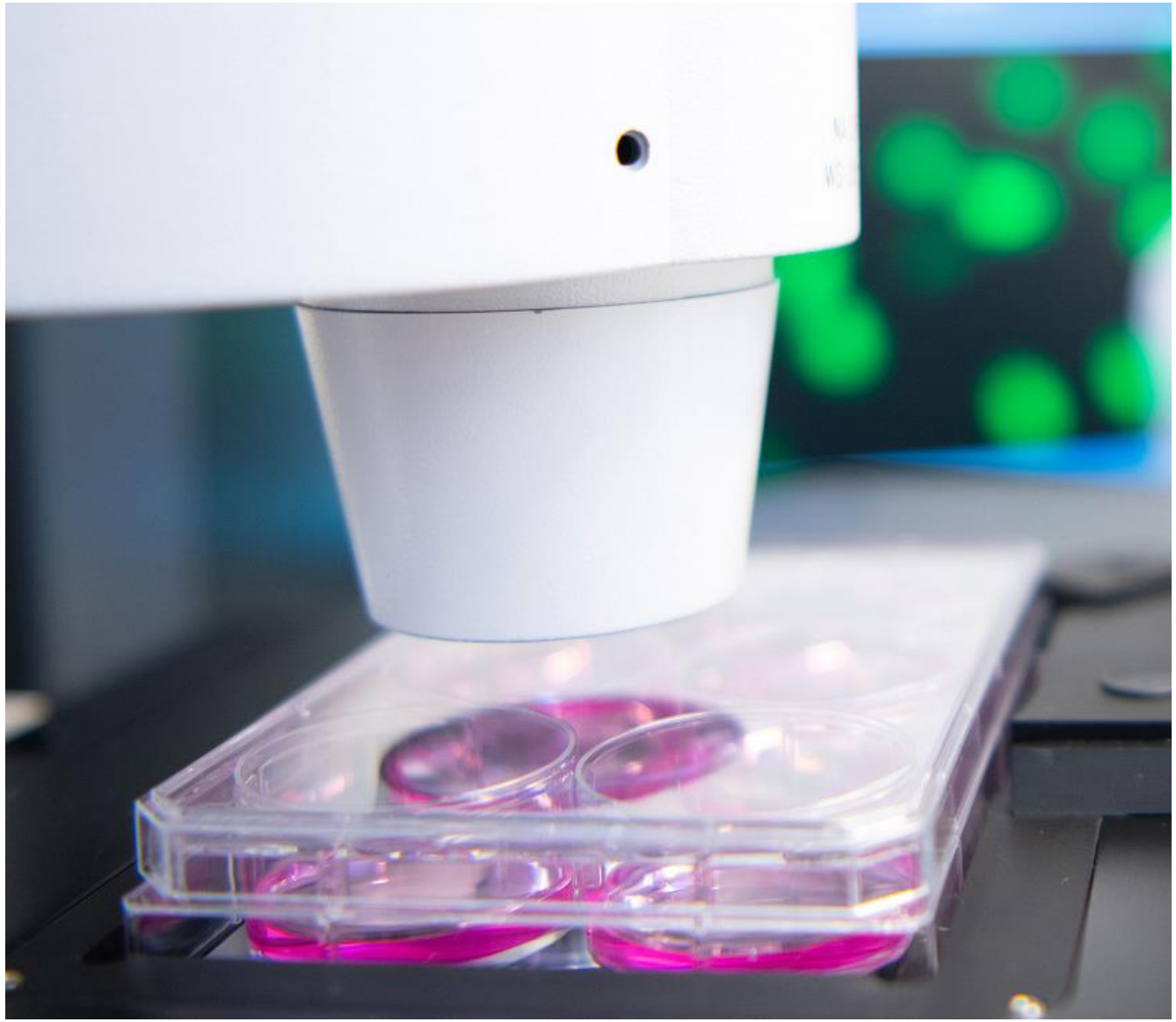
How we explore the future of tissue engineering

Alexander König | June 27, 2019, Düsseldorf



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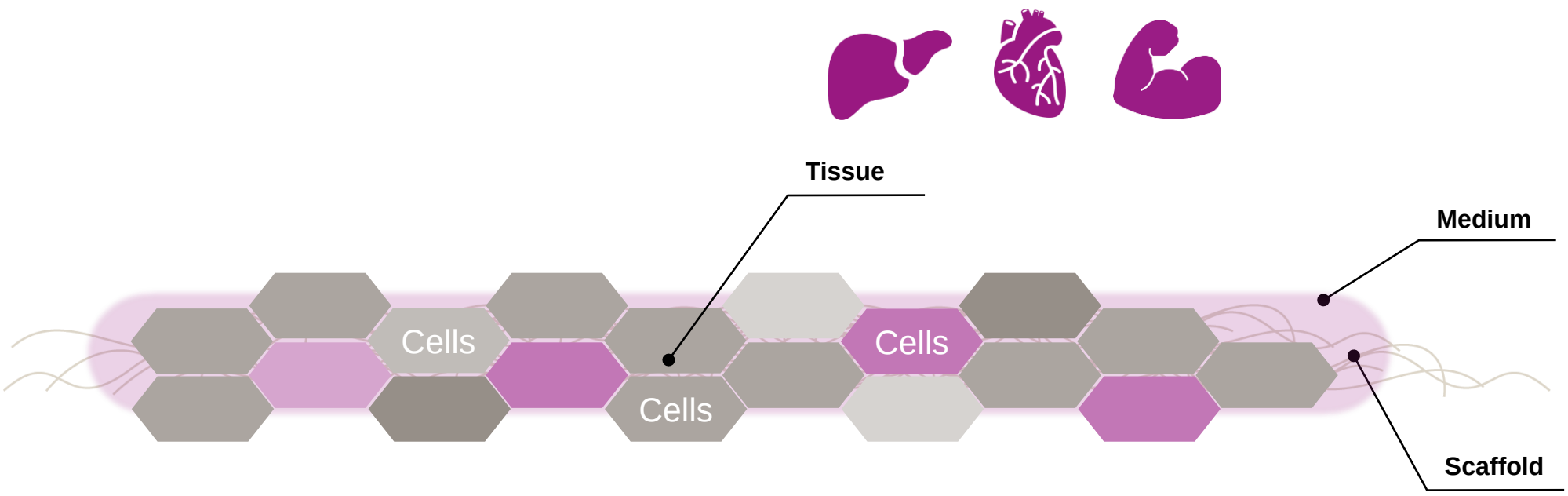
What is tissue engineering?



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Why tissue engineering?

1
in **55,000**
people experience
severe burns

Patient's own
skin graft

Approx.
2,100,000
tests on
vertebrate animals

In vitro
test models

250,000
cases of diabetic foot
syndrome.

50,000
foot amputations

Better
wound healing

300
in **100,000**
people suffer from
Crohn's disease

Stem cell
therapy

per year in Germany

Technical challenges for tissue engineering

Scaffold material

Today
Materials of animal origin

Future
Nature-inspired materials based on e.g. Resomer®

Ingredients for cell cultures

Today
Primarily formulations of animal origin

Future
Formulations of nature-inspired components based on e.g. cQrex®

Process know-how

Today
Complex, manual processes

Future
Automated, scaled processes

Advanced solutions for tissue engineering

Connecting competencies–a global approach

USA

Competence center for Medical Devices

Biomaterial production, processing & analytics…

Germany

Health Care, Care Solutions, Creavis

Components for cell culture media, cosmetics expertise…

Singapore

Tissue Engineering Project House

Cell cultures, 3D printing, application technologies…

The skin: a complex organ

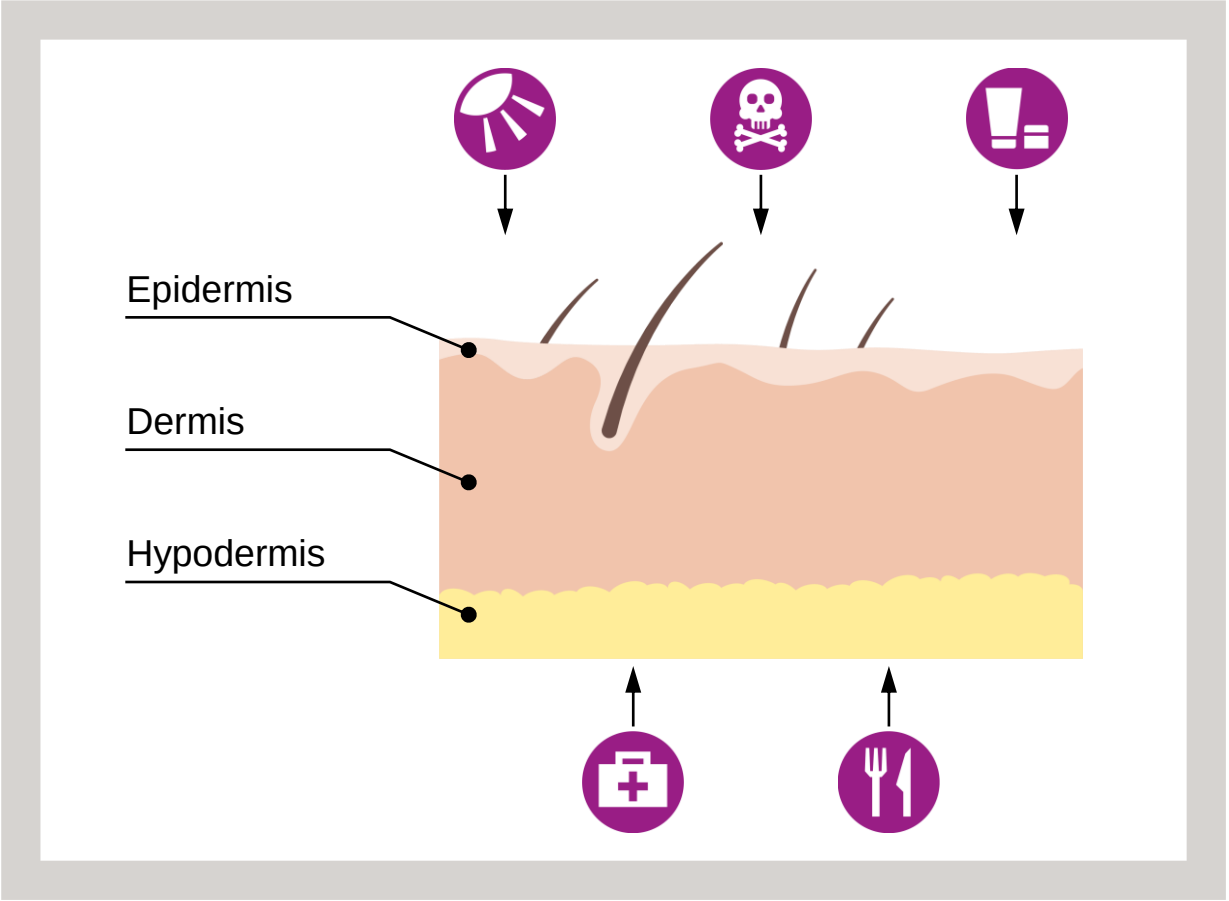
The skin, measuring 1.5 to 2 m², is one of the largest human organs.

The skin is the interface of humans and their environment.

It provides heat regulation and immune protection.

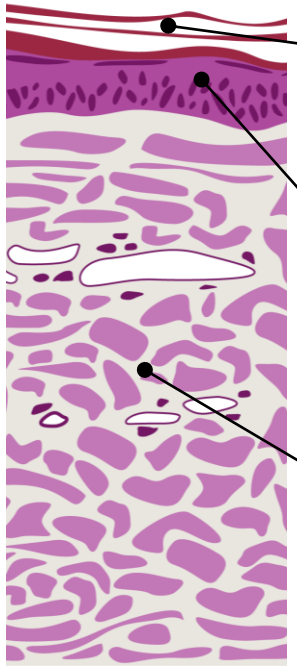
It is exposed to sunlight and substances in the air and is affected by ingredients in household cleaners or cosmetics.

It has unique microbiotic properties.



The skin: layers and functions

Human skin



Stratum corneum

Protective function

Epidermis

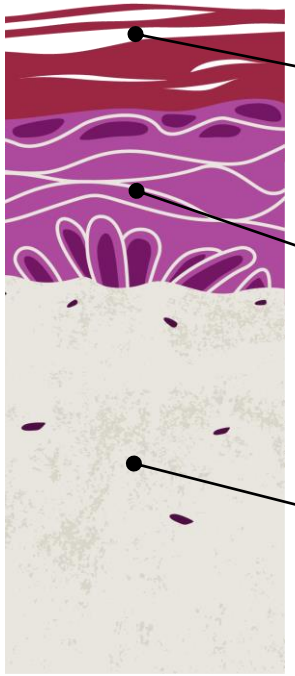
Barrier function and skin renewal

Dermis

Elasticity and resistance,
blood vessels and nerves

Skin models: realistic, reconstructed skin

Conventional skin model



Stratum corneum

Reduced barrier function

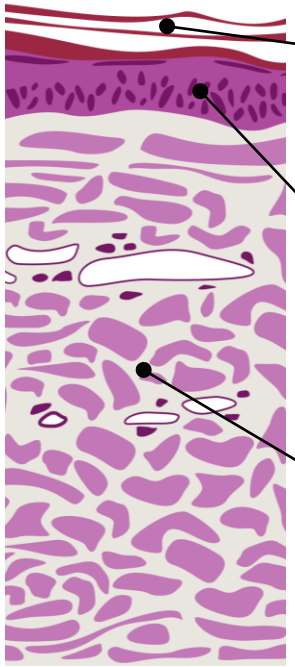
Epidermis

Simplified structure

Dermis

No blood vessels, nerves or immune system

Ideal skin model



Stratum corneum

Improved dehydration protection

Epidermis

Penetration of cosmetics and active ingredients

Dermis

Mechanical and dermatological properties, penetration into blood circulation

Our technical approach

Scaffold
Comprised of biodegradable, non-animal material

Medium
Enables skin cells to grow in quasi-natural conditions

Technology
Makes engineered skin scalable and reproducible

Example:

in vitro test

Skin model applications

Cosmetics development

Safety and efficacy of cosmetic products:

- Protection factor of sunscreens
- Irritation potential of shower gels

Research & development:

- Understanding the effect of pollution
- Modeling of skin aging

Pharmaceutical development

Safety and efficacy of new drugs :

- Efficacy in diseases like psoriasis, eczema
- Evaluation of potential side-effects

Research & development:

- Understanding blood circulation
- Modeling immune response

Safety and effectiveness

Alternative to animal testing for:

- Irritation
- Corrosion
- Sensitization

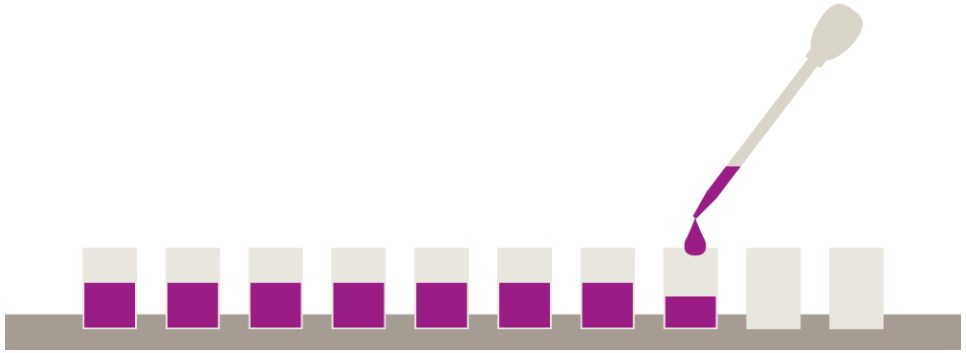
Effectiveness:

- Biological activity of new ingredients
- Impact of environmental influences
- Effect on microorganisms

In vitro skin model applications

Optimized human skin models can

- enhance the relevance of *in vitro* tests.
- further reduce the need for animal studies.



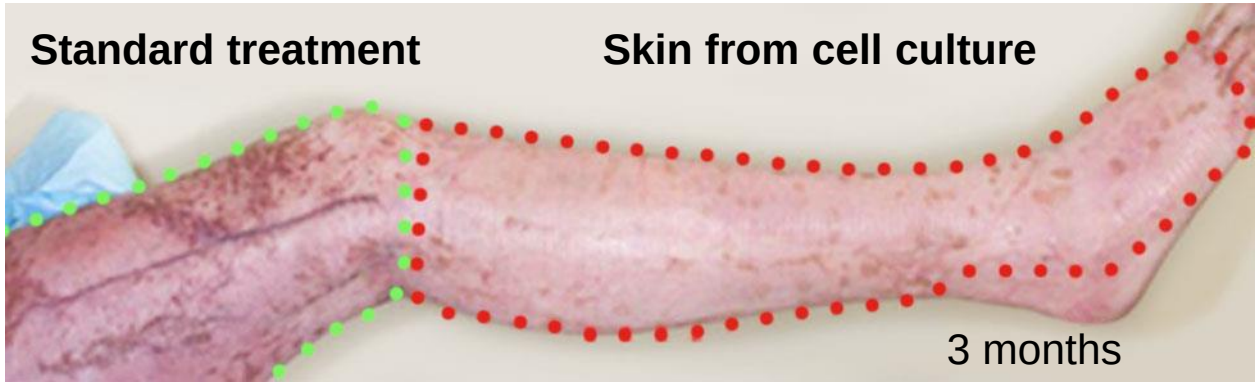
Example:

Clinical skin application

Clinical skin application

Grafts

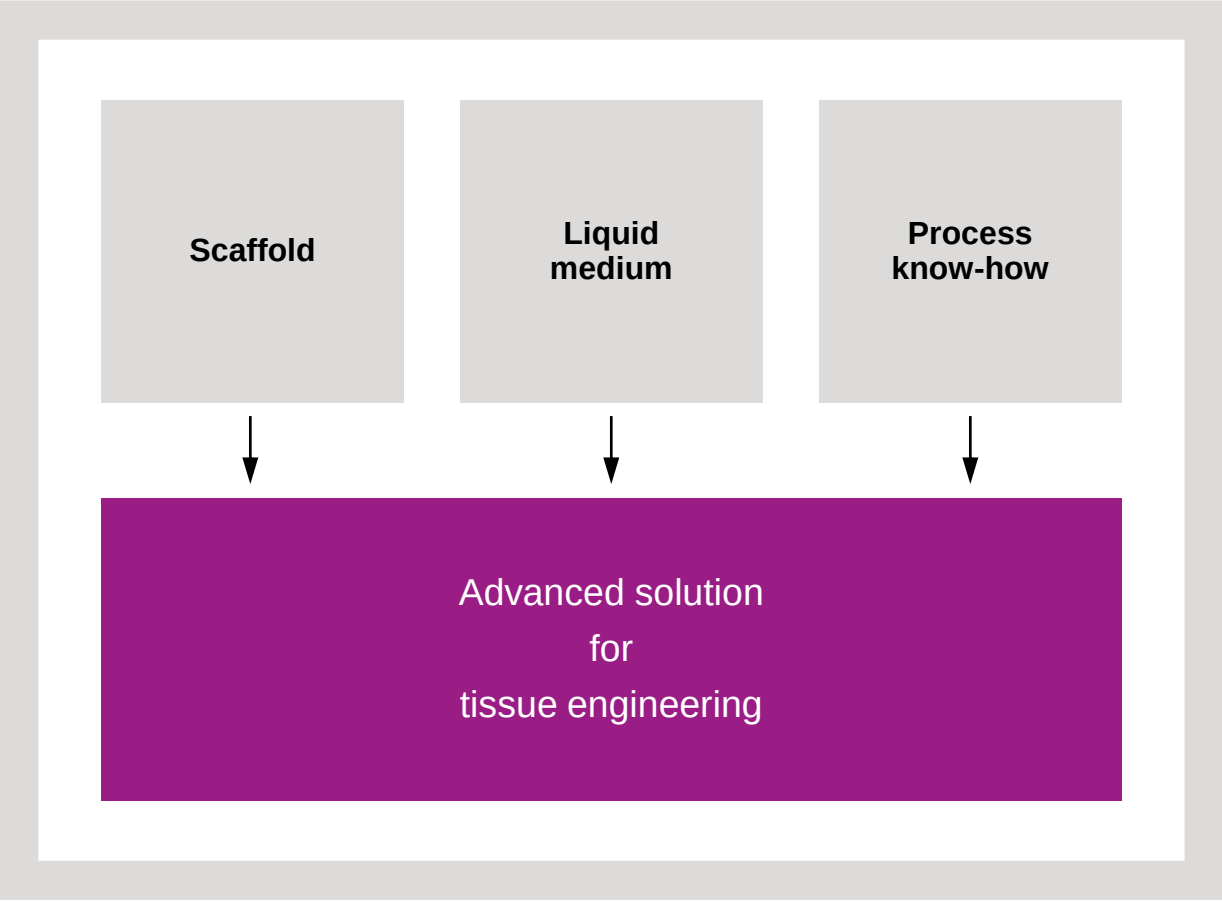
Patient’s own skin
from cell culture



Chronic wounds

- Active wound dressings
- Cell patch

Our vision:
Solutions for reliable, scalable and effective tissue engineering



RELIABLE

Ultrapure scaffold material without animal substances for cell cultures

SCALABLE

Scalable process along the value chain with consistently high quality

EFFECTIVE

Materials and media of the proven highest quality and effectiveness

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Our goals

We want to ...

...simplify and accelerate the production of human cells and tissue in the laboratory for better reproducibility.

...pave the way for innovative healing and testing methods.

...develop new solutions for medical and cosmetic applications, using our existing competencies.


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