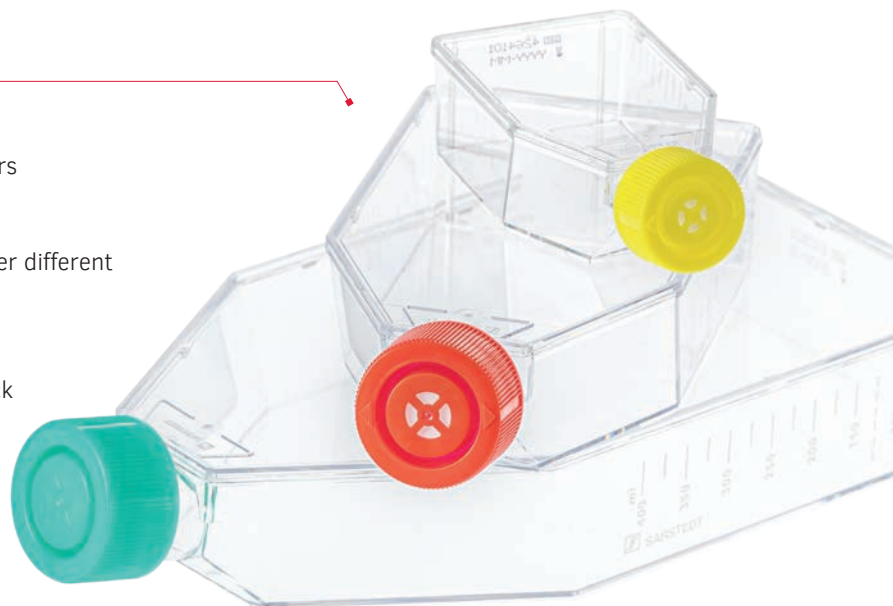
Cell culture dishes

- SARSTEDT SUREGrip – Outer ring enables **a secure grip** through haptic feedback
- Clear arrows on the base and lid for **uniform positioning**
- **Continuous gas exchange** through air vents in the lid
- **Safe stacking** thanks to pronounced rings
- Dishes with 35 mm and 60 mm diameter with **a grid** for cloning experiments



Cell culture flasks

- **Easy access** to all corners with pipettes and scrapers
- Large labelling fields for **easier work**
- Engraved and printed scaling for **best visibility** under different lighting conditions
- High **tilt resistance** due to stacking edge
- **Reduction of contamination risk** due to angled neck and anti-drip rim
- Quick-closure cap – in the filter cap and 2-position screw cap versions – allows opening and closing with 1/3 rotation



Find the optimal surface with the Cell Library

Practical colour codes for quick assignment



Regardless of whether you are working with primary cells or secondary cell lines, specific culture conditions play a crucial role. This starts with choosing the optimal culture vessel.

Cells that adhere to surfaces have different needs than cells cultivated in suspension.

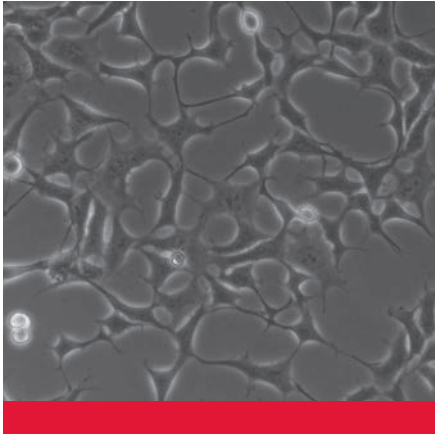
Hydrophilic culture vessels provide optimal culture substrate for adherent cells. They facilitate the initial adsorption and later adhesion of cells. Hydrophilic culture vessels with additional polar groups facilitate the adsorption and adhesion of primary cells or sensitive cell lines.

Hydrophobic culture vessels, on the other hand, reduce the adhesion of suspension cells and keep them in solution.

Especially with adherent cells, the surface of the culture vessel must be completely flat so that your cells can form a uniform cell layer and do not settle at the edges.

Depending on the application, different culture vessels are available for this purpose:

- Flasks: For high cell counts, high protection against contamination due to screw cap
- Dishes: For moderate cell counts
- Plates: For low cell counts, such as when conducting parallel tests



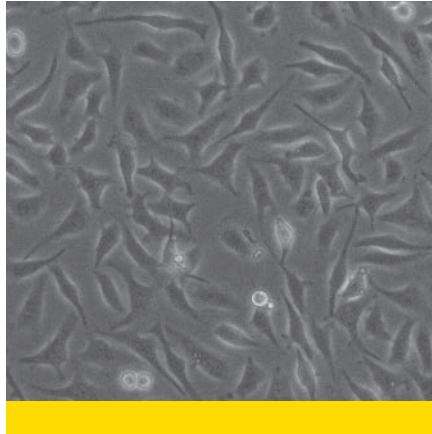
STANDARD

Colour code: Red

Cell type: adherent cells

A special treatment of the polystyrene surface introduces hydrophilic groups into the surface. This enables the binding of cell surface proteins and thus the adhesion of the cells to the plastic surface.

The red-coded, hydrophilic standard growth surface therefore offers many adherent cells an optimal culture substrate.



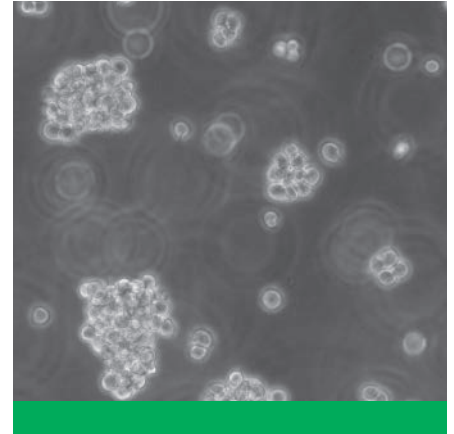
CELL+

Colour code: Yellow

Cell type: challenging adherent cells

Primary cells, sensitive cell lines and cells that are cultivated under serum-reduced/serum-free conditions pose a particular challenge to the surface of the cell culture vessels.

The yellow-coded Cell+ growth surface has been developed specifically for such cells. A special treatment of the plastic surface introduces additional polar groups into the hydrophilic surface.



SUSPENSION

Colour code: Green

Cell type: suspension cells

For suspension cells (mostly cells of lymphoid origin, hybridoma cells, etc.) that are not cultivated adherently in solution, culture vessels with the green, hydrophobic growth surface are ideally suited.

The hydrophobic surface minimises cell loss during subcultivation due to unwanted microadhesion.



The SARSTEDT Cell library

By choosing the right surface, you can optimise the growth of your cells in culture. Our "Cell library" brochure therefore contains an overview and literature references about which cells can be cultivated on which growth surface.

> Which surface to choose for optimal growth?

> What other options are there?

LEARN MORE!



cellculture.
sarstedt.com/en/celllib

BIOFLOAT™

Fast and reproducible for spheroid culture

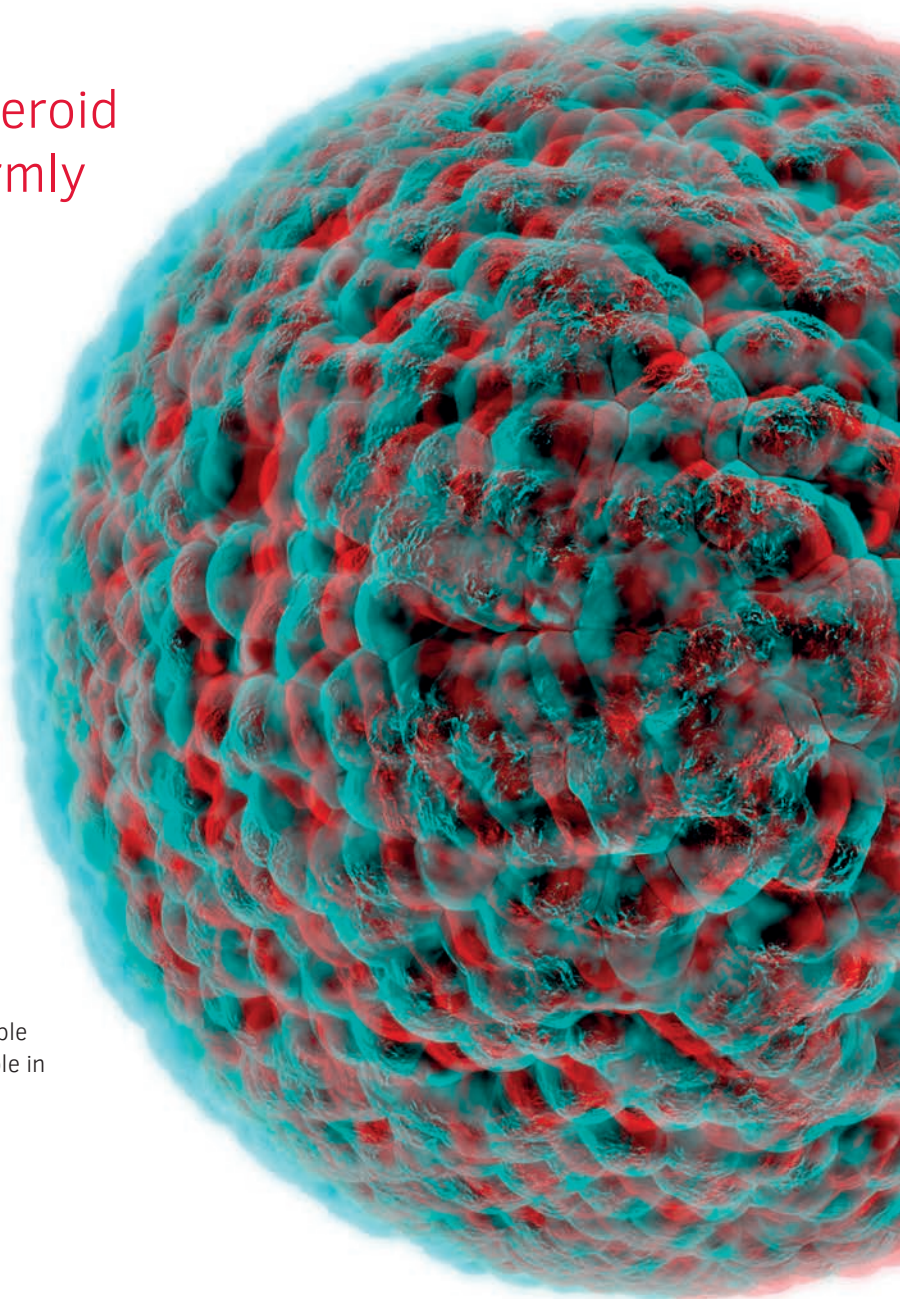
BIOFLOAT™ enables spheroid cultures – quickly, uniformly and reliably

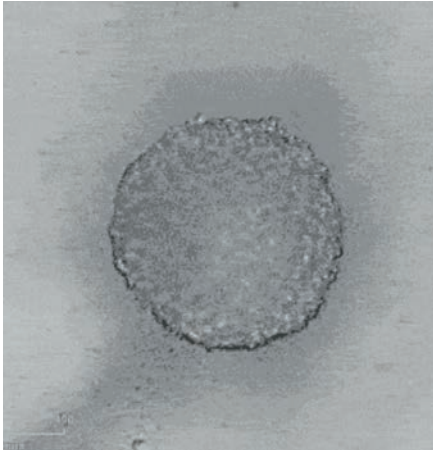
Ideally, uniform spheroids can be generated in a quick and reproducible manner – even when dealing with challenging cell lines. The appropriate cell culture plate can make your work significantly easier and lead to measurably better results.

Thanks to its robust, highly anti-adhesive surface, BIOFLOAT™ ensures that adherent cells preferentially form cell-cell contacts. Compared to other anti-adhesive surfaces, this means the following for your 3D culture:

- **Rounder:** innovative, high-grade anti-adhesive surface coating for easy cultivation
- **Faster:** uniform spheroids are proven to form faster than on most anti-adhesive, cell-repellent surfaces
- **More reliable:** evenly round spheroids – usually one per well (>95%) – ensure the high reproducibility of your results

As a 96-well cell culture plate in ANSI/SLAS standard dimensions, BIOFLOAT™ with these properties is suitable for automated high-throughput procedures, for example in the preclinical phase of drug research, in toxicological studies and in cancer research.





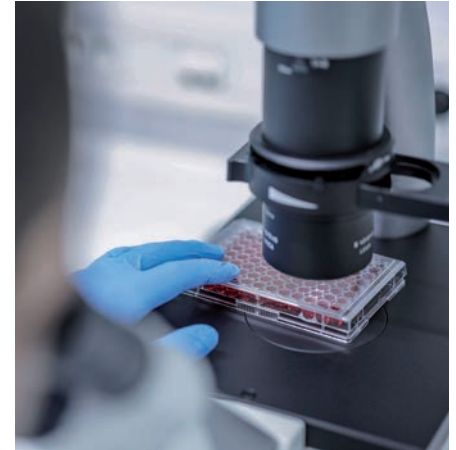
Spheroid cultures with BIOFLOAT™

The cultivation of 3D cell cultures is both challenging and time-consuming. With the innovative BIOFLOAT™ cell culture plates, SARSTEDT is now offering a reliable solution for creating particularly even spheroids in a quick and reproducible manner.



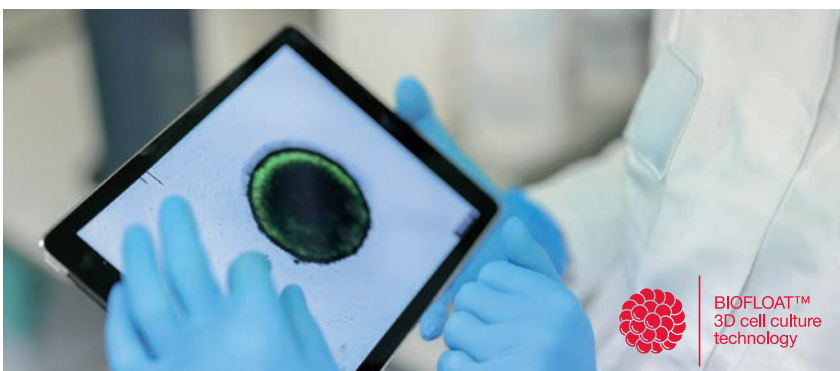
Wash and scratch-resistant coating

Unlike hydrogel-based products, the ultra-thin BIOFLOAT™ polymer coating is not affected by washing and mechanical impact from pipette tips.



For convincing results

Test the BIOFLOAT™ cell culture plates in your process environment and see the precedent-setting development yourself.



Help reduce animal testing – with 3D cell culture

- 3D cell cultures can help to reduce animal experiments by enabling complex cell structures such as spheroid and organoid cultures.
- The use of 3D cell cultures promotes responsible conduct of animal experiments in accordance with the 3R principle (Replacement, Reduction, Refinement).
- SARSTEDT BIOFLOAT™ product line supports scientists with reliable spheroid formation for reproducible results in cell culture.

- > How can you simulate *in vivo* conditions xeno-free?
- > How do you make your 3D cell culture more reproducible?

WHAT OUR USERS SAY.



biofloat.
sarstedt.com/en



TC inserts

For complex experiments in cell and tissue culture

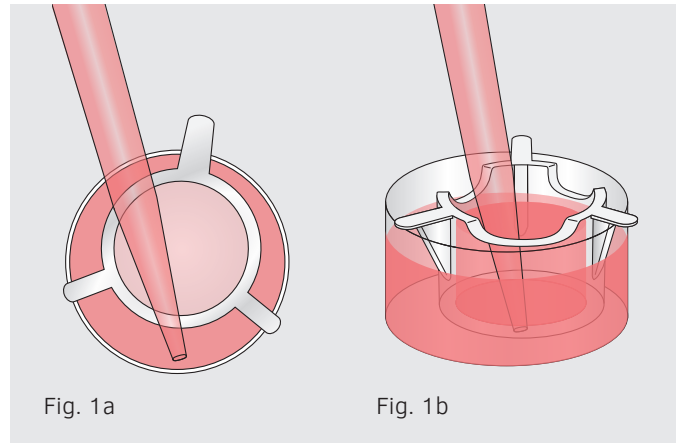
In addition to the spheroid culture, *in vivo* conditions can also be reproduced by using cell culture plates and corresponding TC inserts:

- The 2-compartment system provides your cells with an environment that resembles the *in vivo* situation.
- The inserts are equipped with an ultra-thin, microporous membrane that enables optimal cell adhesion thanks to TC surface treatment.

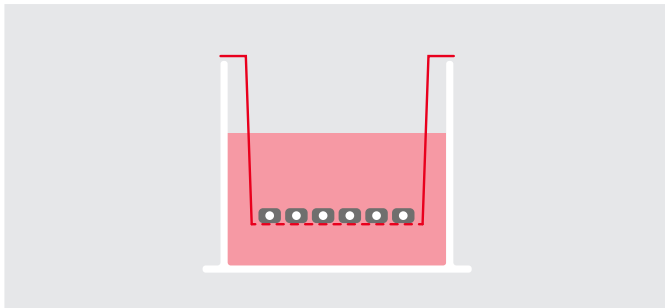
The 2-compartment system enables you to carry out complex experiments, e.g. transport, secretion and diffusion studies, co-cultivation, 3D cell cultures such as organotypic skin models and more.

The particularly user-friendly design of the suspended TC inserts has the following features:

- Sturdy housing made of highly transparent polystyrene (PS)
- Inserts positioned asymmetrically in the well allow convenient pipetting without having to remove the insert (see Fig. 1a).
- There are spacers underneath the holding arms to prevent liquid from being drawn up between the insert and the well.
- The lowered upper edge of the PS body enables optimal gas exchange (see Fig. 1b).

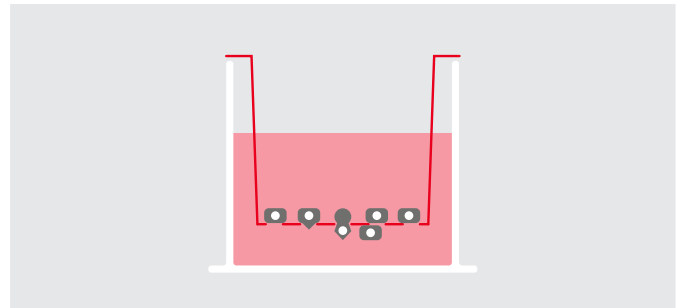


Different pore sizes for flexible application



Small pore size (0.4 μm , 1 μm)

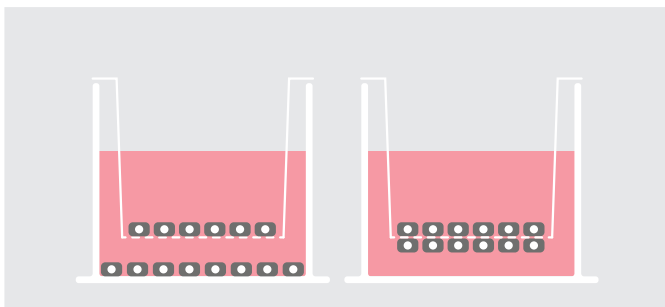
- No cell migration, cocultures possible without mixing the cells



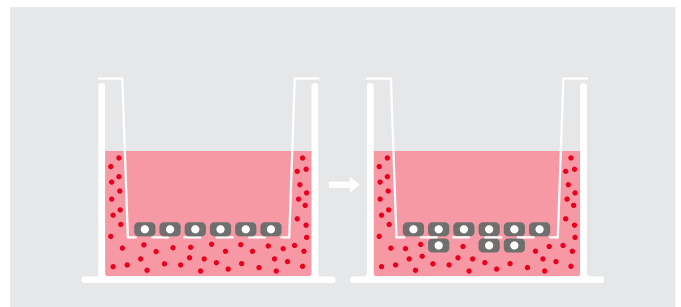
Large pore size (3 μm , 5 μm , 8 μm)

- Cell migration desired, chemotaxis and invasion experiments possible

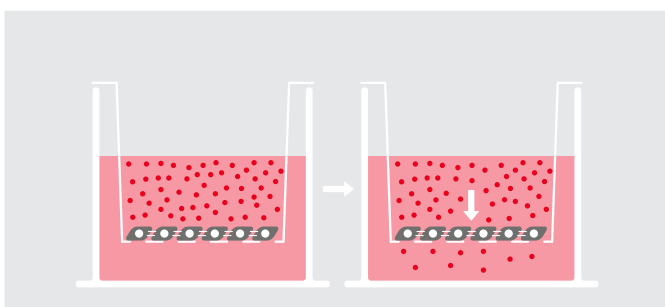
Possible experimental setup



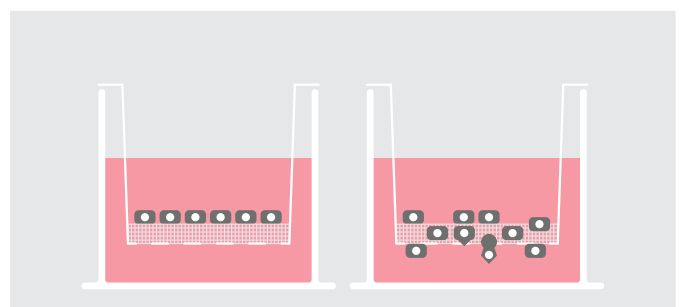
Coculture experiments



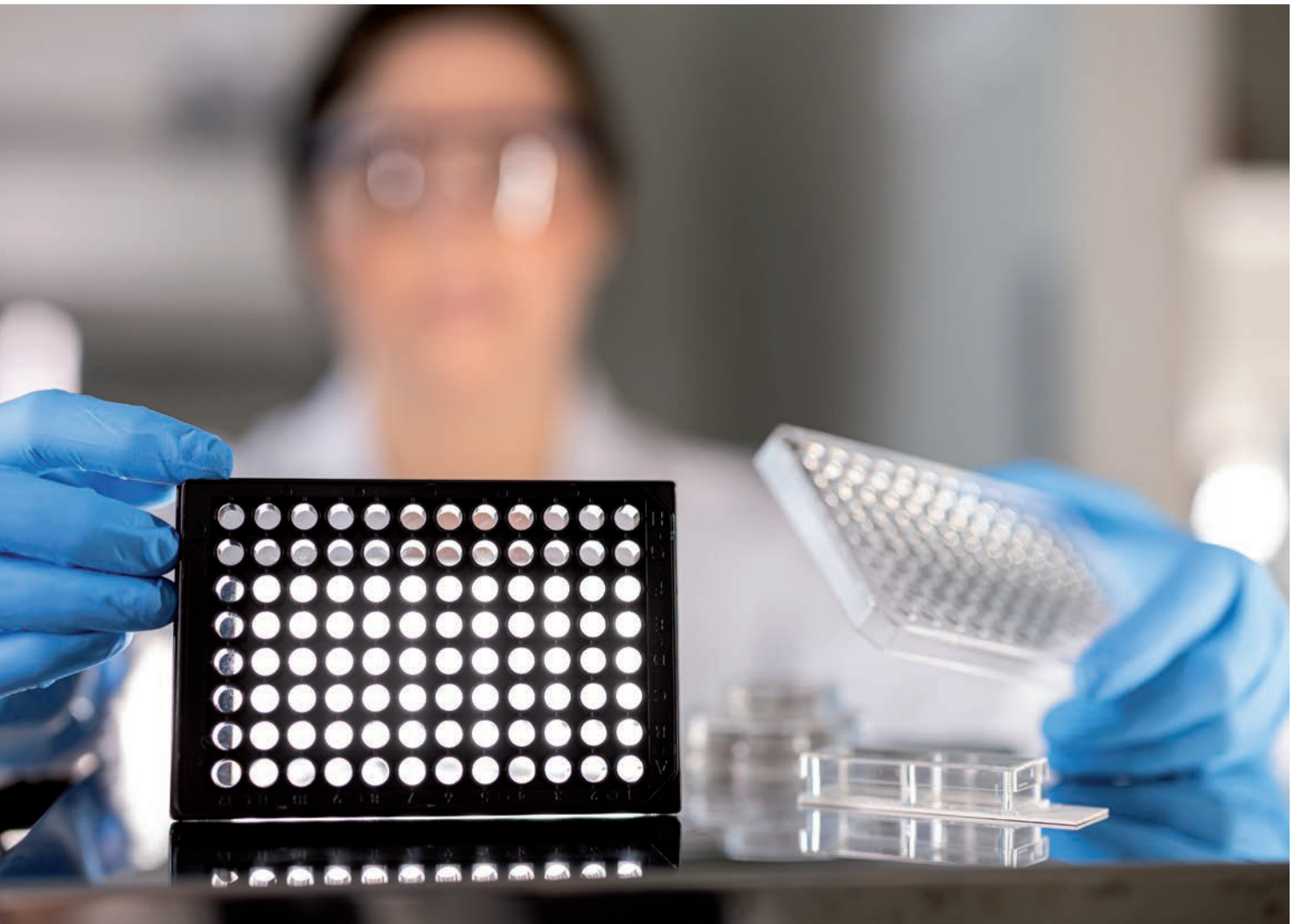
Chemotaxis and migration analyses



Transport, secretion, diffusion and cytotoxicity tests



Invasion investigations



Products for cell microscopy

Maintain a clear view

A milky film at the bottom of the culture vessel and a murky sheen in the suspension culture medium are all that can be seen with the naked eye. Mammalian cells measure between one and 30 μm , with human cells averaging around 25 μm . The condition or growth of your cell culture can be assessed

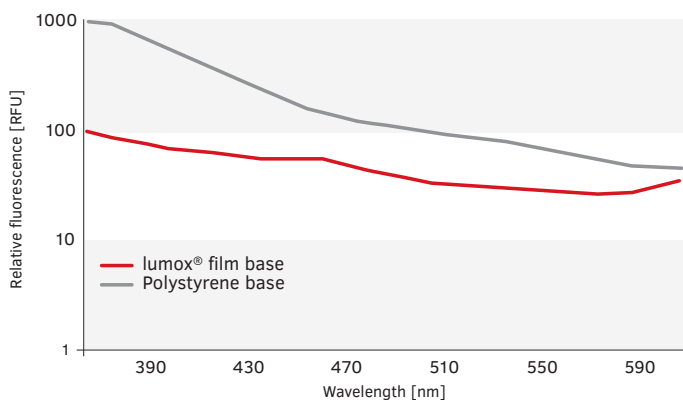
only by light microscopy. Further details, e.g. specific organelles, surface molecules or the expression of certain gene products, can be revealed – after appropriate staining or labelling – by using a fluorescence microscope, for example.



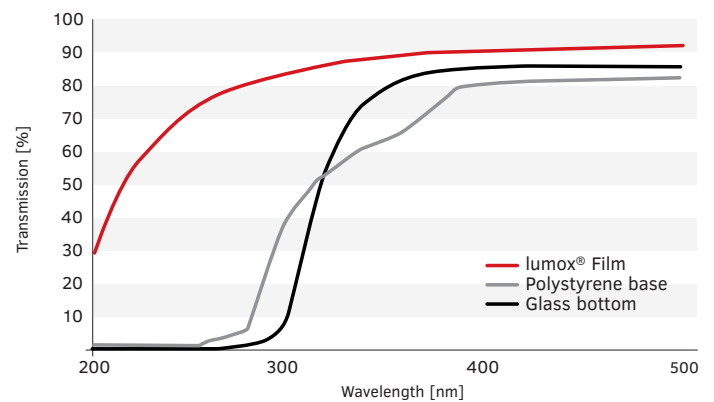
lumox® technology

In addition to the right microscope, a clear view of your cells requires suitable consumables with excellent optical properties and optimal growth conditions. Cell culture plates and dishes as well as x-well cell culture chambers with lumox® technology combine both properties:

- Ultra-thin, gas-permeable film base enables effective gas exchange and ensures optimal growth.
- Good light transmission and low autofluorescence of the film ensure high sensitivity in assays, imaging and reader techniques



Fluorescence measurement of the lumox® film and the polystyrene base at 330 nm



Light transmission measurement. Detection of low signals possible, especially at wavelengths of 200–300 nm



x-well cell culture chambers

However, if you want to cultivate and analyse your cells directly on a slide, x-well cell culture chambers offer individual, efficient solutions for live cell microscopy or microscopy of fixed cells.

All histological and fluorescence staining steps are carried out directly in the x-well. You have access to flexible formats (1- to 8-well or flask) and various materials, depending on your needs.

miniPERM® bioreactor

The production plant cell



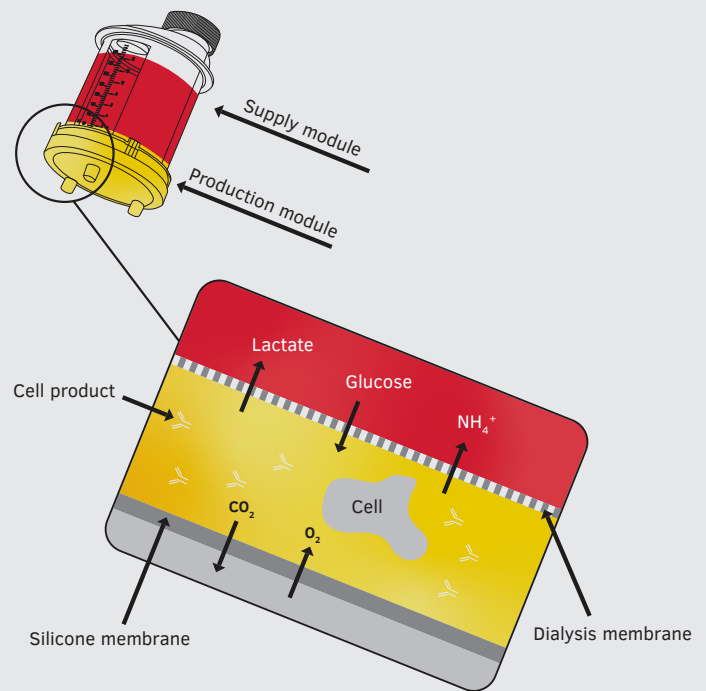
Producing biomass or cell products such as proteins effectively and in larger quantities is difficult in conventional culture flasks. In addition to a lot of hard work and high material consumption, this also requires the necessary space in the incubator.

Instead, you can use a bioreactor that constantly supplies your cells with all the nutrients and growth factors they need, removes metabolic waste products and ensures the highest possible yield. On a laboratory scale, we want easy handling as well as a high yield. Production in the miniPERM® bioreactor is ideal for this.

The functional principle

The miniPERM® bioreactor is a membrane-based 2-compartment system. The culture chamber of the miniPERM® bioreactor is divided by a dialysis membrane into a production module (either 35 or 50 ml cell culture volume) and a supply module (400 ml medium volume). Due to the small pore size of the dialysis membrane (MWCO 12.5 kD), neither the cells nor the secreted cell products, such as antibodies, can pass through the dialysis membrane. They are enriched to high cell densities and product concentrations in the production module.

At the same time, the metabolites secreted by the cells diffuse through the dialysis membrane from the production module into the supply module and are diluted or neutralised in the medium and nutrients penetrate into the production module. The outward-facing side of the production module consists of a thin O₂- and CO₂-permeable silicone membrane through which optimal gas exchange takes place.

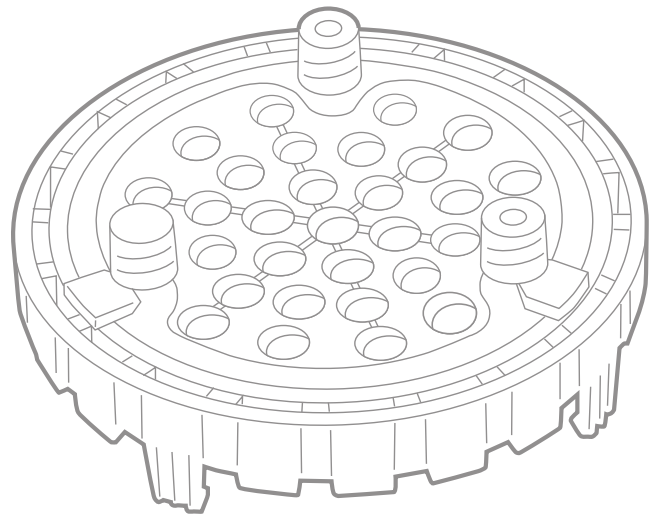
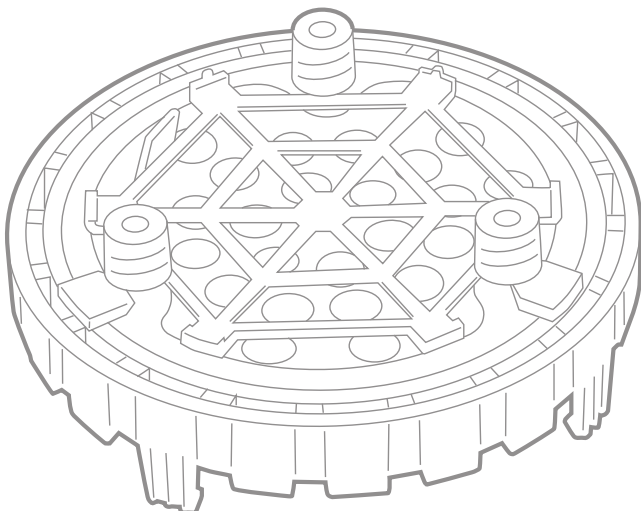


Different cell culture volumes

Depending on the production scale, the miniPERM® production modules for the cultivation of suspension cells are available in two different culture volumes:

miniPERM® classic "High density culture 35 ml"

The production module miniPERM® classic has a cell culture volume of 35 ml and is ideal for production on a laboratory and research scale.



miniPERM® HDC 50 "High density culture 50 ml"

With a cell culture volume of 50 ml, the miniPERM® HDC 50 production module is suitable for the production of proteins and biomass on a slightly larger scale.

The external dimensions of this production module do not differ from those of the miniPERM® classic.



Whether Filtration, Liquid Handling or cryopreservation

Always optimally prepared

In research, biological processes are elucidated in order to create the basis for the discovery of new treatment approaches, the development of vaccines and the improvement of quality of life through scientific innovations.

We are paving the way for you so that you can make progress faster: SARSTEDT is a leading workflow provider for laboratory and medical technology products. We support scientific and diagnostic laboratories as well as biotechnology and pharmaceutical companies with a comprehensive portfolio of

high-quality products and first-class customer service.

We offer solutions for a wide range of applications to ensure the success of your projects.

Complete your cell culture workstation with our comprehensive range of accessories and products from other areas such as liquid handling or molecular biology.



Filtration

- Ideal for preventing contamination of solutions with heat-labile components
- Reliable sterile filtration or particle removal thanks to various pore sizes as low as 0.1 μm
- Choice of filtration volume to suit your application



Serological pipettes

- Indispensable for safe sterile working under the sterile workbench
- Perfectly equipped together with our Automatic-Sarpette®
- Easy-to-read graduations for worry-free handling



Cryopreservation

- Vital cell preservation with our specially certified CryoPure tubes
- Convenient one-handed use in combination with our CryoRack 40
- Easy identification of the correct sample thanks to multiple possible combinations of lid and coding plate colour



For life, for science. SARSTEDT

Life sciences play a crucial role: Whether in modern research or diagnostics. They enable a deeper understanding of the fundamental processes of life, from the functioning of individual cells to complex biological systems.

Life is not always science. But science is our life.

- > How do you optimise your workflow?
- > How sustainable can laboratory work be in the future?

LEARN MORE!



lifescience.
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If you have any questions,
we'll be happy to help!

Visit our website:
www.sarstedt.com

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