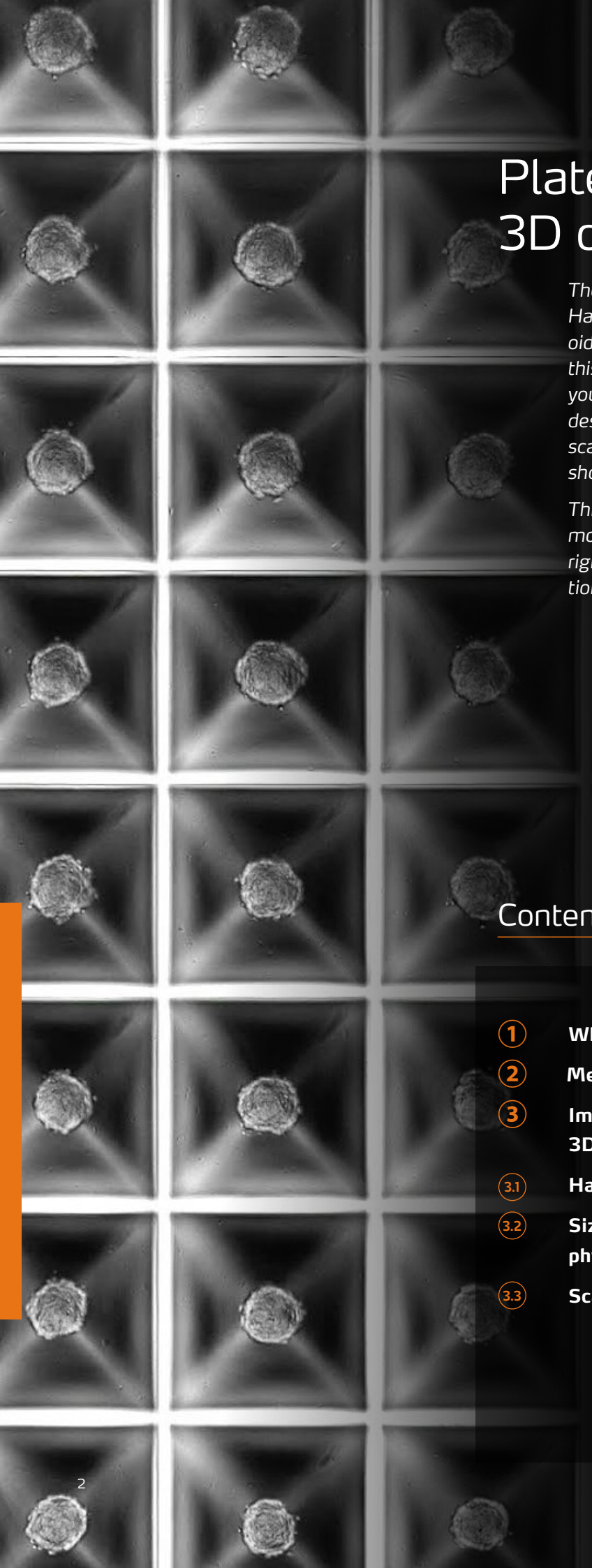
Premium Laboratory Equipment

3D cell culture plates

Buyer's Guide

heidolph
research made easy



Plates for the 3D cell cultivation

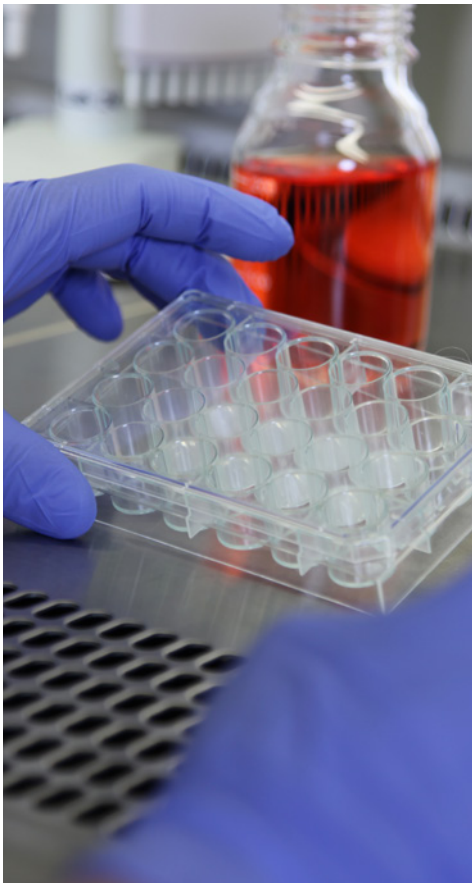
Those who do not want to rely on the inefficient Hanging Drop method for the cultivation of spheroids, will use culture plates especially provided for this purpose. When choosing the suitable plate, you should consider some aspects to receive the desired result at the end. Handling, coating and scalability are just three of the key points that should have an impact on the decision.

This Buyer's Guide should help you to consider the most important aspects and thus to identify the right 3D cell culture plate for the desired application.

Contents

① Why 3D cell cultivation?

The cultivation of cells as spheroids in a three-dimensional space becomes increasingly significant as it has certain advantages compared to the traditional 2D-cell cultivation. The range of applications of the 2D-method is limited by the insufficient representation of the predominant in vivo conditions. The growth and also the cell-cell communication of a monolayer culture, for example, differ significantly from those of a three-dimensional structure being much closer to the physiological environment. Thus, if spheroids are used instead of traditional cell cultures, studies can be carried out in a significantly more realistic way and can deliver more meaningful results.



② Method: Hanging Drop vs. 3D cell culture plates

The Hanging Drop method is one of the most common methods for the cultivation of spheroids. Here, you apply the culture fluid in form of a drop on the inner side of a Petri dish's cover and put the cover on the Petri dish afterwards. The drop with the cells gets stuck on the cover by the surface voltage. The gravity ensures that the cells join together at the bottom end of the drop and form the spheroid. The major disadvantage of this method is that only a few spheroids per Petri dish can be harvested and moreover, this method quickly reaches its limits if a larger mass of material is needed. Special multi-well plates offer an alternative to achieve higher yields. Either you cultivate a spheroid per well in their inside or the wells contain microcavities in which several spheroids can be formed by the predetermined geometry. In this way, the space per well is optimally used. Thus, plates with microcavities allow a significantly more efficient work.

3 Important aspects when choosing the 3D cell culture plate

To choose the right plate out of the available variants on the market for your own requirements regarding the 3D cell cultivation, you should consider some aspects that are discussed in the following.

3.1 Handling and automation

The handling is one of the most important aspects in the decision-making process. It should be as easy as possible and should not require time-consuming, avoidable additional steps. The cell seed is particularly easy with ready-to-use 3D cell culture plates. They can be taken from the packaging and can be filled without further treatment with the respective fluid. Plates that first require a manual coating contain an additional source of error if the applied coating is uneven. Moreover, the workload increases by the additionally required work step.

The geometry of the plate should be such that the seeded cells slide in the microcavities on their own without sticking on the edges. An additional centrifugation step after the seed should not be necessary, also to protect the cells from further stress.
When carrying out controls during the cell growth, you often use the real time imaging. Here, the material of the used cell culture plate should be such that no background noise damages the observation and eliminates a relocation of the cells for screening purposes.

Another aspect that should be taken into consideration is the automation of the used cell culture plate. Its dimensions should be such that it can be integrated in common Liquid Handling Systems like pipetting robots.

3.2 Size control and physiological

The size control is a decisive factor when cultivating spheroids. If the cell clusters become too large, the cells in their inside will not be sufficiently supplied with oxygen anymore and necrotic cores arise. The geometry of the plate should determine a controlled and uniform spheroid growth. The form of the bottom of the microcavities plays among other aspects an important role: If the bottom is tapered or flat, physiologically unnatural forms and differentiations are cultivated. This is why the bottoms of the chosen plate should be rounded. Here, due to physical reasons, the lowest amount of energy for the formation of spheroids is consumed and the environment exerts less unnecessary stress on the cells.

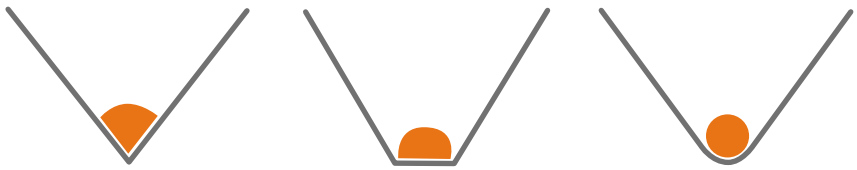
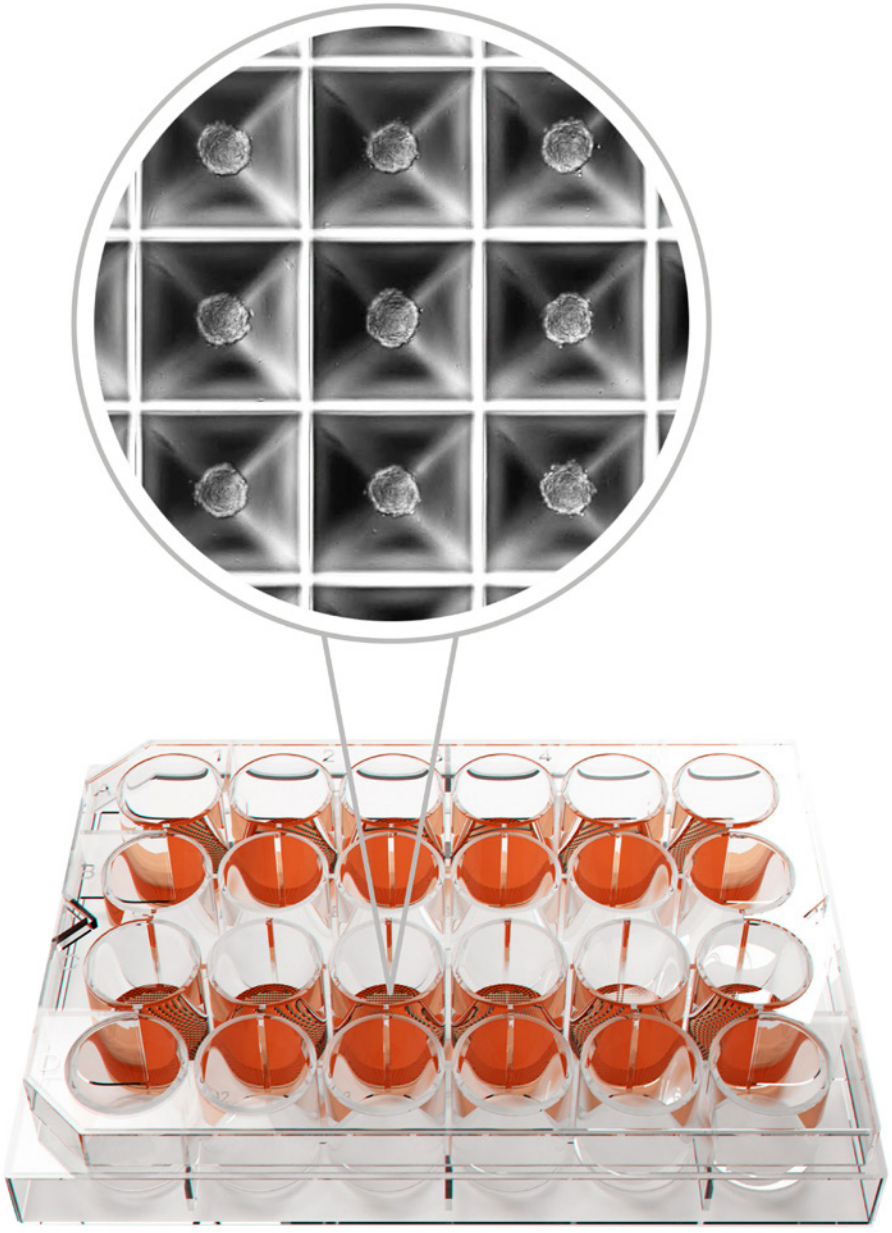


Fig. 1: Impact of the geometry on the spheroid form

3.3 Scalability and translation

Another aspect that should be taken into consideration when buying a 3D cell culture plate is the possibility of scalability. Where at first you often do not need much material, the more the study progresses, it is sometimes necessary to get more standardized biological material. Whereas the Hanging Drop method or culture plates for a spheroid per well often reach their limits, there are solutions which allow the cultivation of up to 9,000 spheroids in a single plate. This is how examinations can be scaled up in a small space.

You should also consider the possibility of translation in preclinical studies. With the common methods, this step is often problematic as the corresponding amount of cell clusters cannot be produced in an efficient and reproducible way. This is why, when choosing a suitable 3D cell culture plate, you should also think about the future and if a translation could eventually be pursued. In this case, you should preferably choose a system with the highest yield of standardized spheroids.



Further questions?
Please contact us:
Heidolph Instruments GmbH & Co. KG

+49 9122 9920 -0
sales@heidolph.de

Further links:
Cell cultivation

heidolph
research made easy