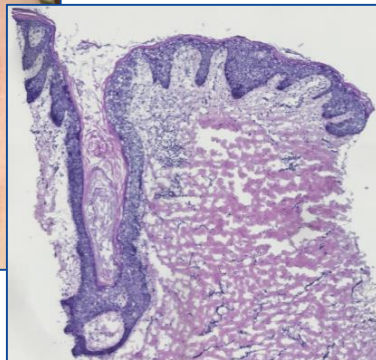


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- ▶ Pre-clinical Research
- ▶ Clinical Research
- ▶ Education



# Hidradenitis suppurativa



"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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Skin & Hair Research Solutions GmbH

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Dr. Marta Bertolini (PhD)

[m.bertolini@monasteriumlab.com](mailto:m.bertolini@monasteriumlab.com)  
+ 49 (0)251 93263-080

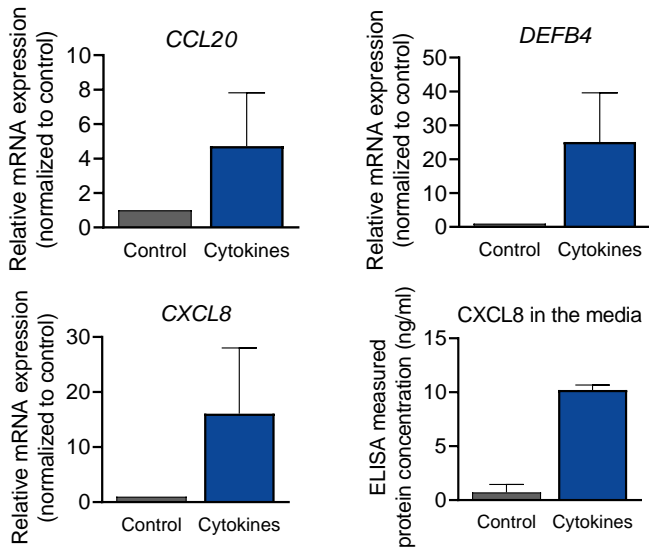
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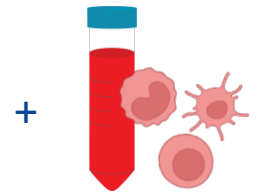
# Modelling Hidradenitis Suppurativa-like responses in human healthy hair follicles *ex vivo*



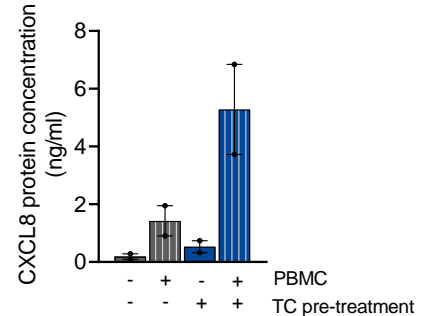
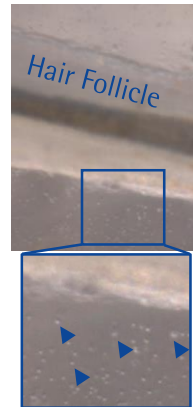
Our method: Organ culture of microdissected full-length healthy human hair follicles + cytokine cocktails



Relative mRNA expression levels were measured from n=2 biological replicates. Mean+SD with 3 HF/replicate after cytokine treatment for 24 hours. ELISA measured concentration of CXCL8 protein in the media.



Our method: Co-culture of human PBMCs isolated from frozen or fresh blood with microdissected full-length healthy human hair follicles

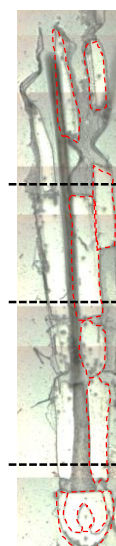


Representative image of a healthy human HF in co-culture with human PBMCs (blue arrowheads). CXCL8 (IL-8) levels were measured by ELISA in conditioned media from 2 anagen HF/experimental group cultured for 24 hours with or without PBMCs (± cytokine treatment (TC)).

## ➤ Additional techniques and Read-Out Parameters:

- Multiplex immunostainings
- Multiplex *in situ* hybridization
- bulk RNAseq
- Single cell isolation and FACS analysis
- Single cell isolation and scRNAseq
- Proteomic and lipidomic analysis, ...

... laser-capture microdissection for skin or HF compartment specific multi-omics analyses.



Infundibulum

Isthmus

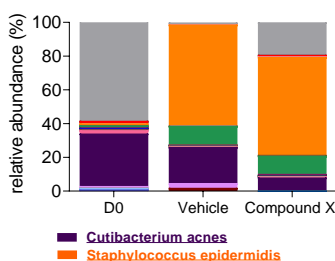
Suprabulbar

Bulb



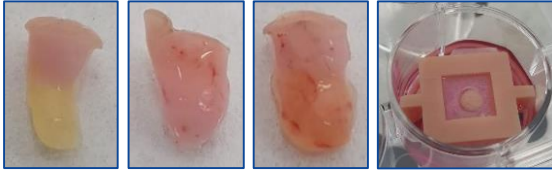
- Proteomics
- Transcriptomics
- Microbiomics
- ...

... analysis of skin and hair follicle Microbiota.



- ITS/16sRNA sequencing
- Shotgun sequencing
- alpha diversity and taxonomic evaluations
- Antimicrobial peptides
- ...

# Organ culture of Hidradenitis Suppurativa perilesional and lesional skin

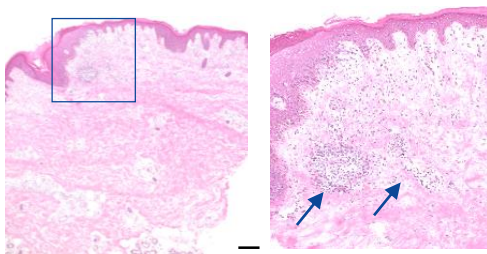


Our method: Culture of full-thickness HS perilesional (left) and lesional skin biopsies, containing Nodule (middle left) or Fistula (middle right). Representative image of fresh biopsies during culture under air-liquid interphase conditions (right).

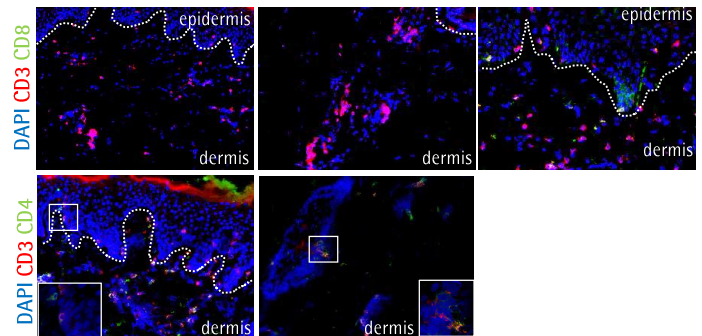
**Read-Out Parameters:**  
Transcriptomics, quantitative (immuno-)histomorphometry, *in situ* hybridization, cytokine and chemokine release into the medium, ...

## Identification and characterization of a target in freshly frozen HS samples

### ➤ Immune cell infiltration in perilesional tissue from HS patients

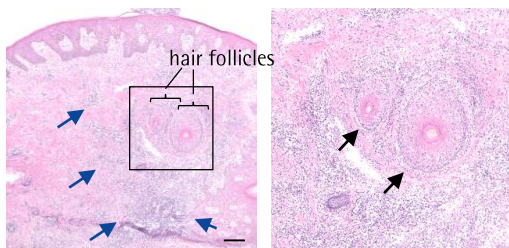


H&E staining of a perilesional biopsy obtained from a HS patient showing immune cell infiltration in the dermis (blue arrows). Scale Bar: 200µM

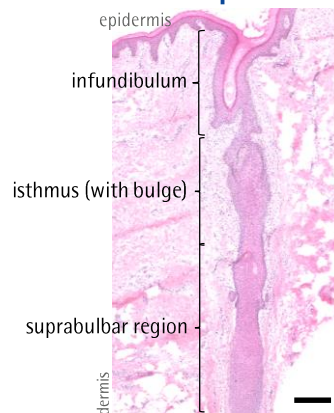


Immunofluorescence staining of a perilesional biopsy showing CD4+ and CD8+ T-cell infiltrates

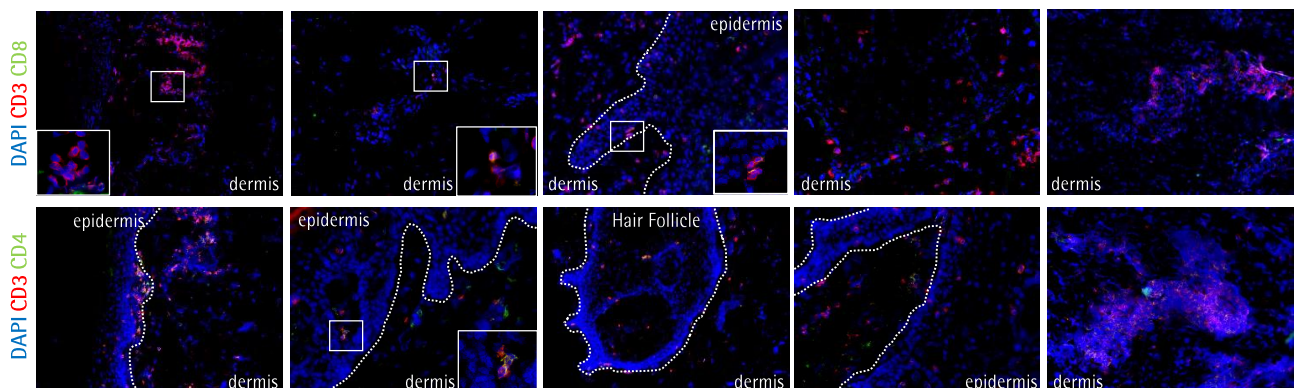
### ➤ Immune cell infiltration in lesional tissue from HS patients



H&E staining of a nodule containing, lesional HS biopsy, showing immune cell infiltrates (blue arrows) and hyperplasia of the hair follicle epithelium (black arrows). Scale Bar: 200µM



H&E staining of a lesional HS biopsy, containing a tunnel that has formed around a hair follicle and extends into the dermis, showing hyperplasia of the hair follicle epithelium. Scale Bar: 200µM

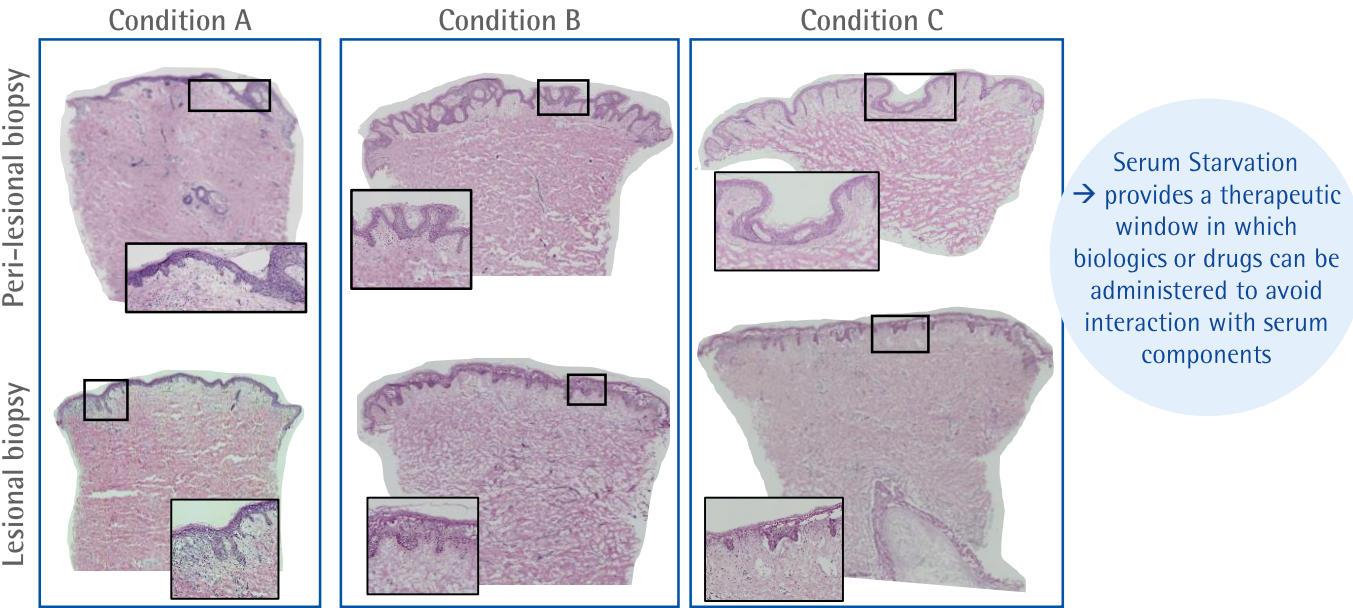


Immunofluorescence staining of a nodule containing, lesional biopsy from a HS patient, showing CD4+ and CD8+ T-cell infiltrates

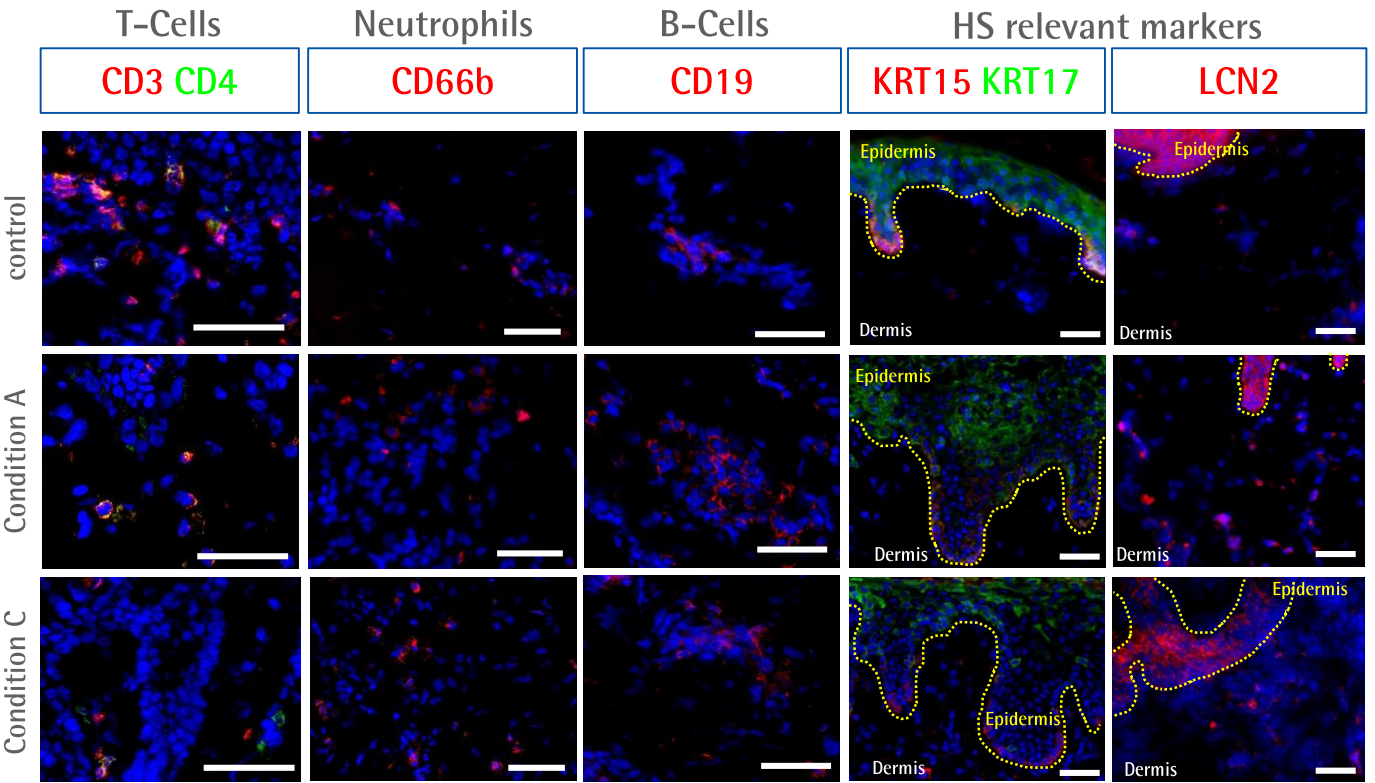


# Perilesional and lesional skin organ culture: Our methods

- Organ culture of perilesional and lesional HS biopsies, including cycles of serum starvation, results in preservation of tissue integrity after 72h *ex vivo*



Tissue integrity, evaluated by H&E, in HS-biopsies cultured for 72h under different medium conditions. Condition A: ++ human serum without serum starvation, Condition B: ++ human serum subjected to cycles of serum starvation or Condition C: + human serum subjected to cycles of serum starvation.

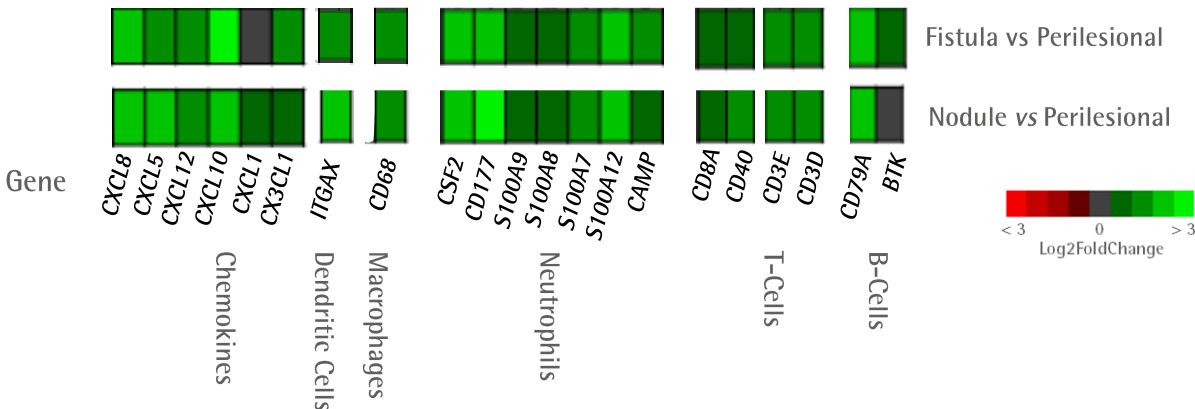
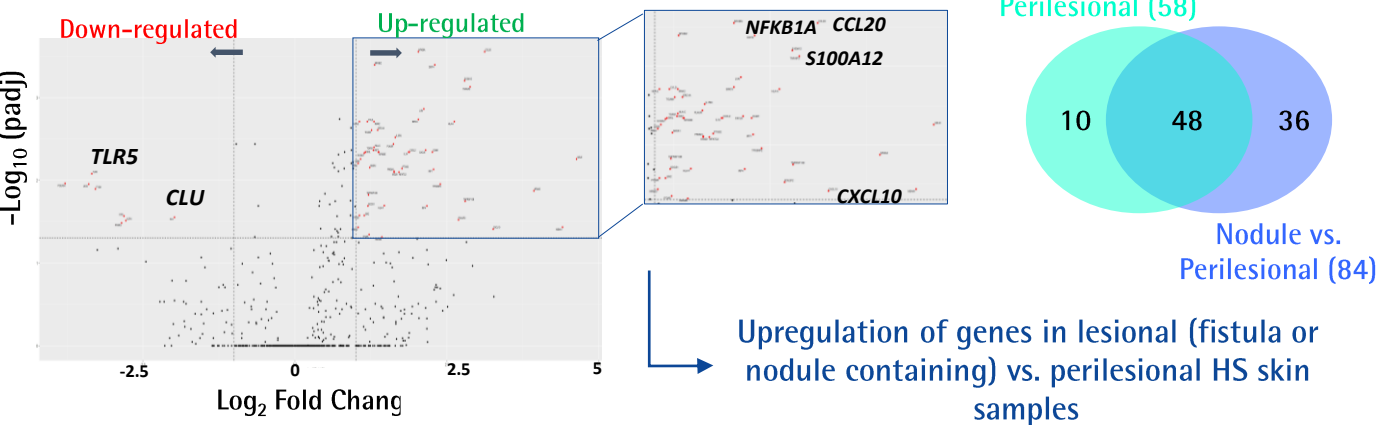


Immune cell detection in HS-biopsies cultured for 72h under different medium conditions. Lesional biopsies cultured under conditions A and C, together with non-cultured biopsy, were stained for several HS relevant markers (Lipocalin 2, LCN2, and keratin 15 & 17, KRT15/17) as well as immune cells: T-Cells (CD3/CD4), neutrophils (CD66b) and B Cells (CD19). Scale bar: 50µm.

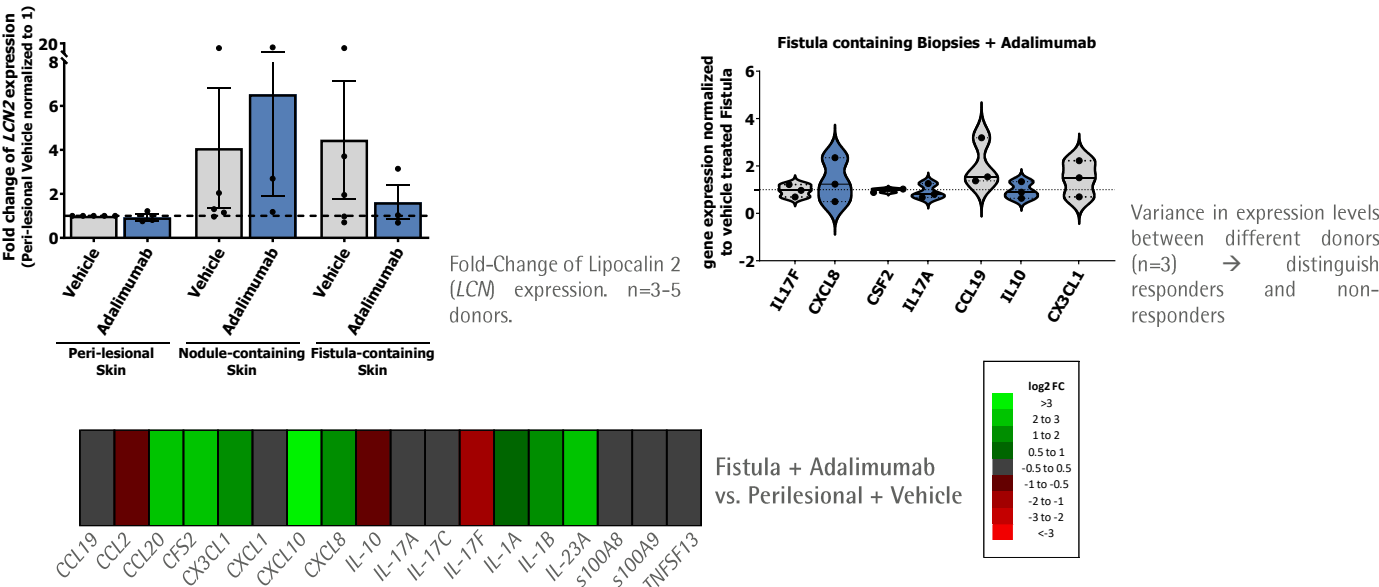
# Ex vivo model: Perilesional and lesional skin organ culture

## Assessment of transcriptomic changes: validation of lesional HS organ culture

Fistula vs. Perilesional skin samples after 24h of organ culture



## Assessment of transcriptomic changes: validation of therapeutic screening

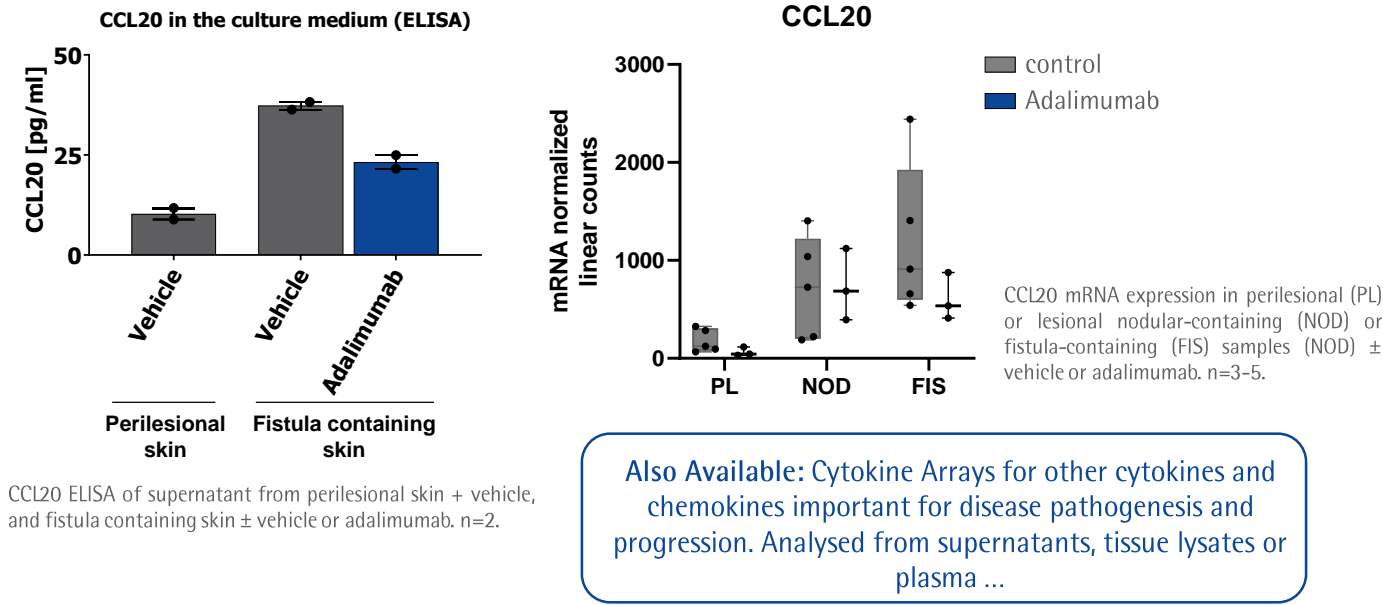


Heatmap showing the expression of genes ( $\log_2 \text{FC}$ ) that are reported to be affected by Adalimumab treatment in fistula containing biopsies  $\pm$  Adalimumab compared to perilesional biopsies + vehicle. Dysregulation of several HS-relevant genes is counteracted by Adalimumab treatment.

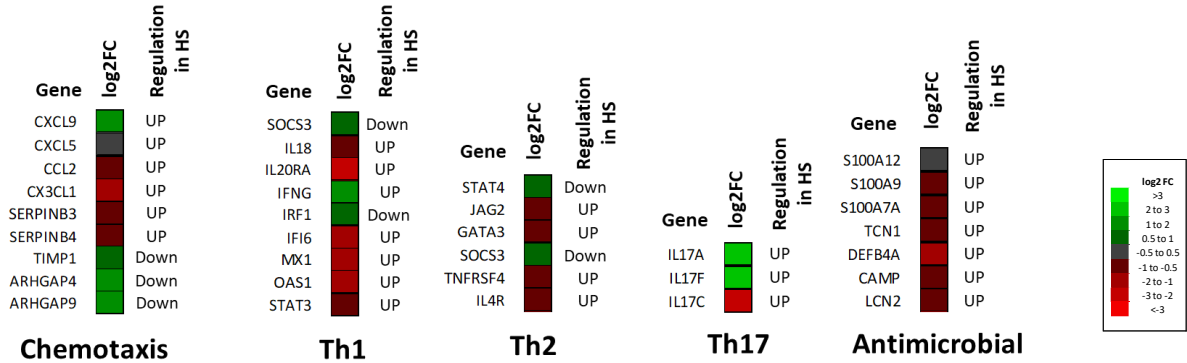
→ Adalimumab treatment reduces pro-inflammatory characteristics in lesional HS skin samples

# Ex vivo model: Perilesional and lesional skin organ culture

## Assessment of cytokine production: validation of therapeutic screening

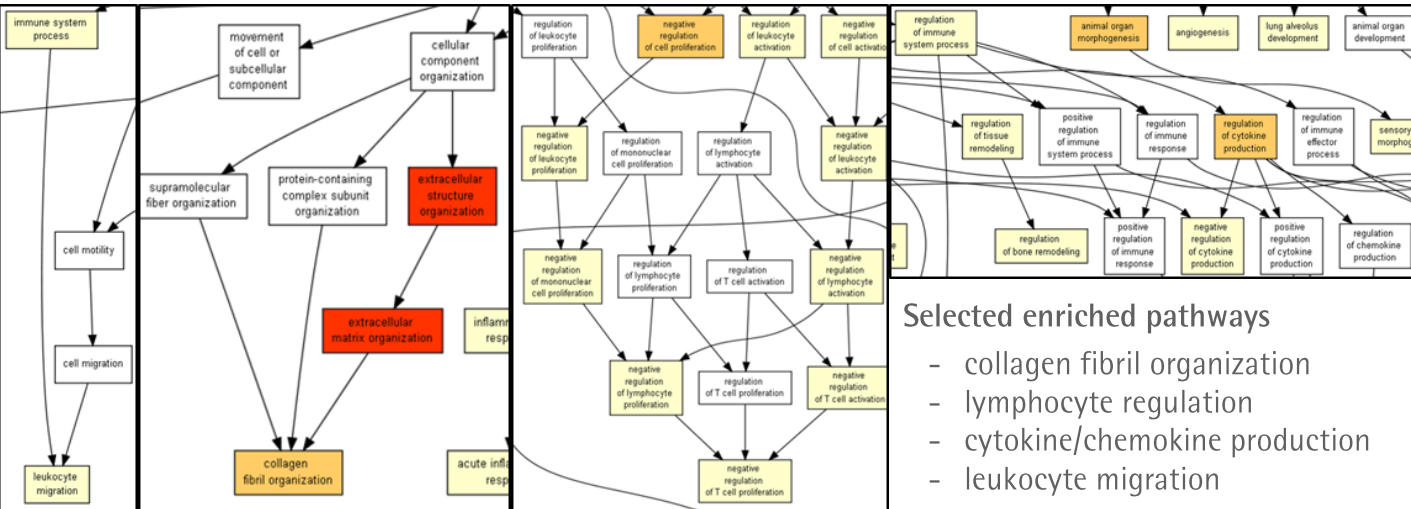


## RNAseq analysis: Adalimumab treatment regulates expression of HS-relevant genes



Pathway analysis of fistula containing biopsies: Adalimumab vs. Vehicle

Pathway analysis of fistula containing biopsies: Adalimumab vs. Vehicle



# WHY US?



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

Contact us for a  
customized study:

Acting CEO & CSO:  
Dr. Marta Bertolini (PhD)  
CSO:  
Dr. Janin Edelkamp (PhD)

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