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skin and hair
bioscience!

State-of-the-art technology and expertise
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clinical needs in dermatology research.

- ▶ Pre-clinical Research
- ▶ Clinical Research
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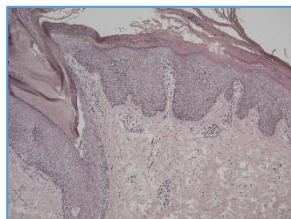


Psoriasis

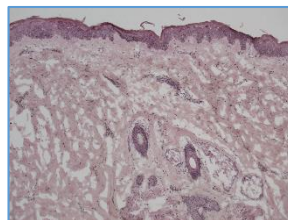
Psoriasis



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"

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Dr. Marta Bertolini

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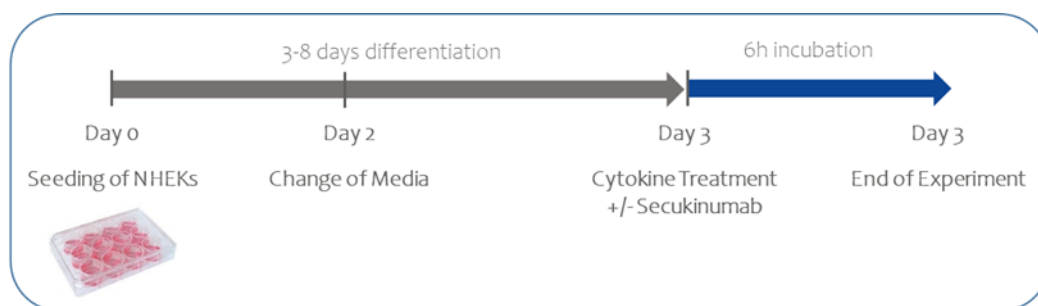
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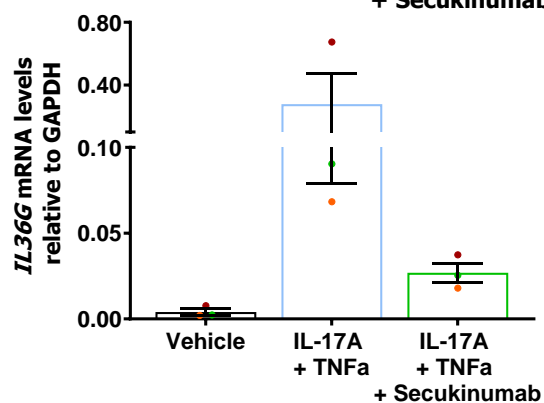
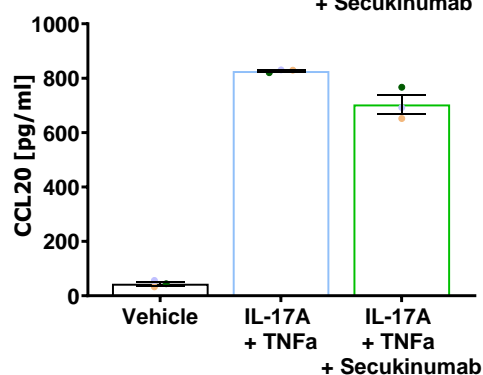
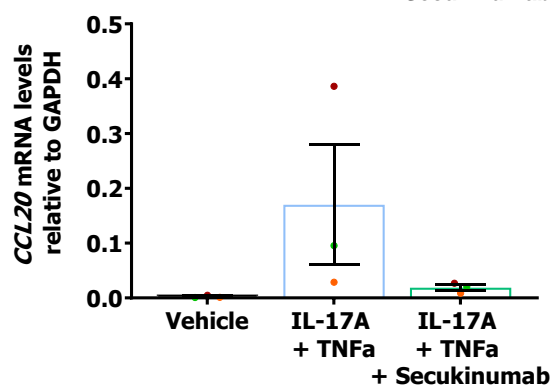
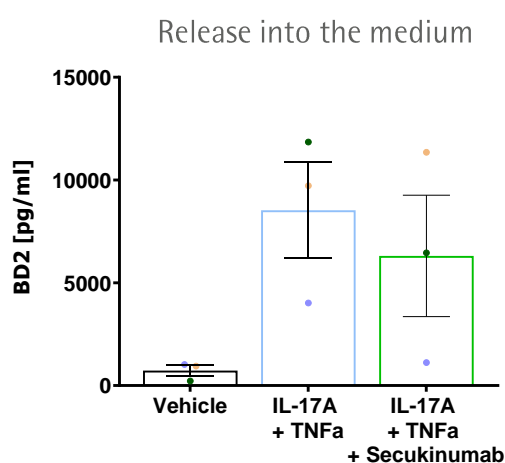
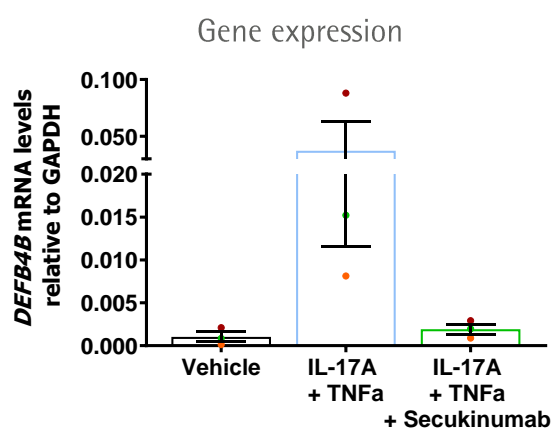


Modeling psoriasis-like responses in primary epidermal keratinocytes *in vitro*

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



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

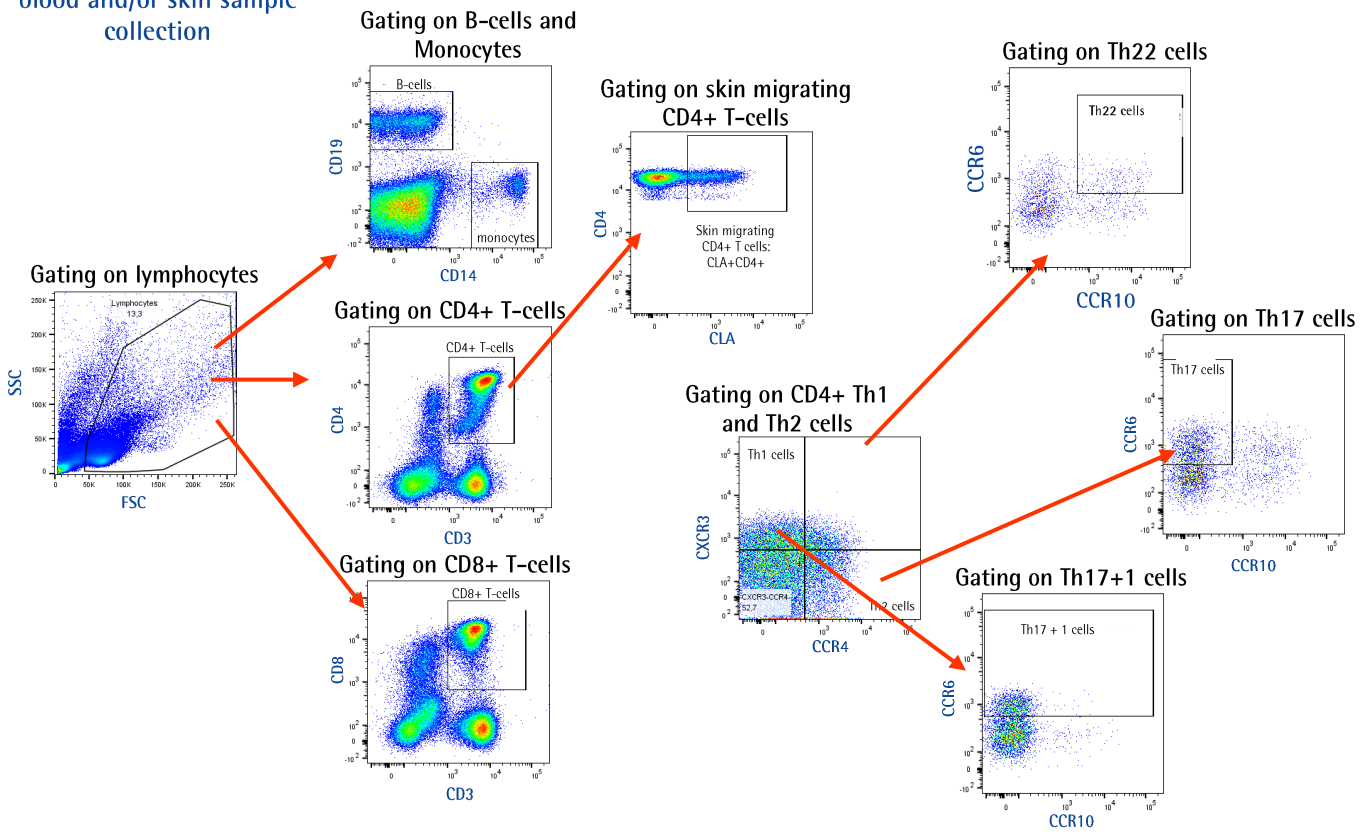
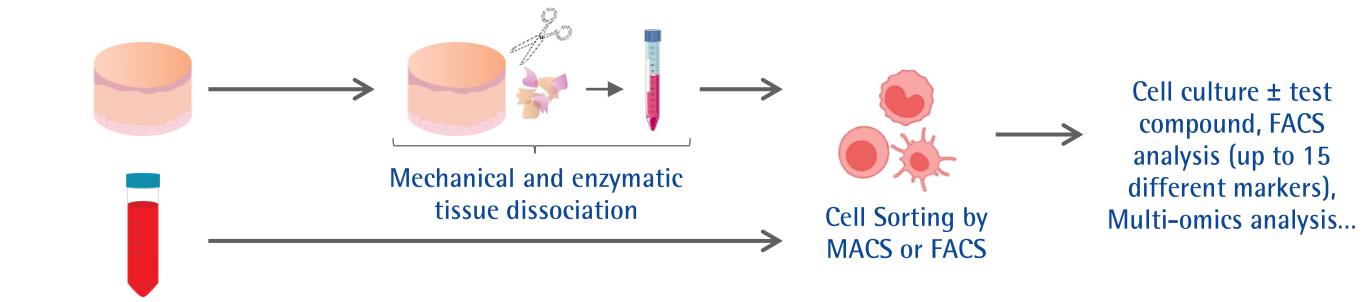


● Donor 1 ● Donor 2 ● Donor 3

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

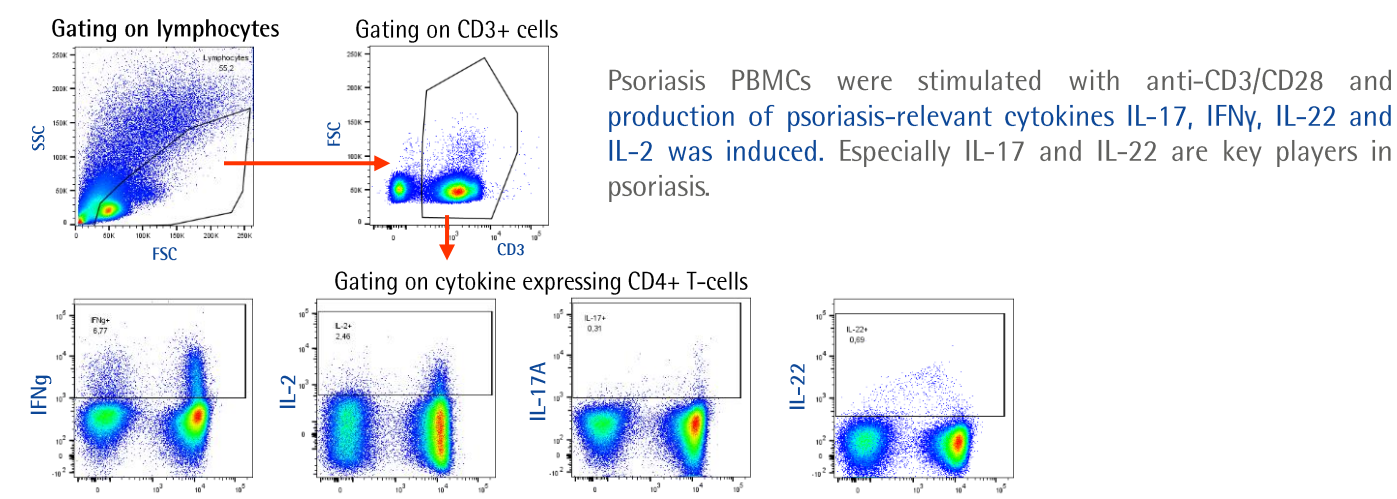
Secukinumab is an anti-IL17A recombinant antibody

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



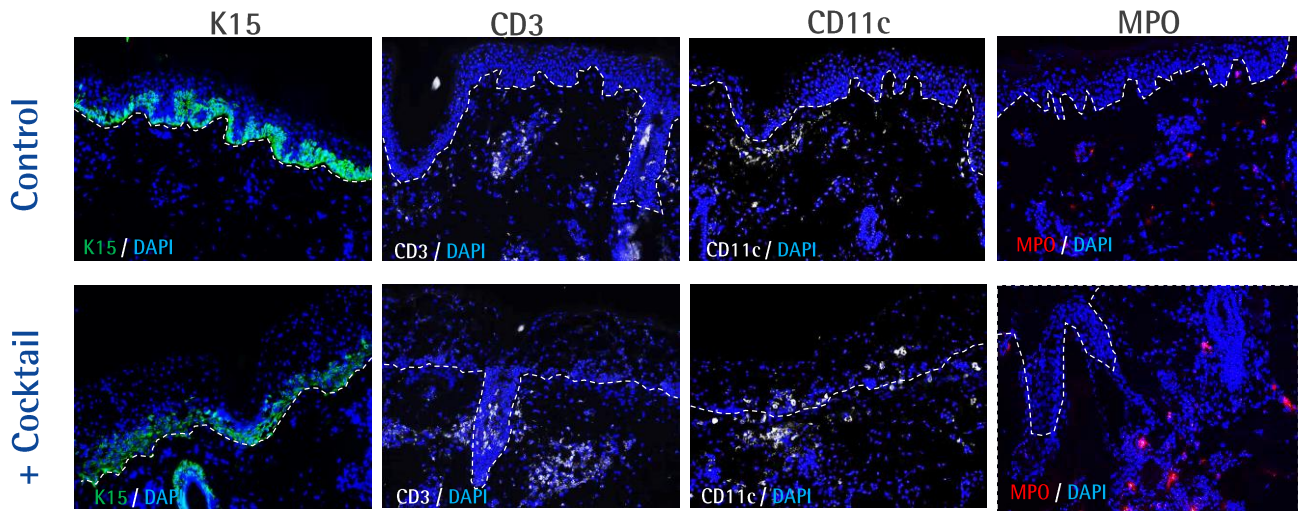
FACS plots generated from healthy human blood. We can detect B-cells (CD19+), monocytes (CD14+), CD4+ or CD8+ T-cells, but also neutrophils (CD56+), dendritic cells (CD11c+), mast cells (CD117+), and more. In further steps, the CD4+ T-cell population can be analyzed for psoriasis-relevant immune cell 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



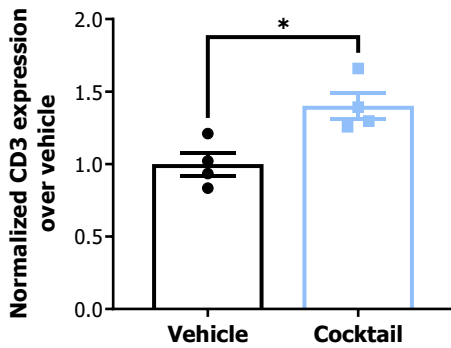
Modeling psoriasis-like responses in human HEALTHY skin *ex vivo*

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

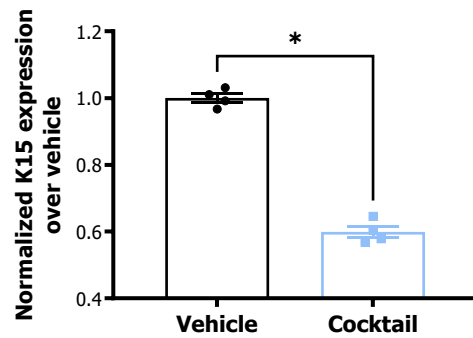


Resident skin immune cells still present and stimulated by cytokine cocktail!

CD3 expression in the skin

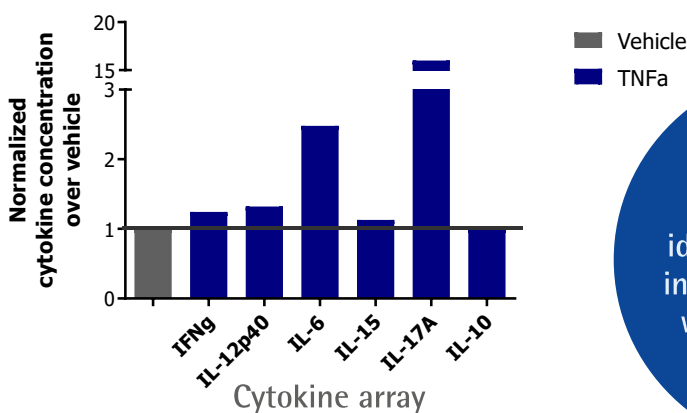


K15 expression in the basal layer



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

Cytokine release into the medium

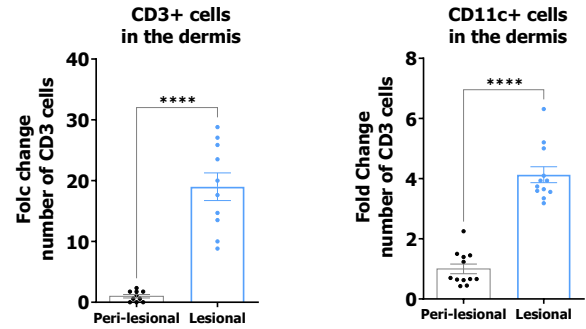
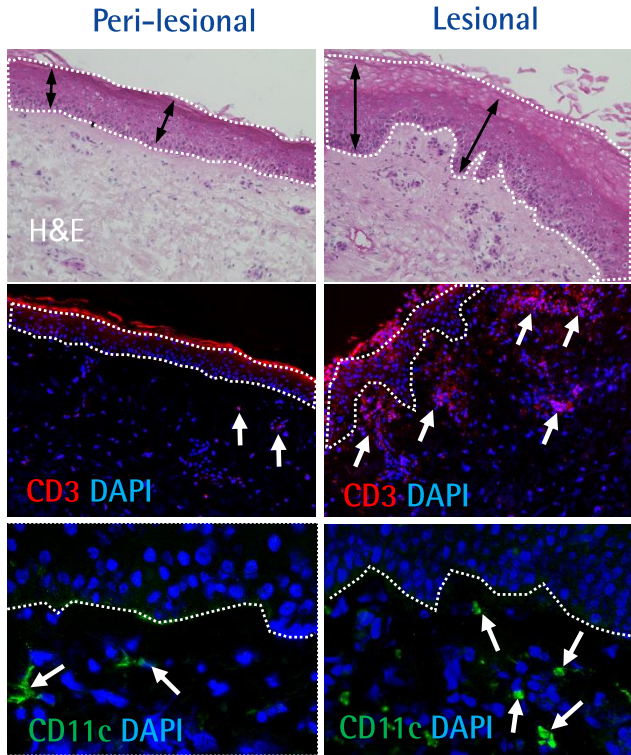


Customized analysis of your target of interest by: multiplex immunostaining, FACS analyses, transcriptome or proteome analyses

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

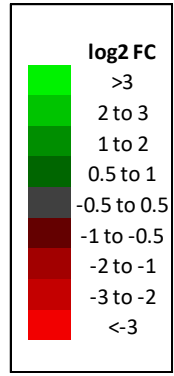
Investigating the effect of a drug on lesional skin from psoriasis patients *ex vivo*

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



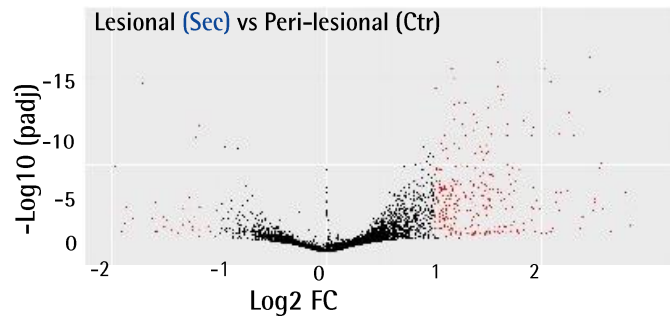
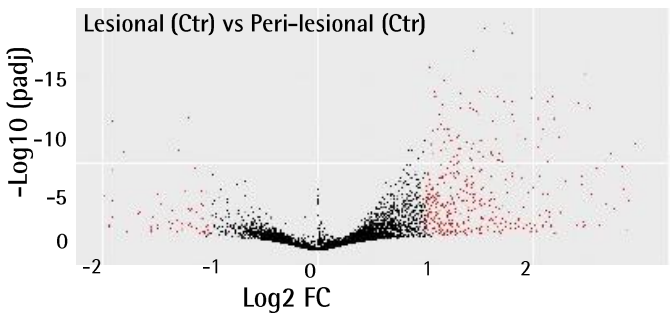
Relative gene expression of lesional vs peri-lesional human psoriatic skin after 24hrs *ex vivo* organ culture

Gene	log ₂ FC	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

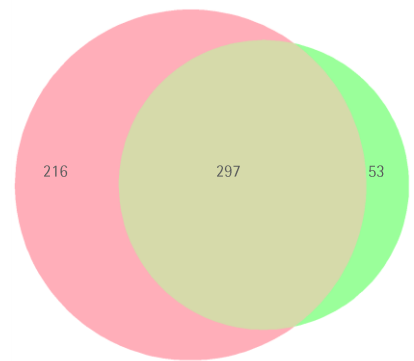


RNAseq

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



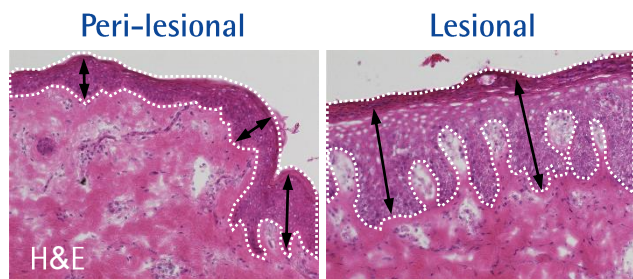
Number of differentially expressed genes



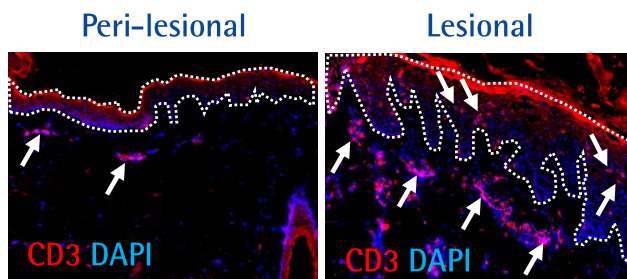
- Lesional (Ctr) vs Peri-lesional (Ctr) (513)
- Lesional (Sec) vs Peri-lesional (Ctr) (350)

Target characterization or identification

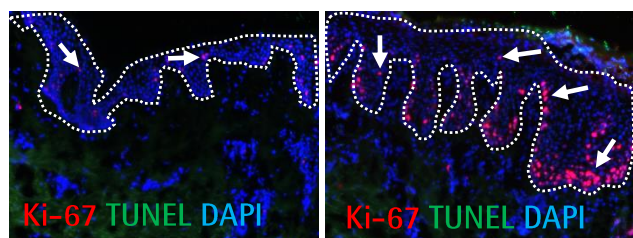
Analysis of human psoriasis patient skin biopsies



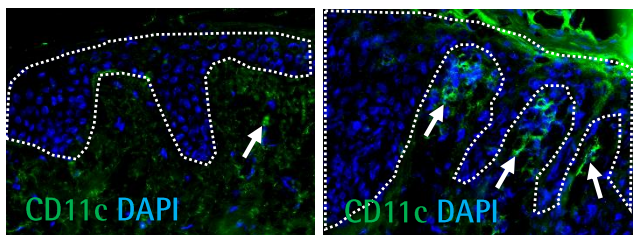
Epidermal thickness



CD3+ T-cells



Ki-67+ proliferating keratinocytes

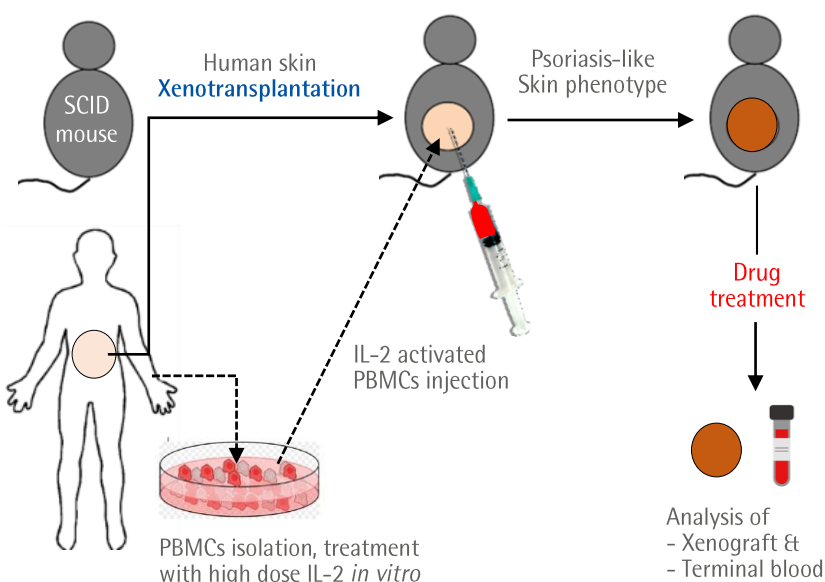


CD11c+ dendritic cells

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!

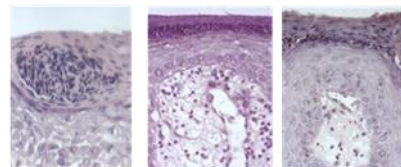
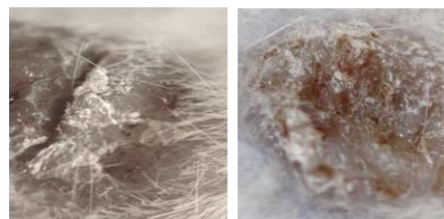
Investigating the effect of a drug on inhibiting psoriasis-like phenotype *in vivo*: Humanized mouse model



Custom-choice drug treatment by delivery through

1. Systemic treatment
 2. Topical treatment
- can be applied **prophylactically** or **therapeutically** to prevent or reverse the psoriasisform phenotype. Endpoint analysis of xenograft and terminal blood can be customized including classical quantitative Immunohistomorphometry, RNAseq, and cytokine assay.

Psoriasisform

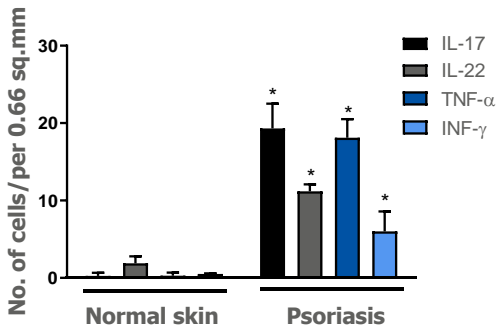
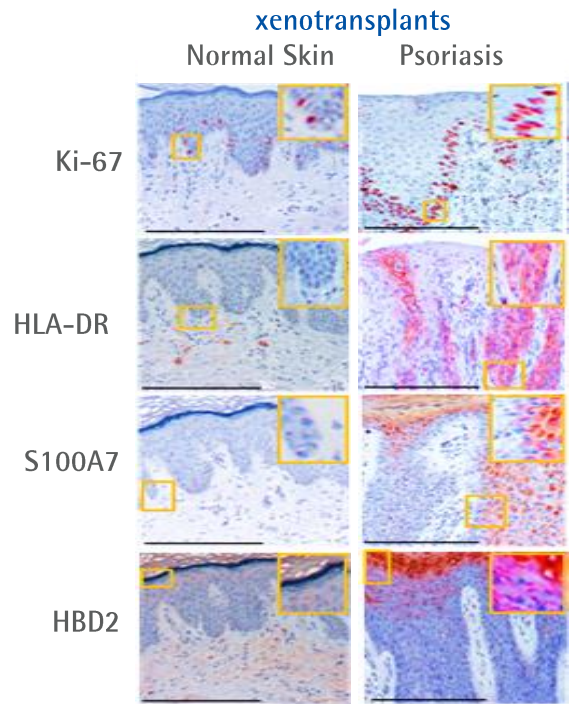
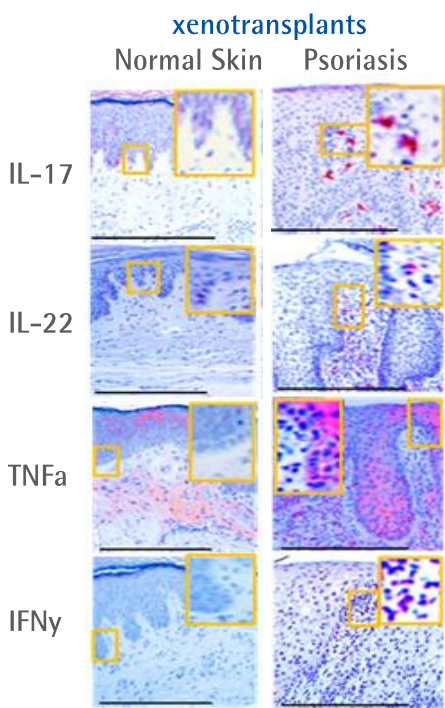


Alternative, *allogeneic IL-2 stimulated PBMCs from psoriasis patients* can be also used to induce psoriasis phenotype.

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

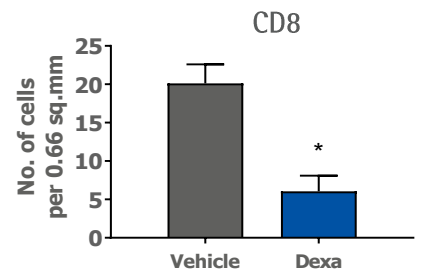
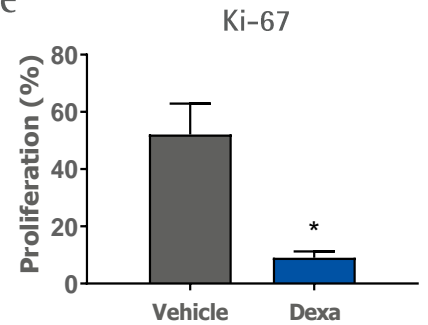
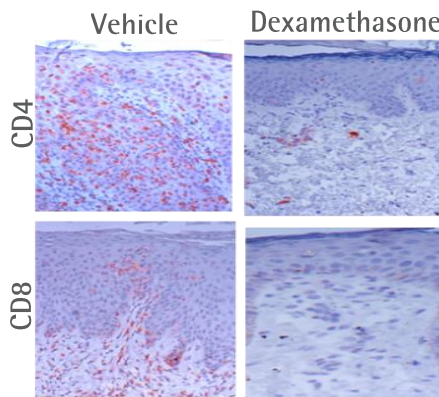
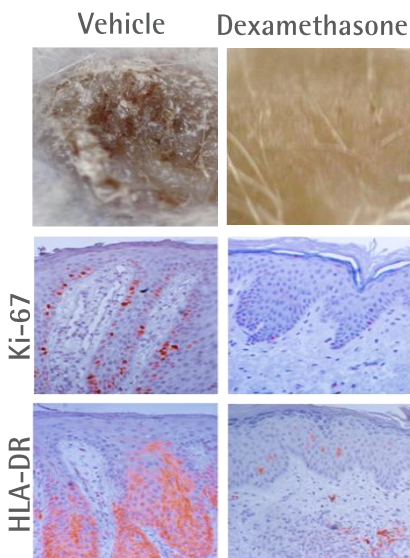
Psoriasis-like response in the skin



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