

Fraunhofer Translational Center Regenerative Therapies TLC-RT

Materials meets Biology meets Engineering



Bioreactors and lab automation

"We believe engineering empowers scientific advancements."

Dipl. Ing. Thomas Schwarz
Prof. Jan Hansmann



3D In vitro test systems

"We believe in challenging the status quo of what can be tested without the use of animal models."

Dr. Daniela Zdzieblo
Dr. Christian Lotz



Biomaterials

"We believe in realizing complex and challenging biomaterial property profiles."

Dr. Sofia Dembski
Dr. Jörn Probst

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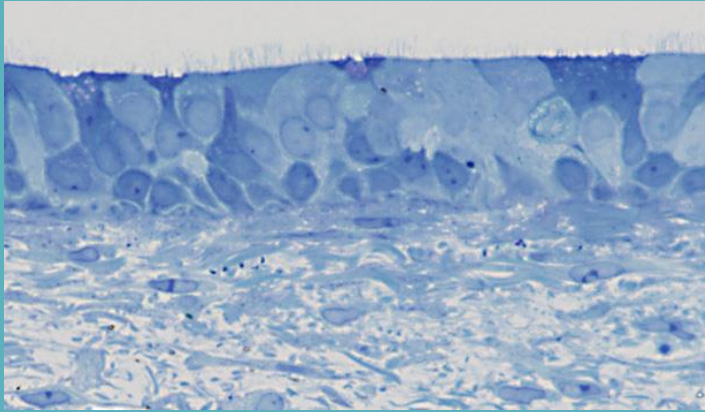
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Advancing Biomedical Research

Innovative In Vitro Models Utilizing Primary Cells, iPSCs, and Organoids



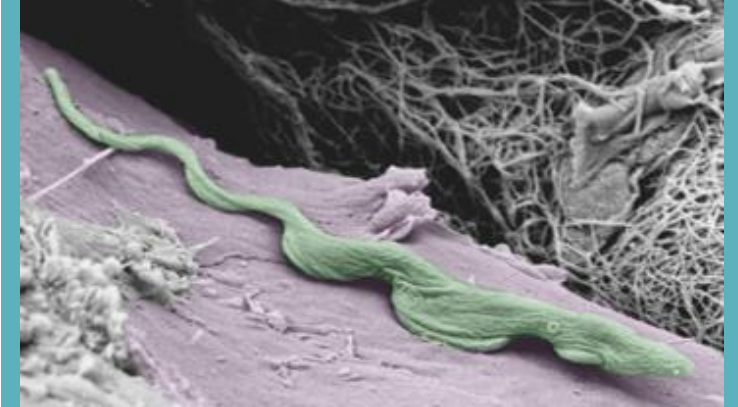
Human in vitro tissues

- Skin
- Eye
- Intestine
- Airways
- Innervation
- Neurovascular Unit



New approach methods

- Risk assessment
- Efficacy testing
- Preformulating evaluation
- Consultancy
- Customized assays

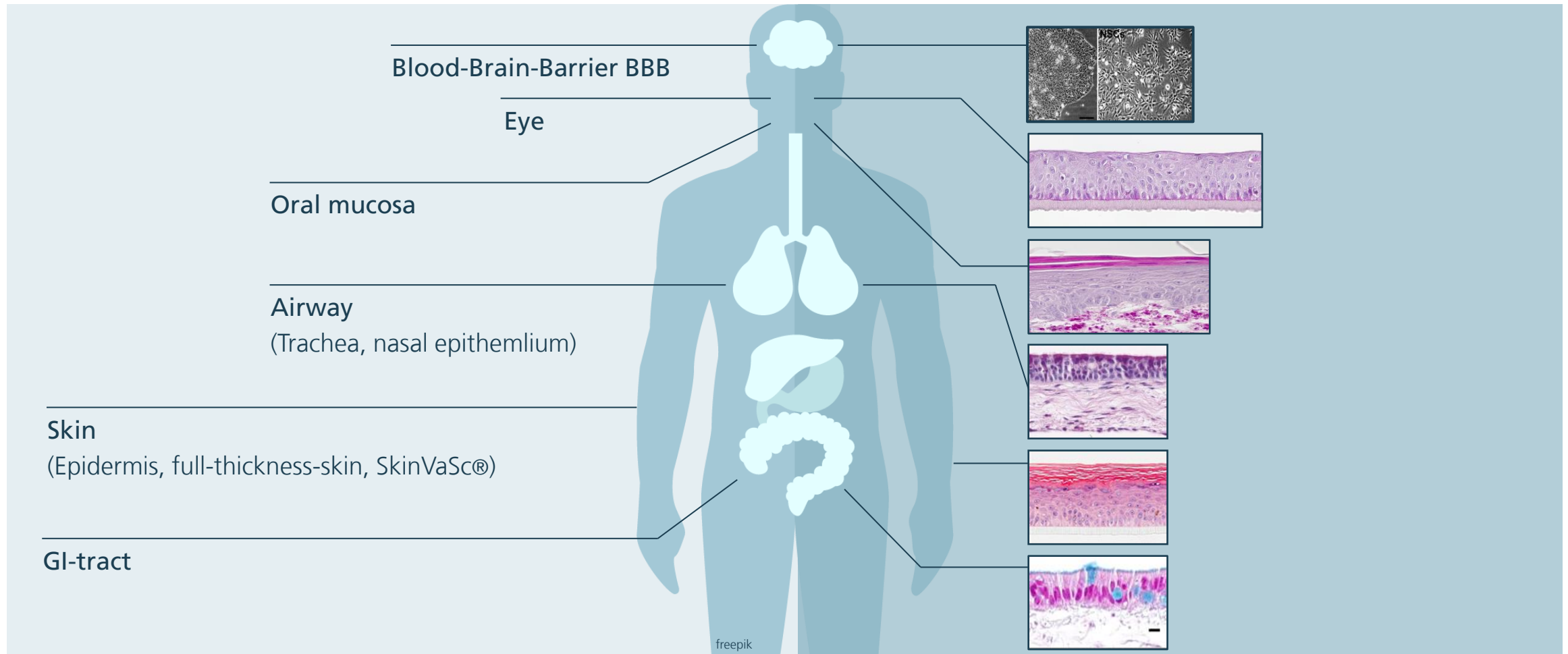


Tissue environment interaction

- Wound healing
- Tumor development
- Infection studies
- Genetic diseases
- Material
- Immune mediated diseases

In vitro test systems

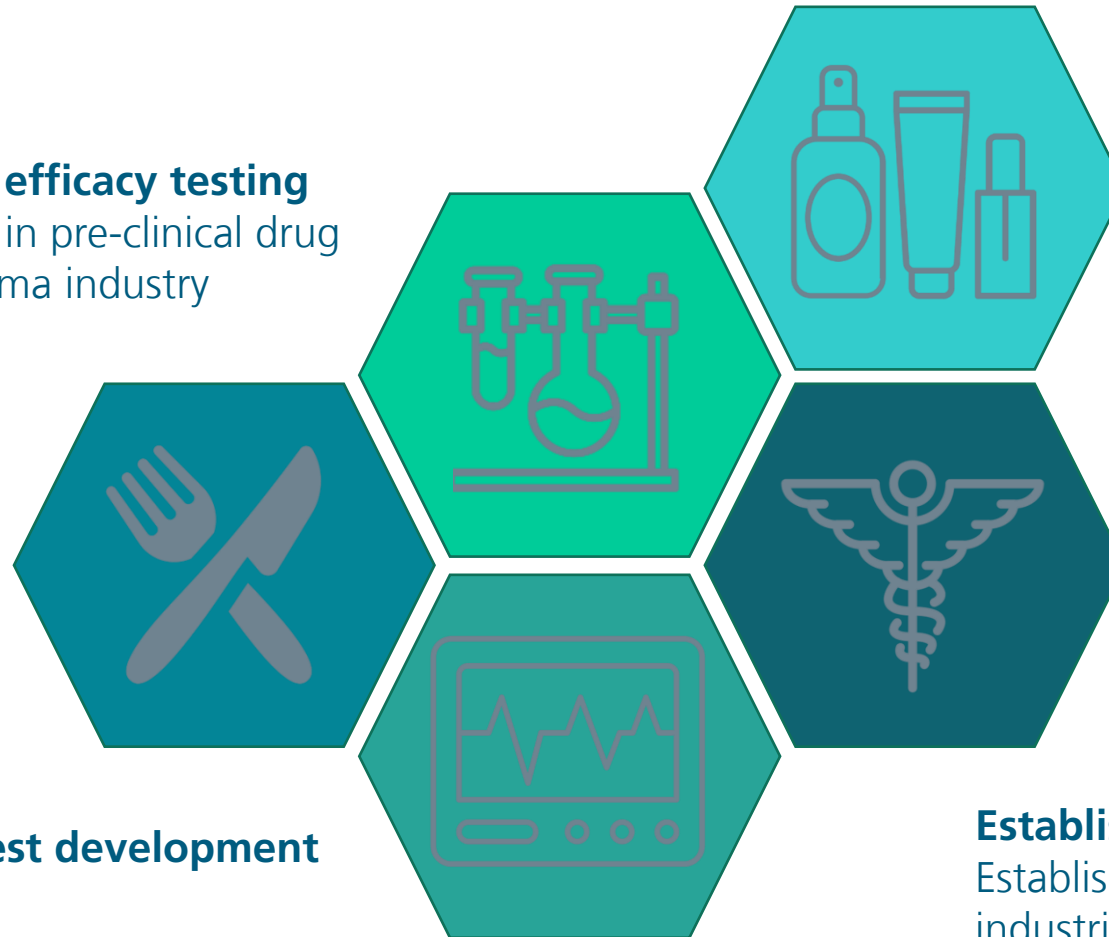
Portfolio



Translational Center Regenerative Therapies (TLC-RT) – pre-clinical research

Drug discovery and efficacy testing

Long time experience in pre-clinical drug assessment with pharma industry



Testing on industrial level

Fully traceable experimental results
Established SOP system

Client specific test development

Established organization processes

Established legal system for research with industrial clients

Key benefits



Enhanced Predictive Accuracy



Cost efficiency meets Customization and Flexibility



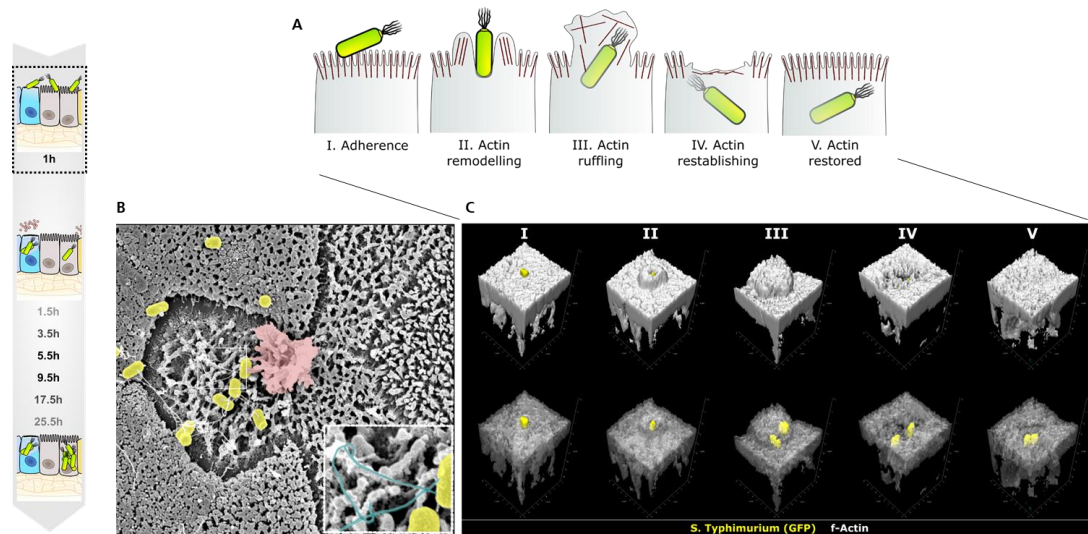
Reduction of Animal Testing

Intestine

Modeling human infections *in vitro* at multicellular level

Method

- Primary organoid-based tissue model
- Infection with *Salmonella Typhimurium*



Results

- Interaction of STm flagella with microvilli
- Membrane ruffling
- Discreet invasion mechanism
- Reassembling all invasion steps

Applications

- Assessment of compounds

Reference:

[1] Däullary et al. 2023. doi: <https://doi.org/10.1080/19490976.2023.2186109>

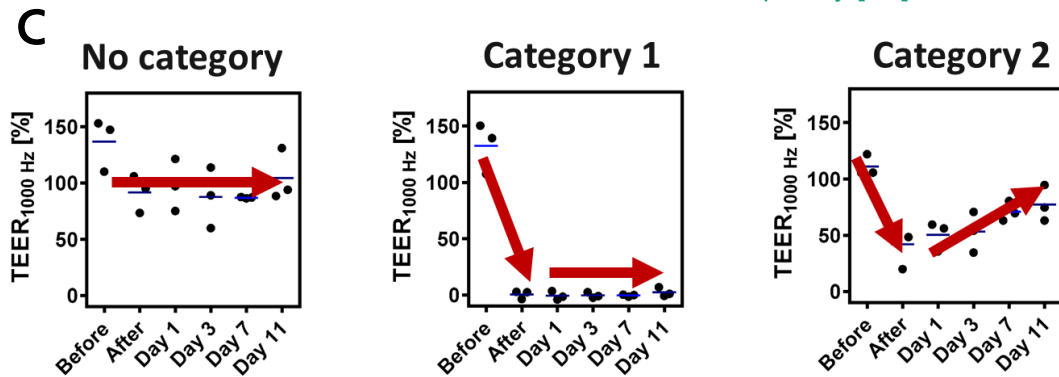
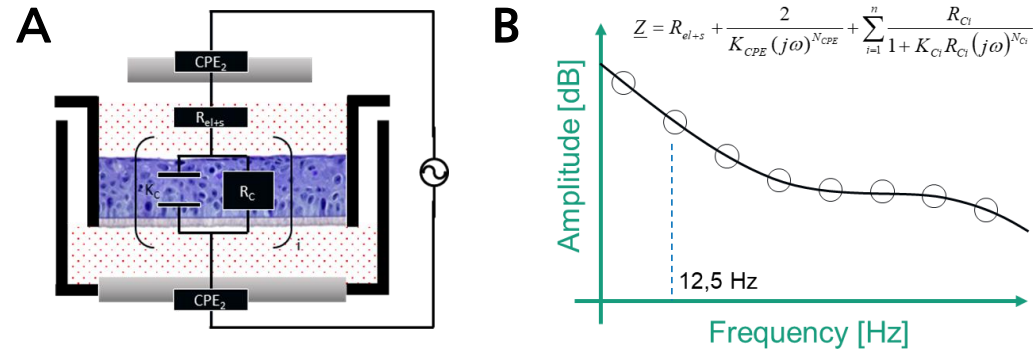
[2] Damigos et al. 2025 doi: <https://doi.org/10.1002/adv.202411233>

Eye

Eye irritation test in a single in vitro method

Method

- Cornea epithelial model with **primary cells**
- **Non-destructive** impedance spectroscopy to analyze eye irritation



Results

- Distinguish between **all GHS categories for eye irritation** in one in vitro test
- Identification of **reversible effects**
- **Formulation** testing
- Transport studies
- Analysis of cell viability

Applications

- Eye Irritation test
- Toxicological analysis of reversible effects

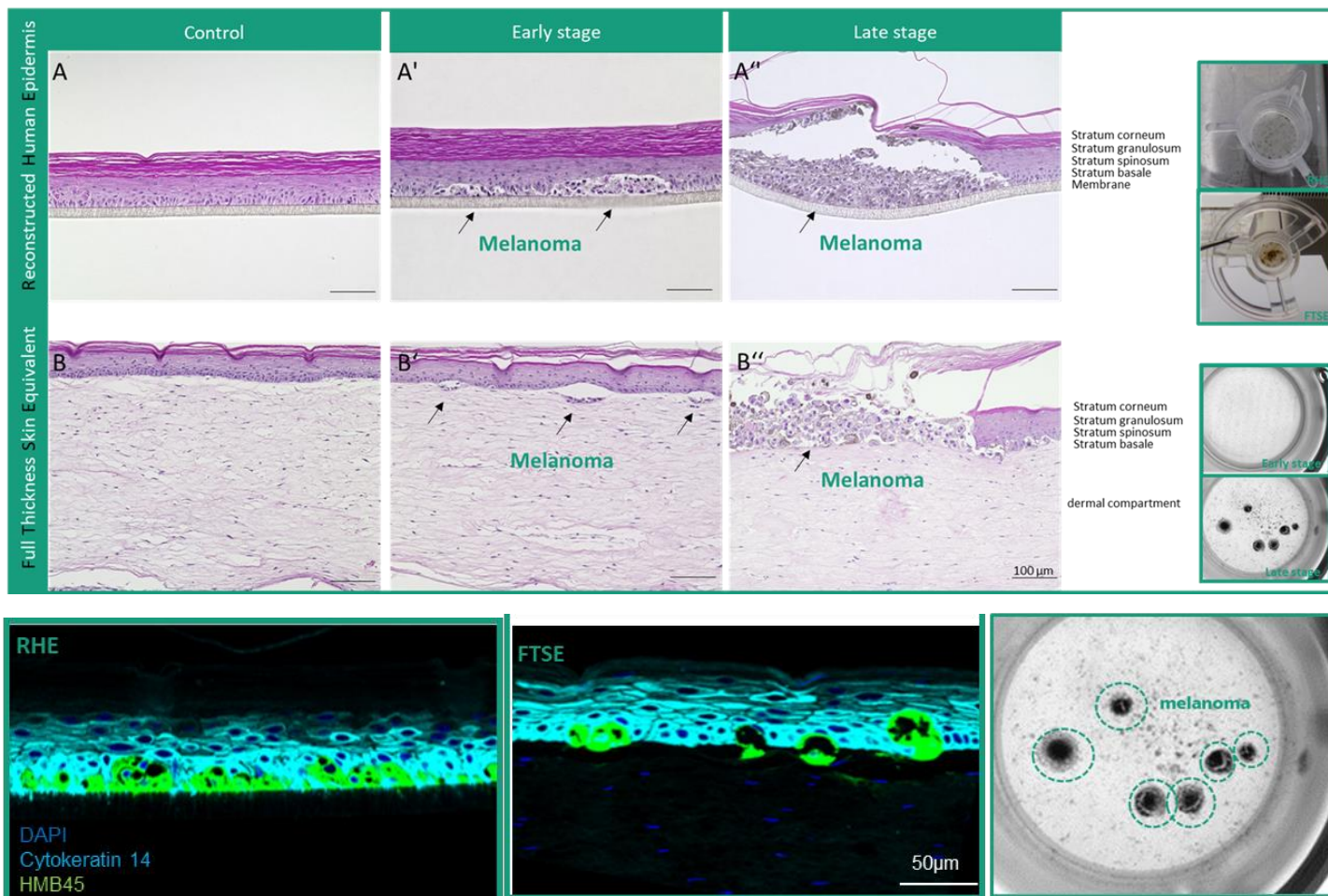
Reference:

[1] Lotz et al. 2018. DOI: [10.1038/s41598-018-33118-2](https://doi.org/10.1038/s41598-018-33118-2)

[2] Knetzger et al. 2024. DOI: <https://doi.org/10.1007/s00204-024-03940-x>

Skin

Human organotypic models of Malignant Melanoma



- models of **various complexity** (A, B)
- reflecting multiple **driver mutations** and **potential targets**
- reflecting different **stages of tumor formation** (A'-A'', B'-B'')
- reflecting not only the **physiological** but also correlating with the **in-vivo** situation
- mimicking **TME-interplay**
- **preclinical test system** for e.g. targeted therapies (like BRAF-/MEK- inhibitors)
- Establishment of **non-invasive** detection methods

Leikeim A*, Wußmann M*, Schmidt FF* et al.: A preclinical model of cutaneous melanoma based on reconstructed human epidermis. *Sci Rep* 12, 16269 (2022)

Wußmann M* et al.: In Model, In Vitro and In Vivo Killing Efficacy of Antitumor Peptide RDP22 on MUG-Mel2, a Patient Derived Cell Line of an Aggressive Melanoma Metastasis. *Biomedicines* 2022; 10(11):2961