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for all your pre-clinical, mechanistic, and  
clinical needs in dermatology research.**

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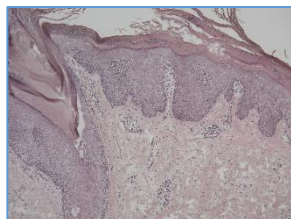


# Psoriasis

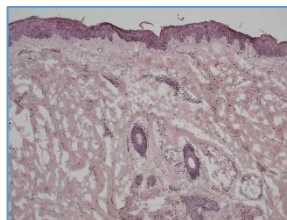
Psoriasis



Lesional skin



Peri-lesional skin



"We combine  
our unique expertise,  
our project design creativity,  
and our passion to advance  
our clients' success in  
delivering novel and game-  
changing skin and hair  
research solutions"

Founder & CEO:  
Prof. Dr. Ralf Paus

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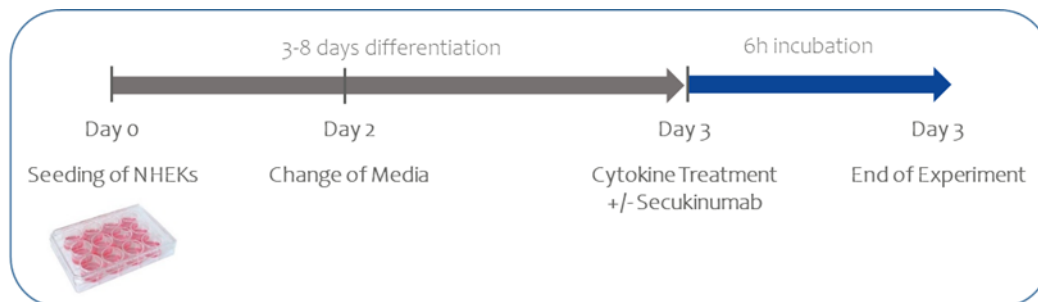
## For enquiries, please contact:

CSO & Deputy General Manager:  
Dr. Marta Bertolini (PhD)

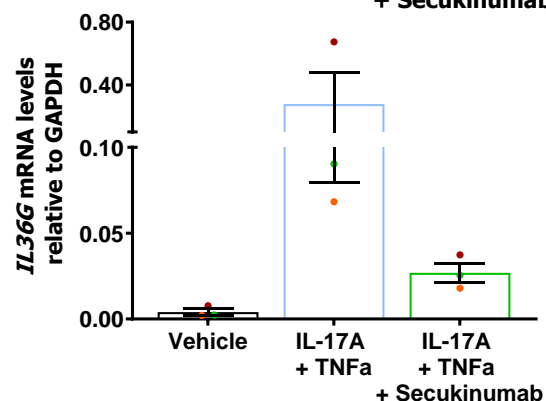
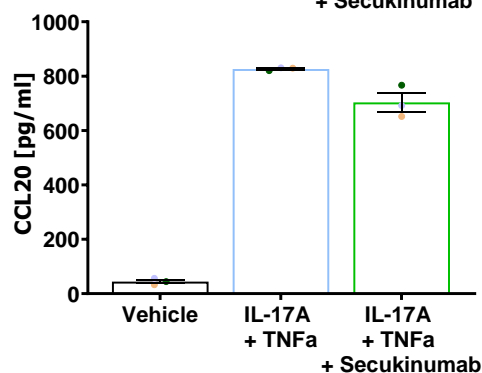
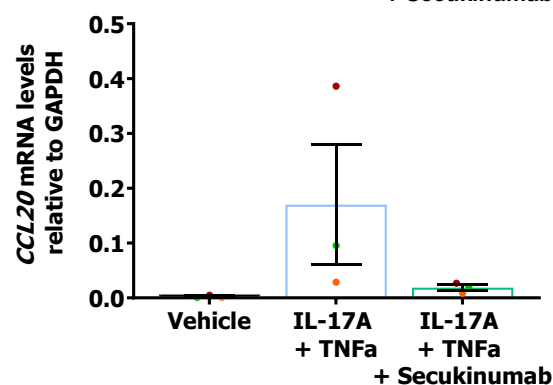
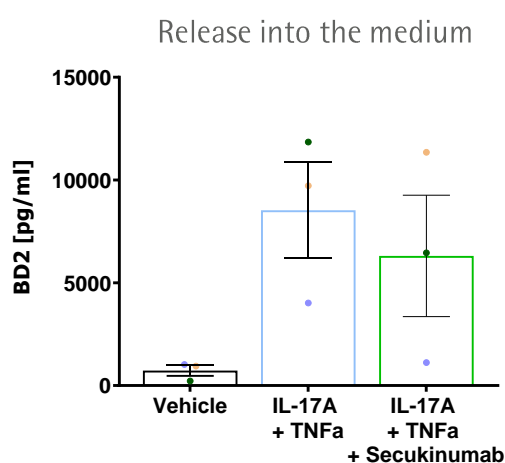
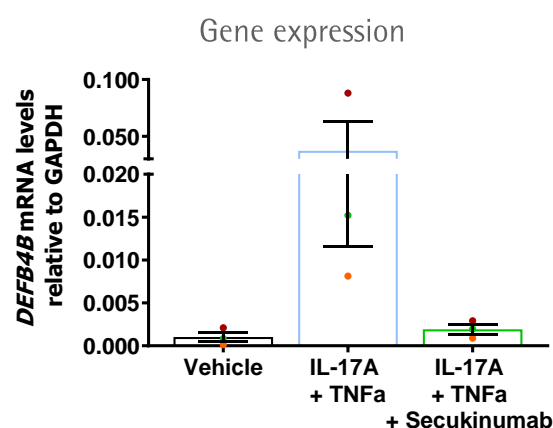
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# Modeling psoriasis-like responses in primary epidermal keratinocytes *in vitro*

Cytokine cocktail (IL-17A/TNF $\alpha$ ) successfully induces psoriasis-associated gene expression in human epidermal keratinocytes



Study Example: Secukinumab inhibits transcriptional changes and reduces the release of  $\beta$ 2-defensin (BD2) and CCL20 into the medium induced by IL-17A+TNF $\alpha$



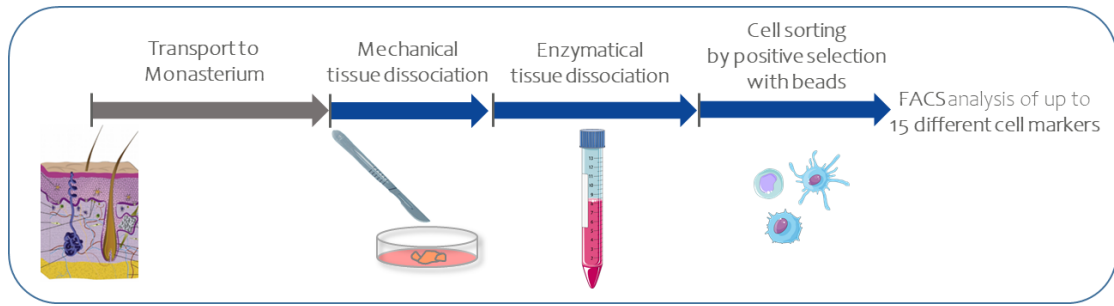
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● Donor 1 ● Donor 2 ● Donor 3

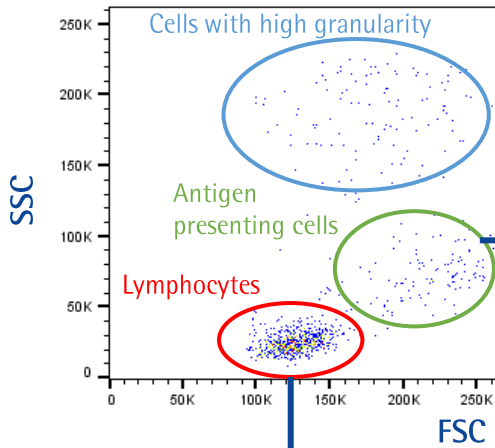
Secukinumab is an anti-IL17A recombinant antibody

Gene expression analysis can be complemented by protein analysis (Western blot, FACS, cytokine assays, immunocytochemistry, etc.)

# Isolation of psoriasis-relevant immune cells from human skin

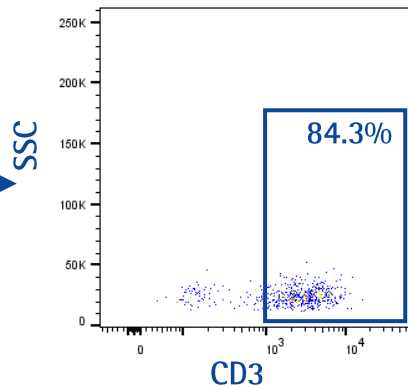


FACS analysis of CD45+ cells from human skin

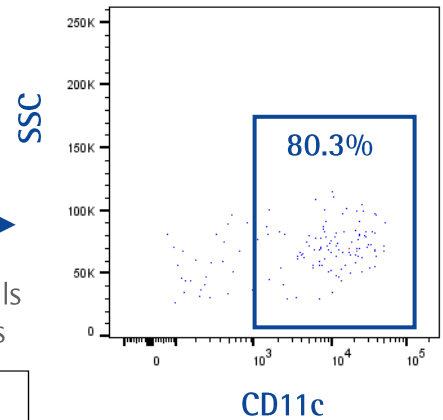


Available also:  
scRNAseq on patient samples!

Percentage of CD3+ T-cells among the Lymphocytes



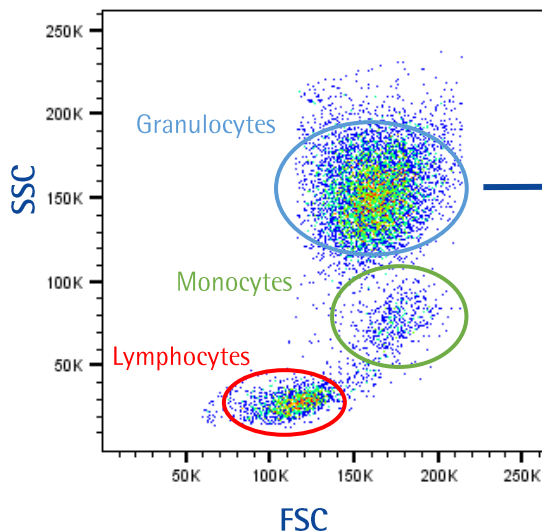
Percentage of CD11c+ Dendritic cells among Antigen Presenting cells



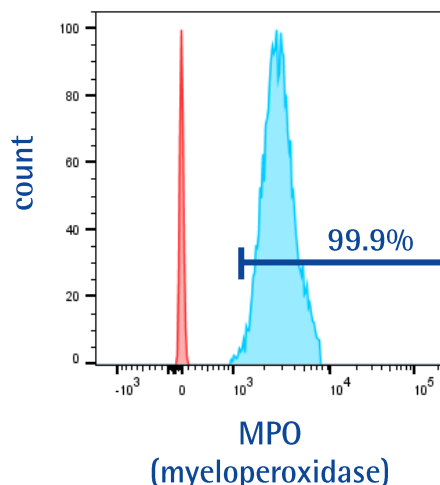
FACS analysis can be performed in both healthy and psoriatic skin and blood samples also after drug treatment

# Isolation of psoriasis-relevant immune cells from human blood

FACS analysis of CD45+ cells from human whole blood



Percentage of MPO+ Neutrophils among the lymphocytes

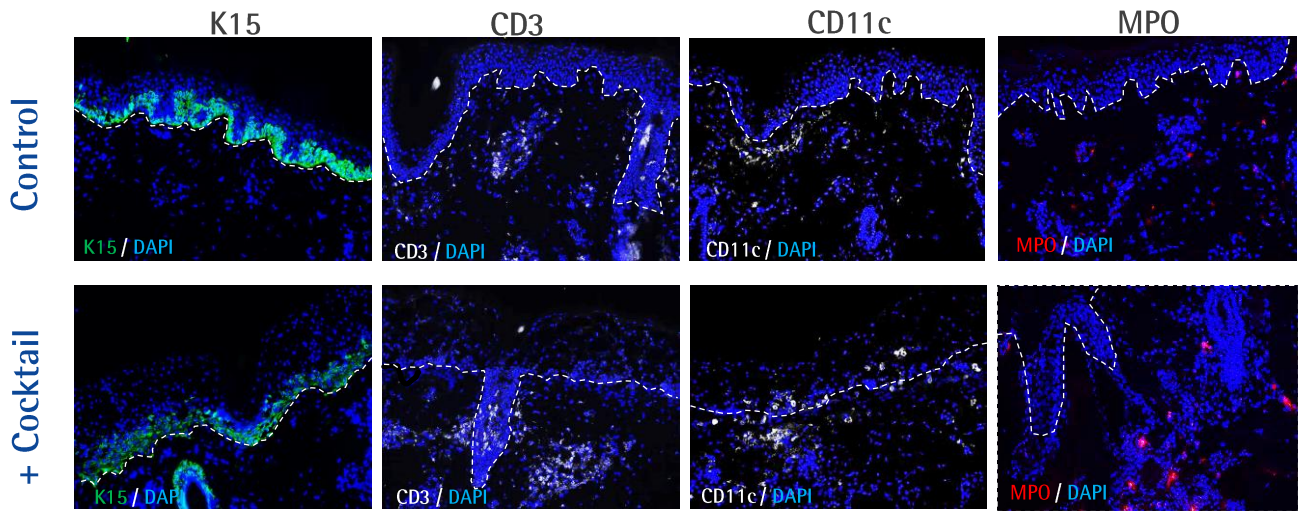


<span style="color: red;">█</span>	MPO negative cells
<span style="color: blue;">█</span>	MPO positive cells

Also available:  
Functional *in vitro* experiments with cells from lesional skin

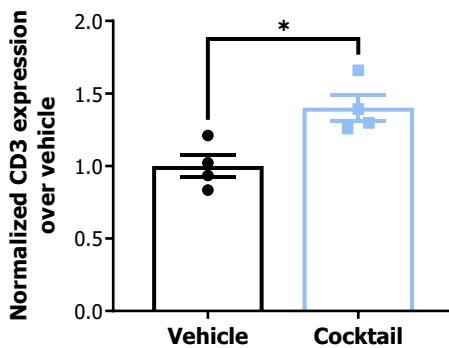
# Modeling psoriasis-like responses in human HEALTHY skin *ex vivo*

Cytokine cocktail activates epidermal keratinocytes and resident immune cells inducing a psoriasis-like phenotype

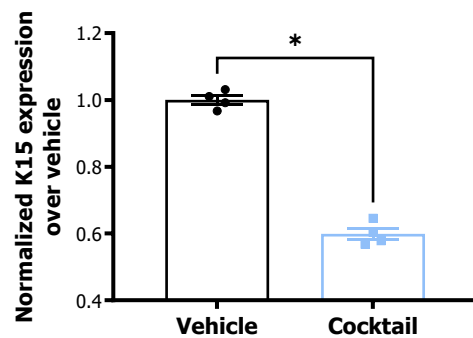


Resident skin immune cells still present and stimulated by cytokine cocktail!

CD3 expression in the skin

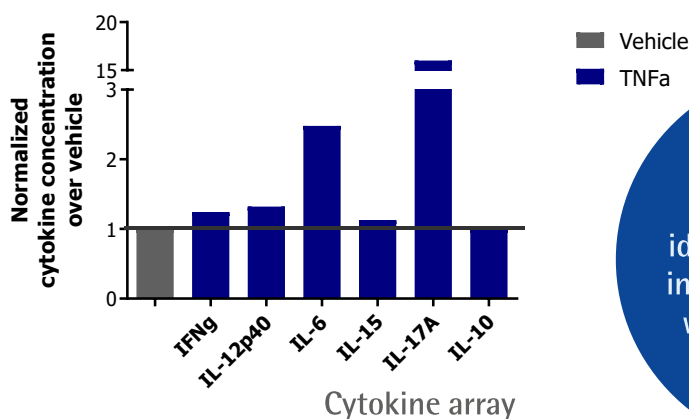


K15 expression in the basal layer



TNF $\alpha$  treatment of human healthy skin stimulates the secretion of psoriasis relevant cytokines into the medium

Cytokine release into the medium

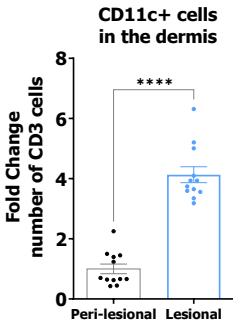
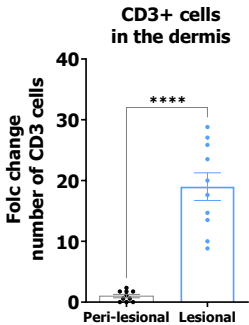
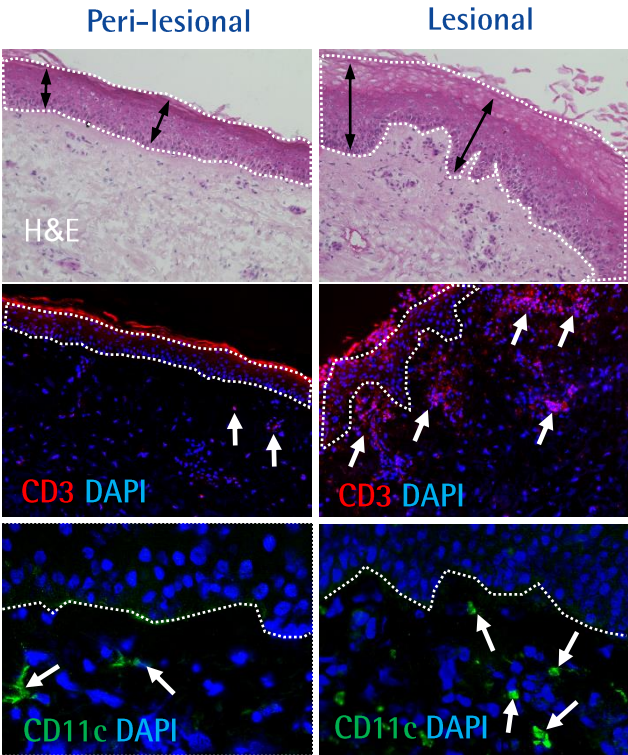


Customized analysis of your target of interest by: multiplex immunostaining, FACS analyses, transcriptome or proteome analyses

Our models can be utilized also to identify new pathways involved in psoriasis as well as investigating modes of action

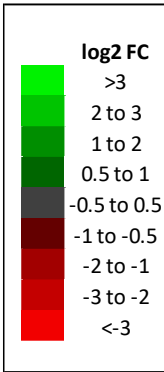
# Investigating the effect of a drug on lesional skin from psoriasis patients *ex vivo*

Psoriasis phenotype of patient skin is maintained during *ex vivo* organ culture



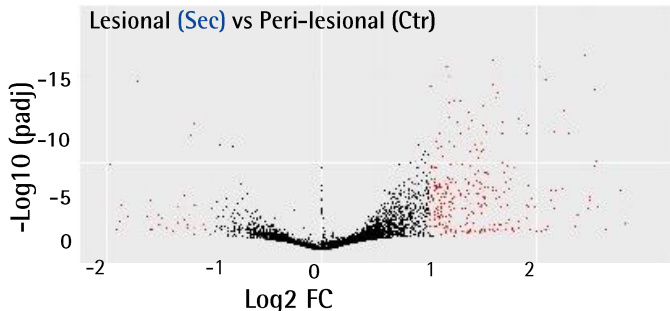
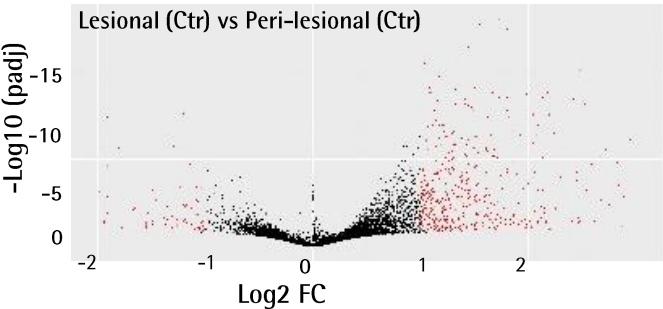
Relative gene expression of  
lesional vs peri-lesional  
human psoriatic skin after 24hrs  
*ex vivo* organ culture

Gene	log2FC	p-value
CCL20	2.37	9.3E-17
CD69	1.94	6.5E-03
CXCL1	0.73	5.6E-03
CXCL13	2.58	3.3E-03
CXCL8	2.36	4.0E-23
CXCR6	2.26	3.0E-03
DEFB4B	1.93	1.4E-04
IL10	0.51	3.2E-01
IL19	0.67	6.5E-02
IL1a	1.72	2.2E-10
IL1b	2.46	1.7E-13
IL23A	3.29	5.5E-11
IL2RA	3.63	2.7E-10
IL36A	8.52	5.7E-05
IL36G	5.25	2.4E-67
S100A7	1.48	1.8E-05
TNF	0.80	6.8E-02

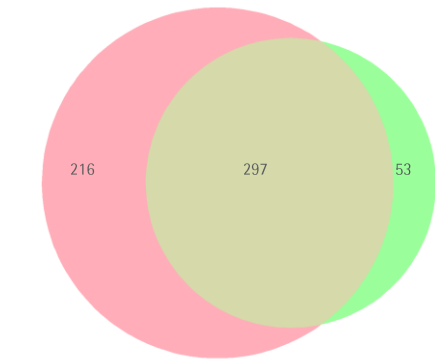


RNAseq

Study Example: Secukinumab (**Sec**) ameliorates psoriasis disease phenotype *ex vivo*, i.e. reduces the transcriptome differences between lesional and peri-lesional skin



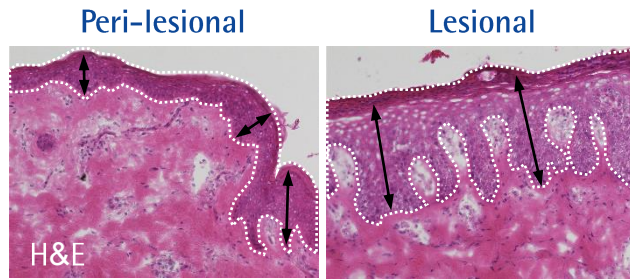
Number of differentially expressed genes



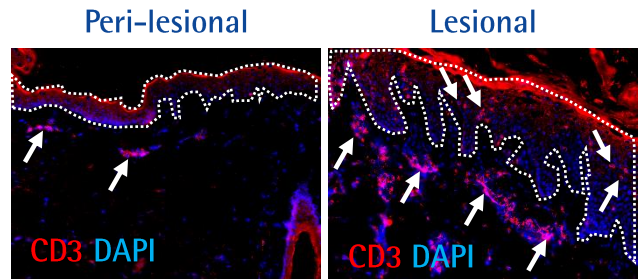
- Lesional (Ctr) vs Peri-lesional (Ctr) (513)
- Lesional (**Sec**) vs Peri-lesional (Ctr) (350)

# Target characterization or identification

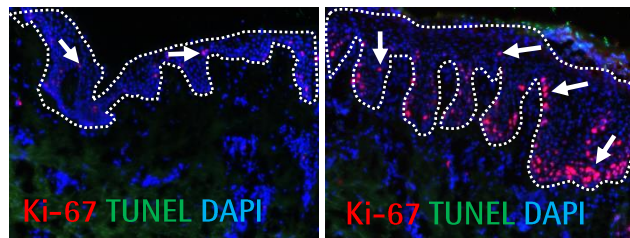
## Analysis of human psoriasis patient skin biopsies



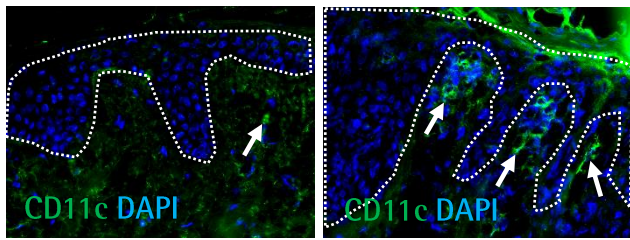
Epidermal thickness



CD3+ T-cells



Ki-67+ proliferating keratinocytes

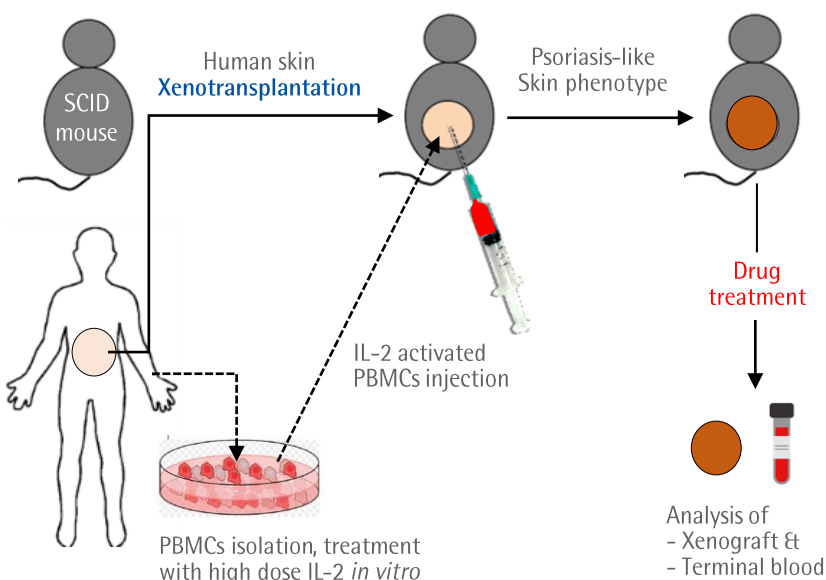


CD11c+ dendritic cells

Multiplex immunostaining can be complemented by *in situ* hybridization, RNAseq, scRNAseq, FACS, cytokine arrays, etc.

Contact us for receiving a customized project proposal that meets your needs!

## Investigating the effect of a drug on inhibiting psoriasis-like phenotype *in vivo*: Humanized mouse model

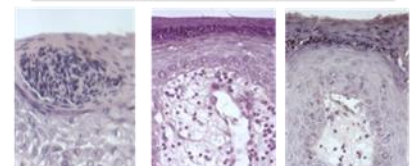
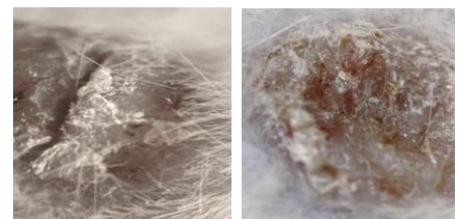


Custom-choice drug treatment by delivery through

1. Systemic treatment
2. Topical treatment

can be applied **prophylactically** or **therapeutically** to prevent or reverse the psoriasiform phenotype. Endpoint analysis of xenograft and terminal blood can be customized including classical quantitative Immunohistomorphometry, RNAseq, and cytokine assay.

### Psoriasiform



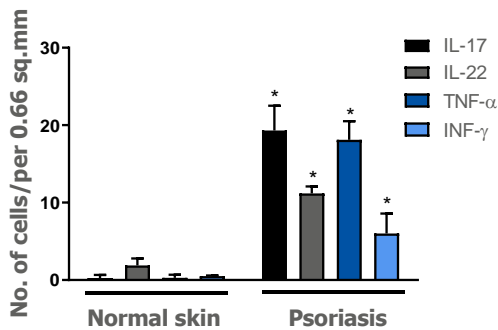
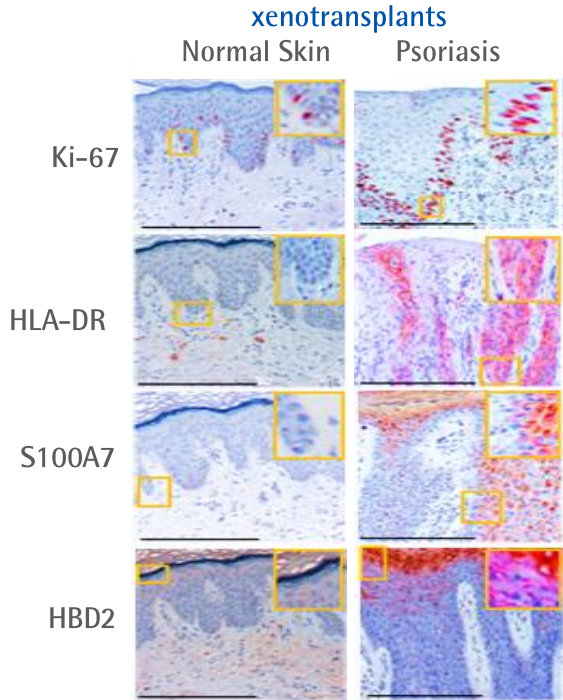
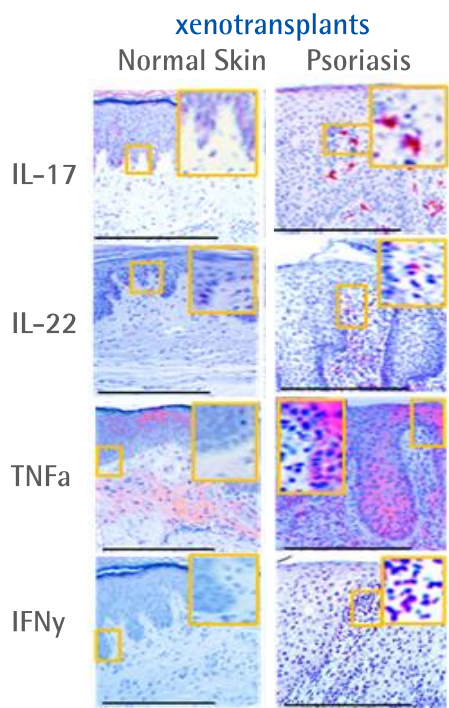
Alternative, *allogeneic IL-2 stimulated PBMCs from psoriasis patients* can be also used to induce psoriasis phenotype.

Keren et al., J Allergy Clin Immunol. 2018; Gilhar et al., J Invest Dermatol. 2011;

Schafer et al., Br J Pharmacol. 2010

# Investigating the effect of a drug on inhibiting a psoriasis-like phenotype *in vivo*: Humanized mouse model

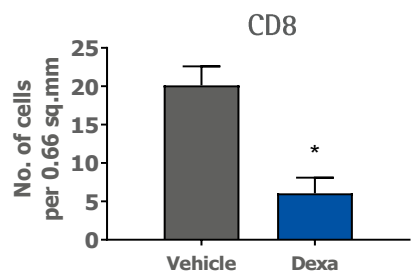
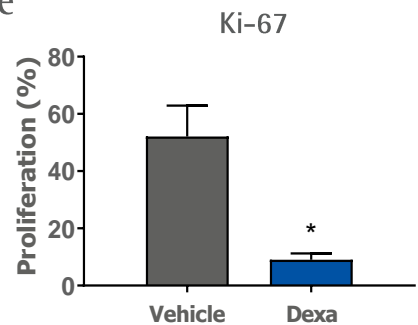
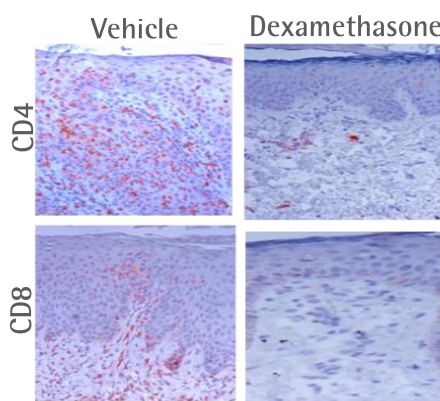
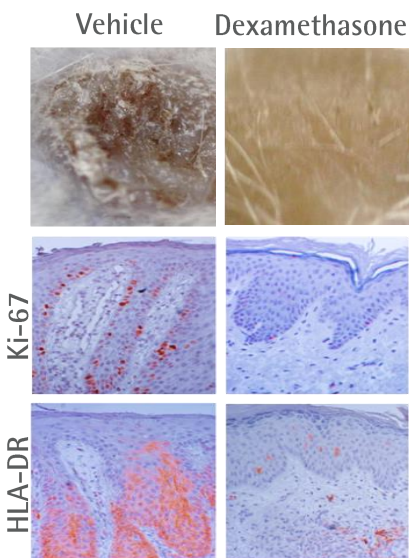
## Psoriasis-like response in the skin



Additional drugs tested in this model: Apremilast, Secukinumab (Cosentyx), etc.

Customize your humanized mouse model & validate drug efficacy

## Amelioration of disease after treatment with dexamethasone



# WHY US?



**MONASTERIUM  
LABORATORY**

A Q I M A Life Sciences Company

Great network of dermatologists and plastic surgeons collecting samples from healthy and diseased skin

Our vision is to provide our clients and partners with the highest quality research in investigative dermatology and trichology – from basic science to translational applied and contract research of high relevance for clinical applications.

World-class scientific leadership & international team

Clinically-relevant *ex vivo* and *in vivo* models

Strong academic background & publication record

## What we can do for our clients:

- Conceptualize & build proof-of-concept studies
- Carry out full service portfolio for pre-clinical skin & hair research (*in vitro/ex vivo* assays, and humanized mouse models)
- Investigate side effects in the skin or hair follicle
- Establish novel cutting edge methodologies and techniques
- Design tailor-made & customized assays for all needs
- Identify, characterize, or validate novel targets and therapeutics for skin & hair disorders
- Discover mechanistic action stories, biomarkers & predictors of response
- Conduct investigator initiated skin & hair clinical trials
- Provide access to human healthy & diseased skin and hair specimen
- Prepare comprehensive project reports & manuscript drafts

Our ambition is to establish and refine research techniques:  
Advanced Methodology Program

Global client list & testimonials

Investigative dermatology:  
Acne Vulgaris, Atopic Dermatitis, Psoriasis, Alopecia Areata, Androgenic Alopecia, Hidradenitis Suppurativa, Vitiligo, Chronic Itch, Prurigo Nodularis, etc.

Biobank:  
Full access to skin & hair samples (patients & healthy subjects)

Exceptional state-of-the-art research technology

We are supported by world-wide recognized experts in dermatology:

Alfredo Rossi, Amos Gilhar, Désmond J. Tobin, Erwin Tschachler, Falk G. Bechara, Francisco Jimenez, Kristian Reich, Mauro Picardo, Thomas Luger, Tiago R. Matos, Vinzenz Oji, Athanasios Tsianakas and many more!