

3D tumor models – malignant melanoma

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In vitro testing

Preclinical risk and efficacy tests or the development of new products in the chemical industry currently rely on animal experiments. As an ethically unproblematic and often scientifically more meaningful alternative, the Fraunhofer Translational Center for Regenerative Therapies TLC-RT develops three-dimensional tissue models that closely resemble human tissues in terms of morphology and respective functionality. In addition, new technical solutions such as process automation or non-invasive testing methods are being developed. In this way, the quality and availability of the models can be improved and more precise statements about the tissue condition can be made.

The skin as in vitro model

The skin protects the human body from potentially dangerous influences and forms the interface to our environment. Accordingly, it is important to maintain the functionality of the skin. At Fraunhofer TLC-RT, methods have therefore been developed to produce in vitro skin models from human skin cells. These tissue models can be used to identify harmful substances or to demonstrate a positive effect on skin tissue.

Depending on the task formulation, epidermal, epidermal-dermal and/or vascularized skin models can be used. The advantage of the assay developed by the TLC-RT is the combination of healthy skin tissue and the diseased tissue (melanoma) in a 3D tissue model. This also

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allows direct introduction of active substances and analyses of the effects on the healthy and diseased skin cells. It thus extends beyond the application possibilities of organoid cell clusters, for example, which contain only one diseased or one healthy cell type.

The method is thus particularly interesting for preclinical and drug development in the pharmaceutical industry, but also for use in academic research on the genesis of diseases and infectious processes.

Investigating tumor formation without animal testing

Human in vitro models can provide rapid predictive information on the effect of therapies or the genesis of disease patterns without having to use animal experiments. In vitro screening can thus identify the most promising compounds, saving valuable resources. In combination with automated, digital evaluation, the data becomes precisely comparable and can be recorded in a centralized form, thus assisting in the further steps of regulatory approval and detection.

In vitro test models – portfolio

- Skin
- Eye
- Gastrointestinal tract
- Respiratory tract
- Blood-brain barrier
- Infection models
- Tumor models

MediTOM – digitized evaluation of tumor models

Together with the Center of Device Development CeDeD at Fraunhofer ISC, a method has been developed for the automated analysis of cell-based in vitro models of malignant melanoma and the digitized recording of changes in the cells. This allows the study of melanoma evolution and the efficacy of potential antitumor therapies. The method can also be extended to other in vitro tissue and tumor models, such as immune cells, stroma, or even the complex blood-brain barrier with regard to brain metastases. Thus, it can also be used to study the development of new tumors – an important issue with regard to metastasis and effective therapeutic approaches.

Further informations

Fraunhofer Translational Center for Regenerative Therapies TLC-RT

www.tlz.fraunhofer.de

In vitro test systems

<https://www.regenerative-therapien.fraunhofer.de/en/fields-of-activity/in-vitro-test-systems.html>

In vitro models

<https://www.regenerative-therapien.fraunhofer.de/en/fields-of-activity/in-vitro-test-systems/In-vitro-models.html>

About the developments of the Center of Device Development CeDeD

www.ceded.fraunhofer.de

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