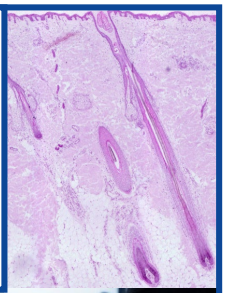
MONASTERIUM LABORATORY
A QIMA Life Sciences Company

All about skin and hair bioscience!

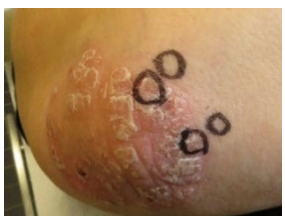
State-of-the-art technology and expertise for all your pre-clinical, mechanistic, and clinical needs in dermatology research.



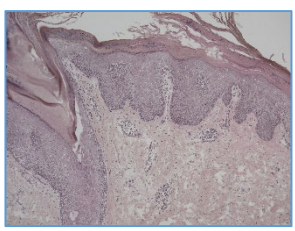
- Pre-clinical Research
- Clinical Research
- Education

Psoriasis

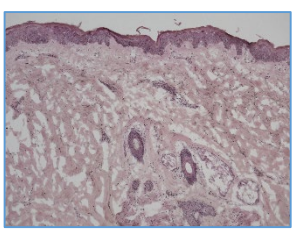
Psoriasis



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"

President:
Prof. Dr. Ralf Paus

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Skin & Hair Research Solutions GmbH

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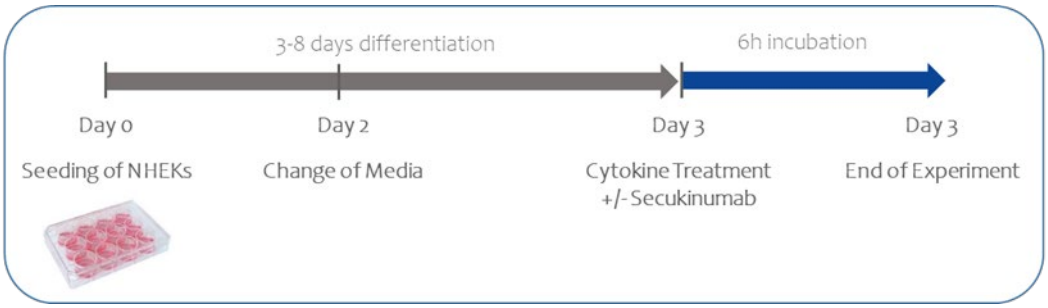
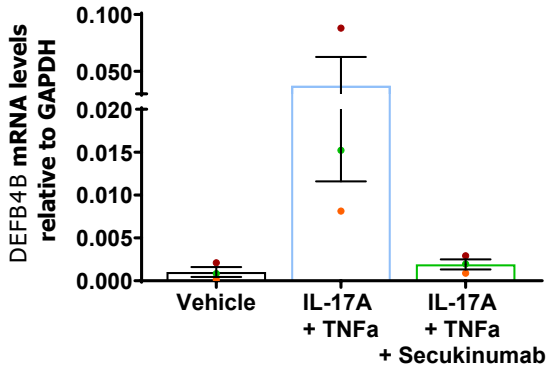
Modeling psoriasis-like responses in primary epidermal keratinocytes *in vitro*

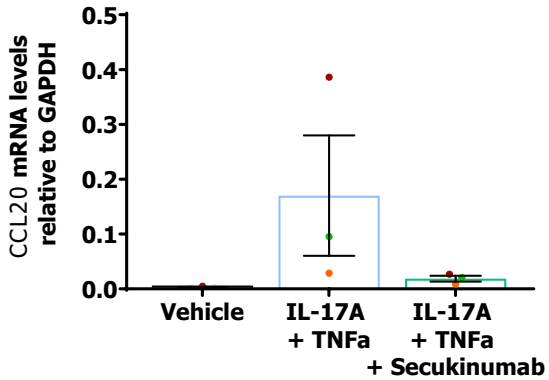
Cytokine cocktail (IL-17A/TNFα) successfully induces psoriasis-associated gene expression in human epidermal keratinocytes

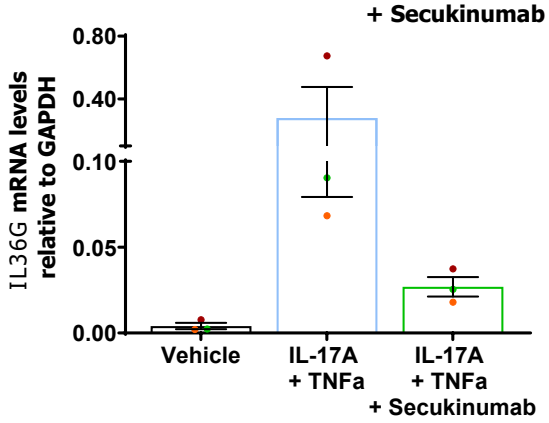


Study Example: Secukinumab inhibits transcriptional changes and reduces the release of β2-defensin (BD2) and CCL20 into the medium induced by IL-17A+TNFα

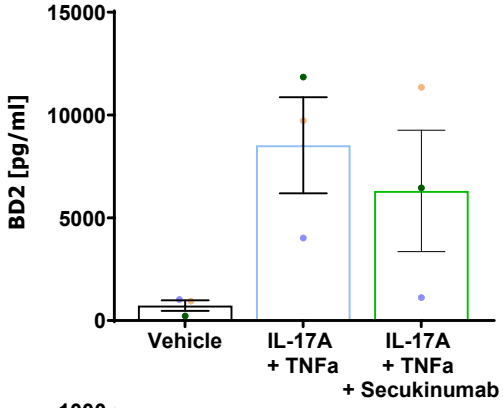
Gene expression

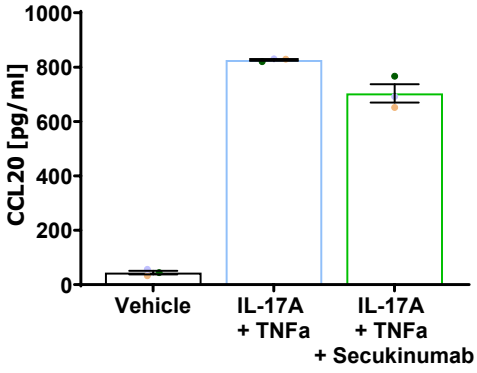






Release into the medium



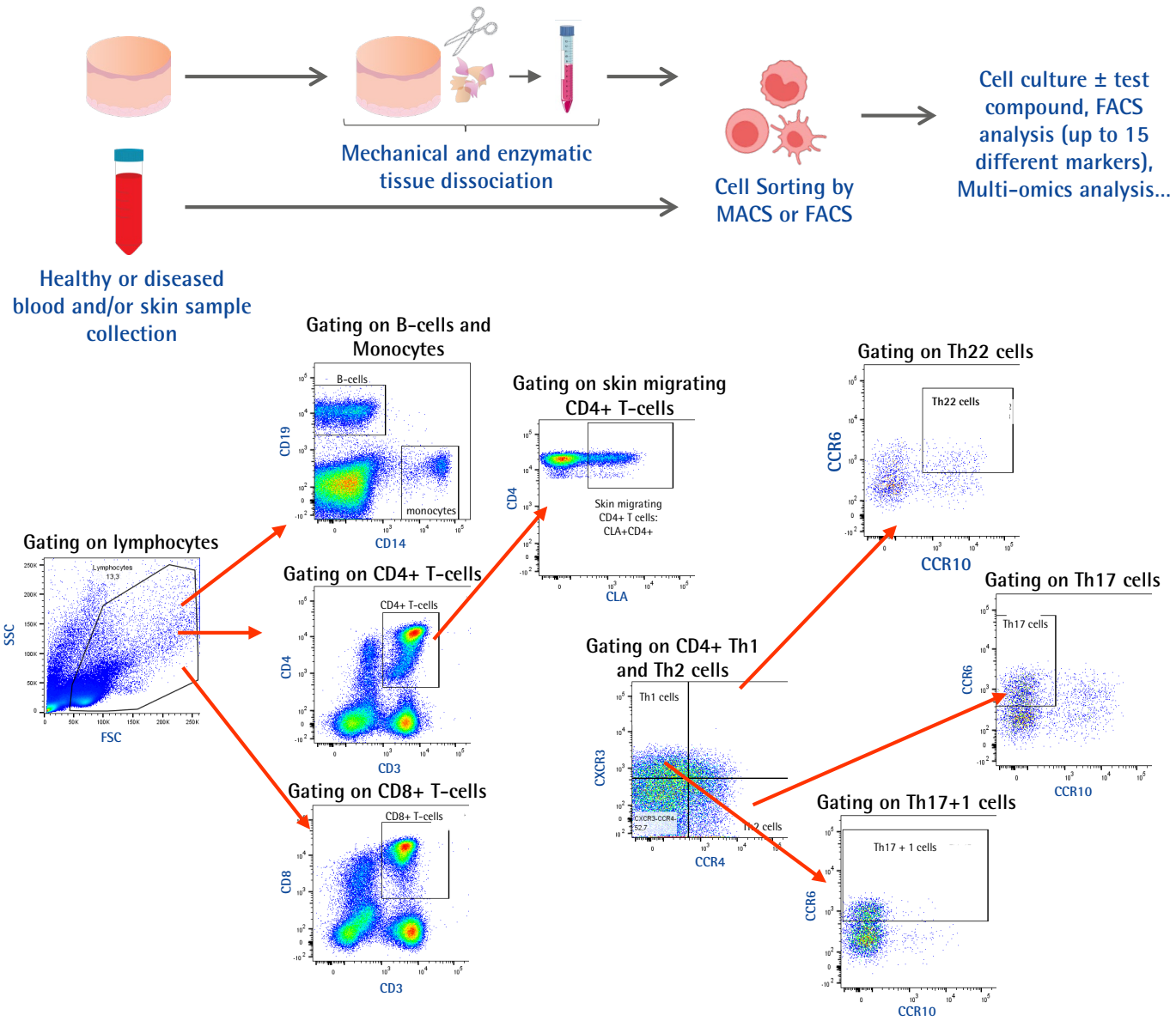


Donor 1 Donor 2 Donor 3

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

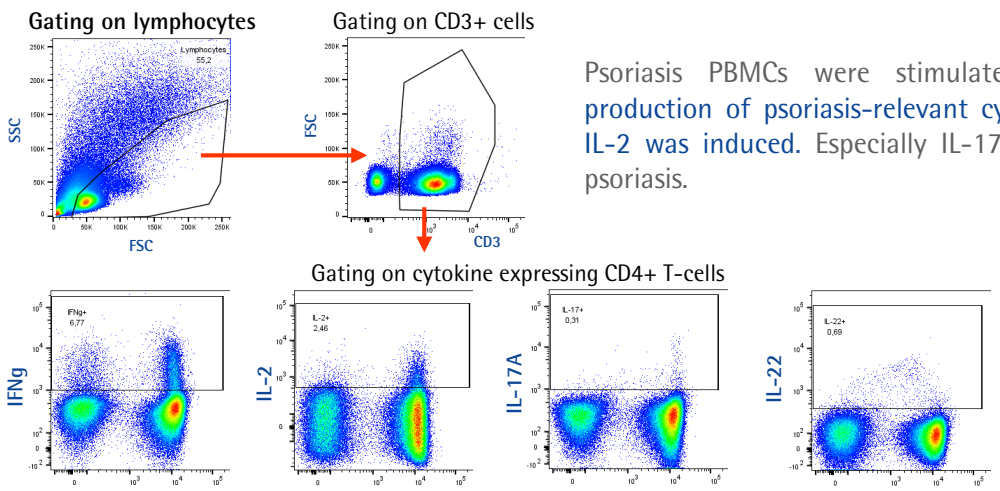
Secukinumab is an anti-IL17A recombinant antibody

Isolation of psoriasis-relevant immune cells from healthy and psoriatic human blood and skin



FACS plots generated from healthy human blood. We can detect B-cells (CD19+), monocytes (CD14+), CD4+ or CD8+ T-cells, but also neutrophils (CD56+), dendritic cells (CD11c+), mast cells (CD117+), and more. In further steps, the CD4+ T-cell population can be analyzed for psoriasis-relevant immune cell subtypes e.g. skin migrating T cells (CLA+, CD4+), and Th1 (CXCR3+CCR4−CCR6−), Th17 (CXCR3-CCR4+CCR6+CCR10-), Th1+17 (CXCR3+CCR4−CCR6+) or Th22 (CXCR3+CCR4+CCR6+CCR10+) polarized CD4+ T-cells.

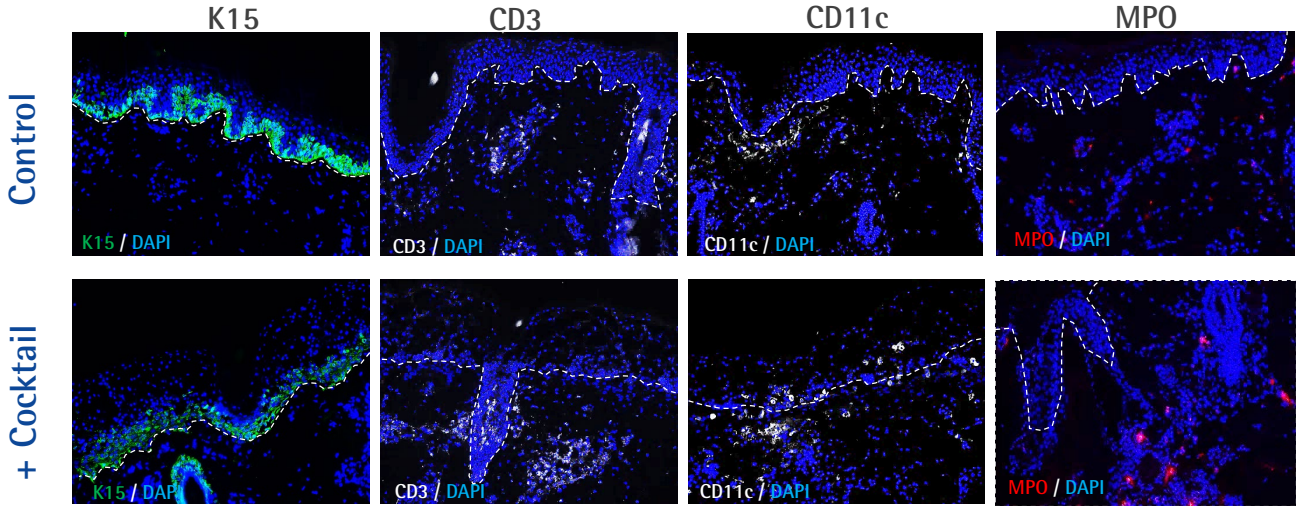
Identification of psoriasis-relevant cytokines from psoriatic human blood



Psoriasis PBMCs were stimulated with anti-CD3/CD28 and production of psoriasis-relevant cytokines IL-17, IFNγ, IL-22 and IL-2 was induced. Especially IL-17 and IL-22 are key players in psoriasis.

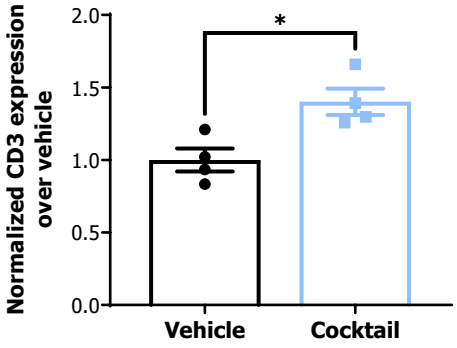
Modeling psoriasis-like responses in human HEALTHY skin *ex vivo*

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

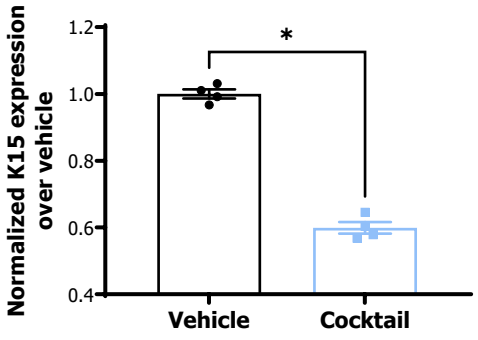


Resident skin immune cells still present and stimulated by cytokine cocktail!

CD3 expression in the skin

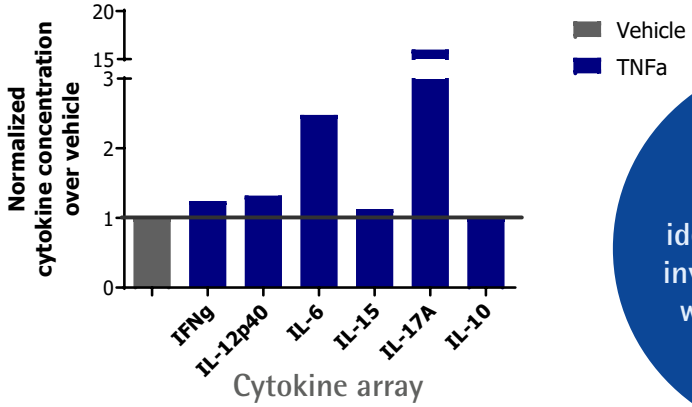


K15 expression in the basal layer



TNFα treatment of human healthy skin stimulates the secretion of psoriasis relevant cytokines into the medium

Cytokine release into the medium

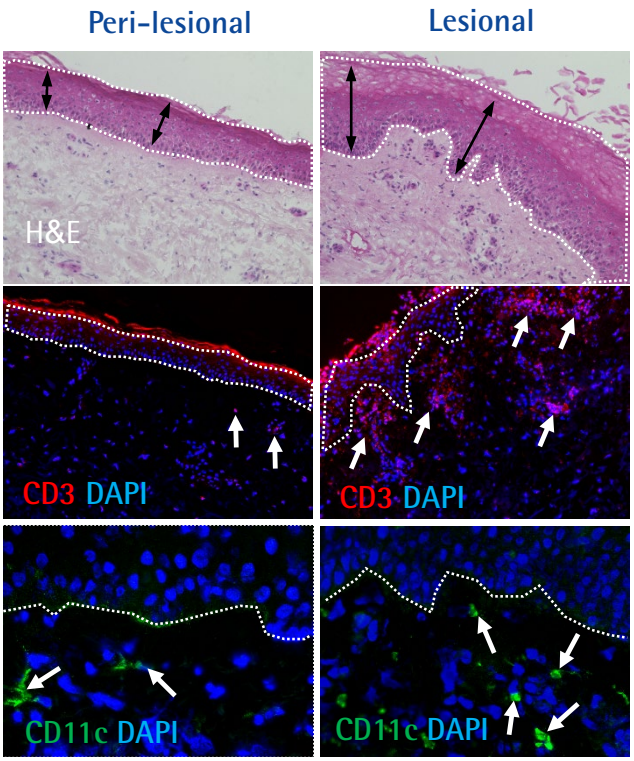


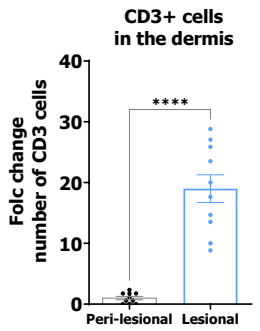
Customized analysis of your target of interest by: multiplex immunostaining, FACS analyses, transcriptome or proteome analyses

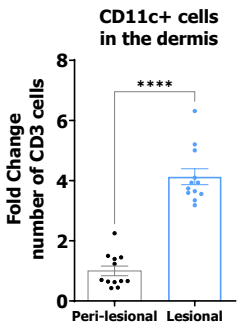
Our models can be utilized also to identify new pathways involved in psoriasis as well as investigating modes of action

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

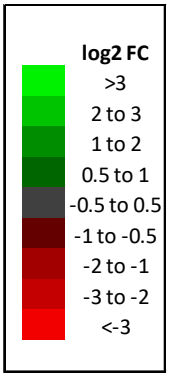






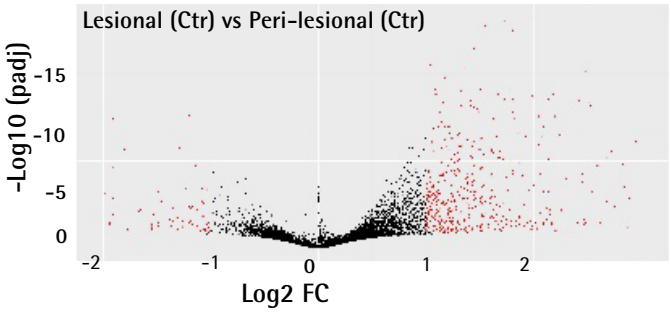
Relative gene expression of lesional vs peri-lesional human psoriatic skin after 24hrs *ex vivo* organ culture

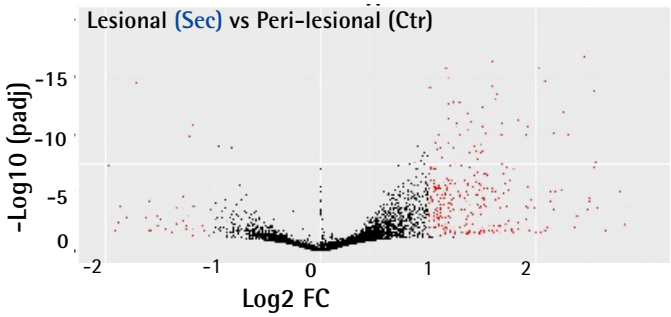
Gene	log2FC	*p-value*
CCL20	2.37	9.3E-17
CD69	1.94	6.5E-03
CXCL1	0.73	5.6E-03
CXCL13	2.58	3.3E-03
CXCL8	2.36	4.0E-23
CXCR6	2.26	3.0E-03
DEFB4B	1.93	1.4E-04
IL10	0.51	3.2E-01
IL19	0.67	6.5E-02
IL1a	1.72	2.2E-10
IL1b	2.46	1.7E-13
IL23A	3.29	5.5E-11
IL2RA	3.63	2.7E-10
IL36A	8.52	5.7E-05
IL36G	5.25	2.4E-67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



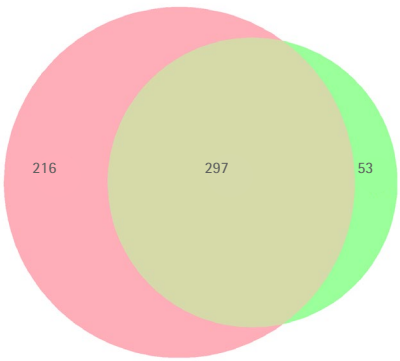
RNAseq

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



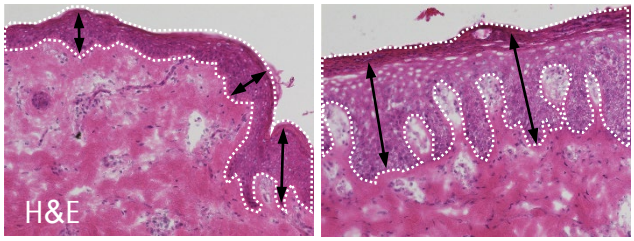
Lesional (Ctr) vs Peri-lesional (Ctr) (513)

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

Target characterization or identification

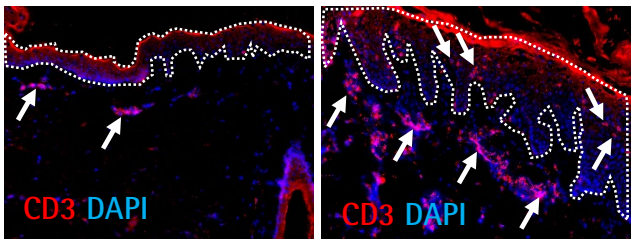
Analysis of human psoriasis patient skin biopsies

Peri-lesional | Lesional

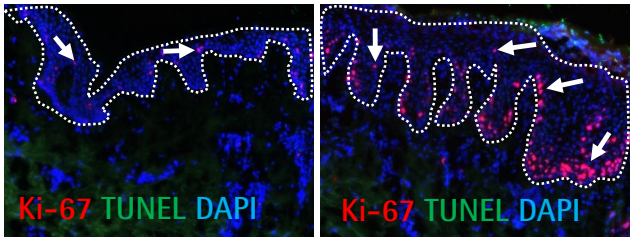


Epidermal thickness

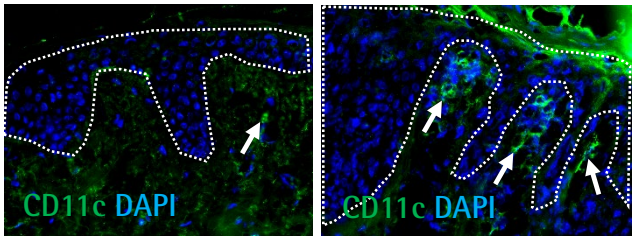
Peri-lesional | Lesional



CD3+ T-cells



Ki-67+ proliferating keratinocytes

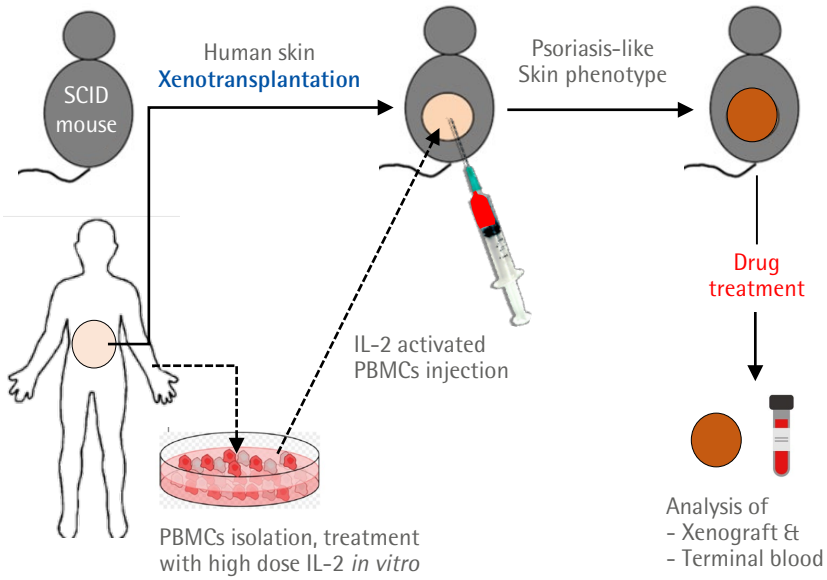


CD11c+ dendritic cells

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



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

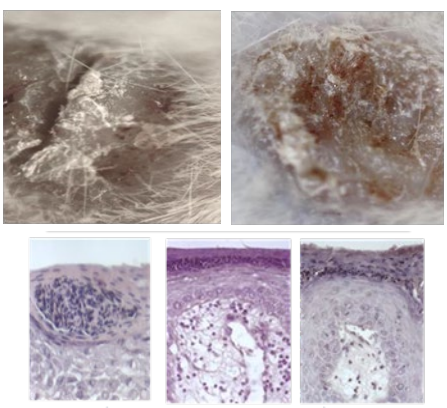
Keren et al., J Allergy Clin Immunol. 2018; Gilhar et al., J Invest Dermatol. 2011; Schafer et al., Br J Pharmacol. 2010

Custom-choice drug treatment by delivery through

1. **Systemic** treatment
2. **Topical** treatment

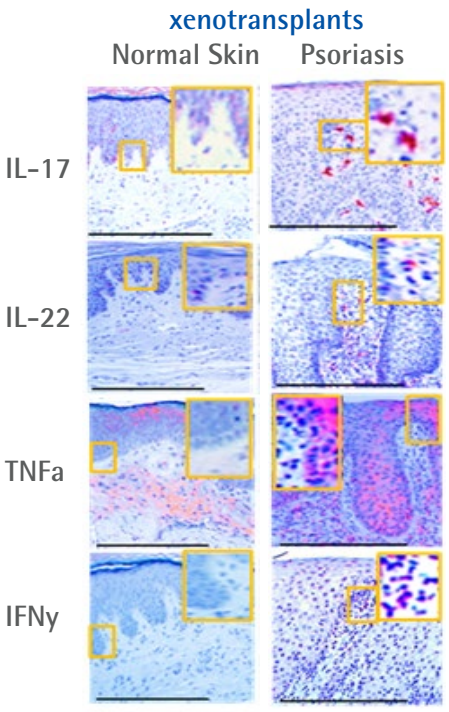
can be applied **prophylactically** or **therapeutically** to prevent or reverse the psoriasiform phenotype. Endpoint analysis of xenograft and terminal blood can be customized including classical quantitative Immunohistomorphometry, RNAseq, and cytokine assay.

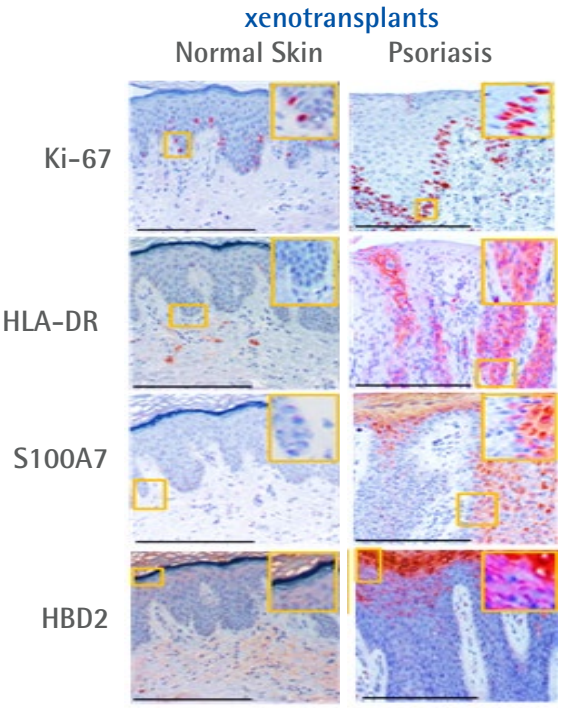
Psoriasiform

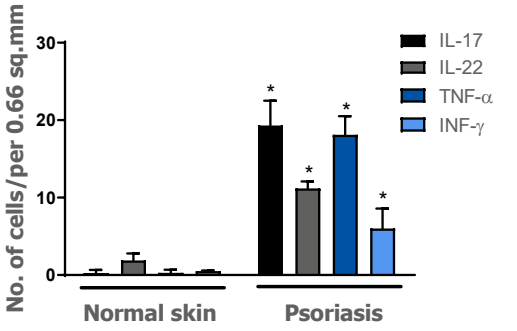


Investigating the effect of a drug on inhibiting a psoriasis-like phenotype *in vivo*: Humanized mouse model

Psoriasis-like response in the skin



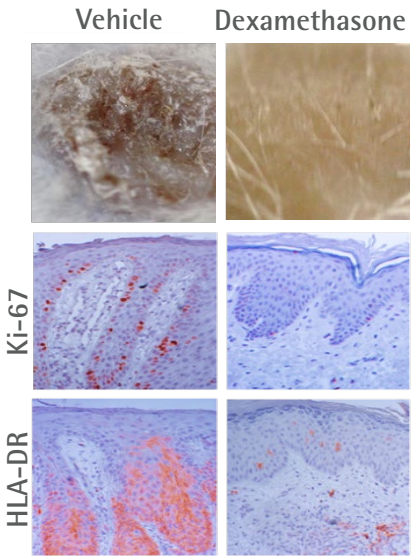


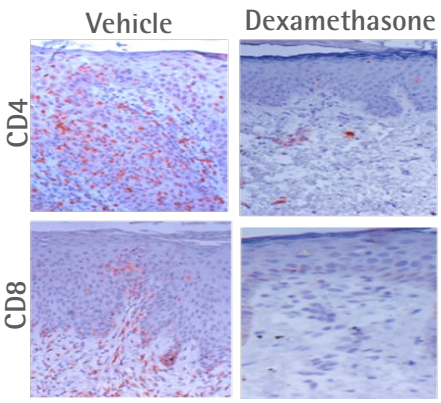


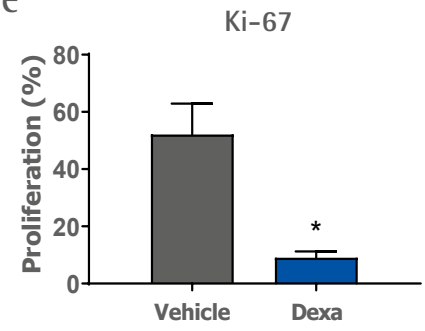
Additional drugs tested in this model: Apremilast, Secukinumab (Cosentyx), etc.

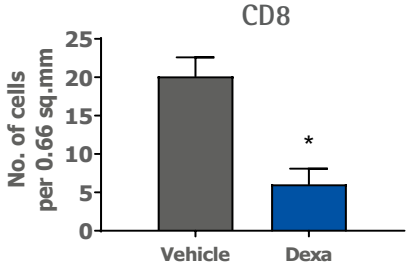
Customize your humanized mouse model & validate drug efficacy

Amelioration of disease after treatment with dexamethasone









WHY US?

MONASTERIUM LABORATORY
A QIMA Life Sciences Company

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.

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

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

Monasterium Laboratory Skin & Hair Research Solutions GmbH was founded in 2015 by **Prof. Ralf Paus**, MD, FRSB.