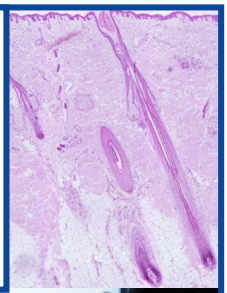
MONASTERIUM LABORATORY

A QIMA Life Sciences Company

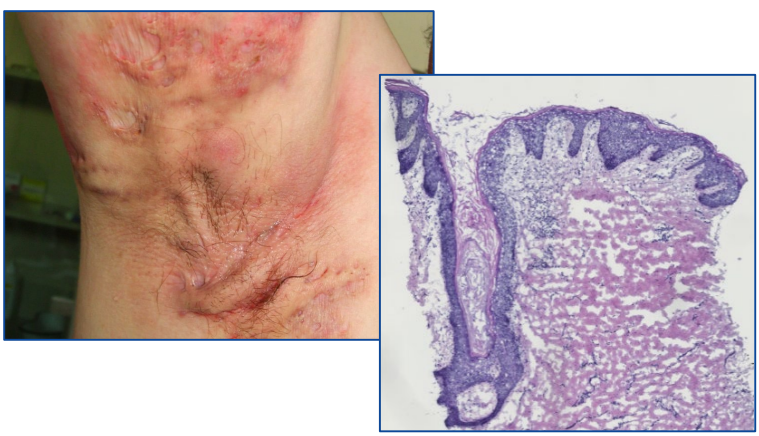
All about skin and hair bioscience!

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

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"

President:
Prof. Dr. Ralf Paus

Monasterium Laboratory
Skin & Hair Research Solutions GmbH

Mendelstr. 17, 48149 Münster, Germany
Phone: +49 (0) 251 93264-458
Fax: +49 (0) 251 93264-457

www.monasteriumlab.com

For inquiries, please contact:

CEO:
Dr. Marta Bertolini (PhD)

m.bertolini@monasteriumlab.com
+ 49 (0)251 93263-080

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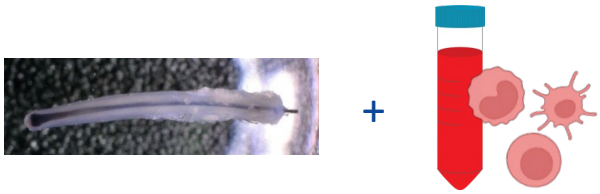
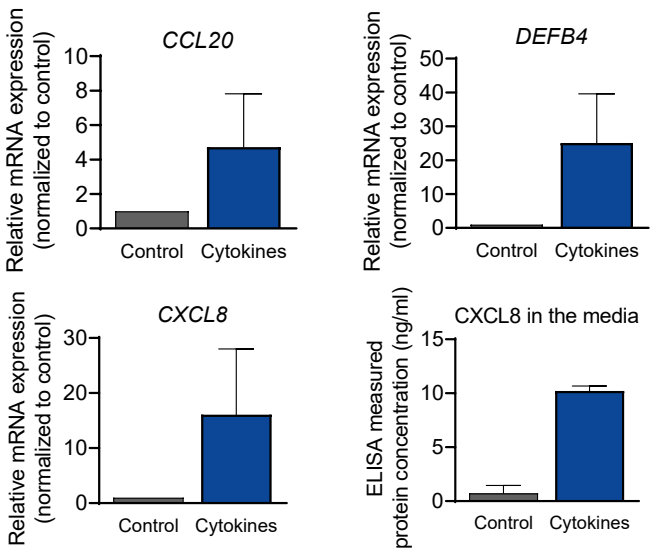
Modelling Hidradenitis Suppurativa-like responses in human healthy hair follicles *ex vivo*

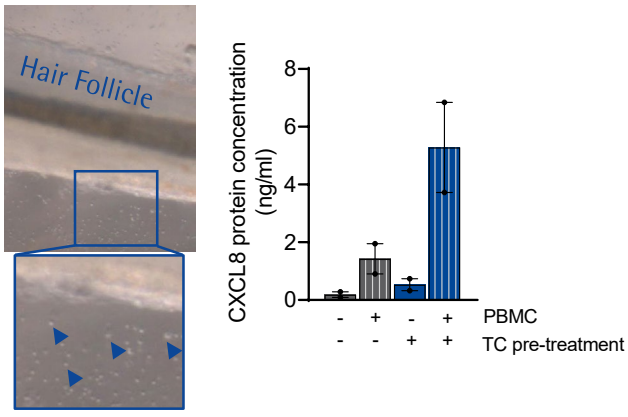
Our method: Organ culture of microdissected full-length healthy human hair follicles + cytokine cocktails



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



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

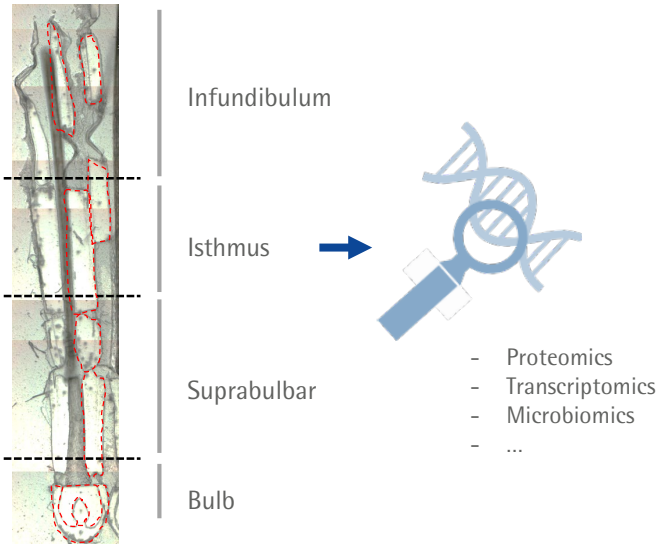


Representative image of a healthy human HF in co-culture with human PBMCs (blue arrowheads). CXCL8 (IL-8) levels were measured by ELISA in conditioned media from 2 anagen HFs/experimental group cultured for 24 hours with or without PBMCs (± cytokine treatment (TC)).

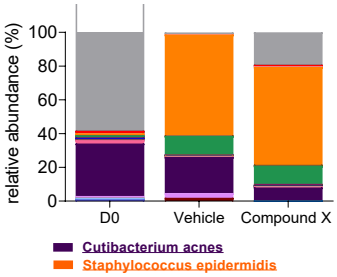
➢ Additional techniques and Read-Out Parameters:

- 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.

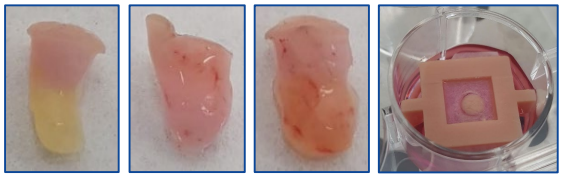


... analysis of skin and hair follicle Microbiota.



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

Organ culture of Hidradenitis Suppurativa perilesional and lesional skin

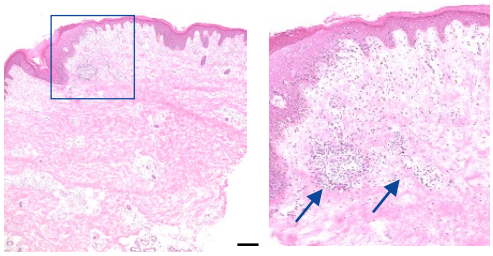


Our method: Culture of full-thickness HS perilesional (left) and lesional skin biopsies, containing Nodule (middle left) or Fistula (middle right). Representative image of fresh biopsies during culture under air-liquid interphase conditions (right).

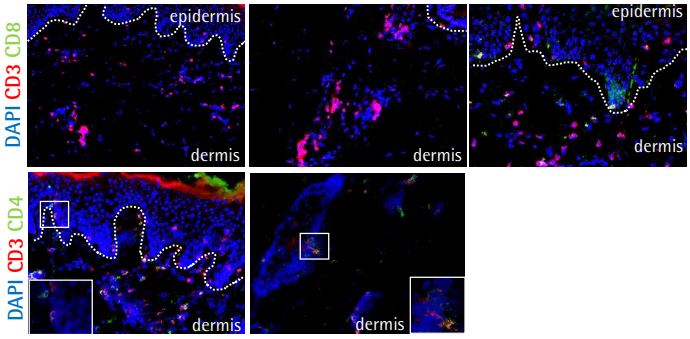
Read-Out Parameters:
Transcriptomics, quantitative (immuno-)histomorphometry, *in situ* hybridization, cytokine and chemokine release into the medium, ...

Identification and characterization of a target in freshly frozen HS samples

➢ Immune cell infiltration in perilesional tissue from HS patients

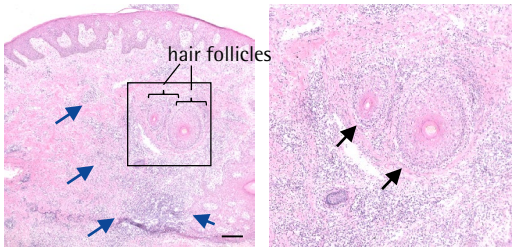


H&E staining of a perilesional biopsy obtained from a HS patient showing immune cell infiltration in the dermis (blue arrows). Scale Bar: 200µM

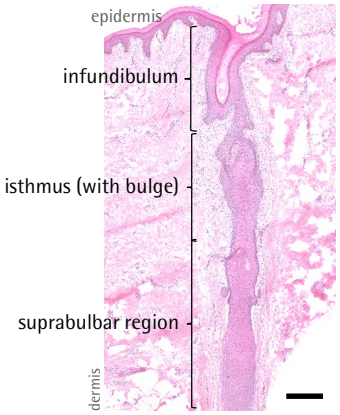


Immunofluorescence staining of a perilesional biopsy showing CD4+ and CD8+ T-cell infiltrates

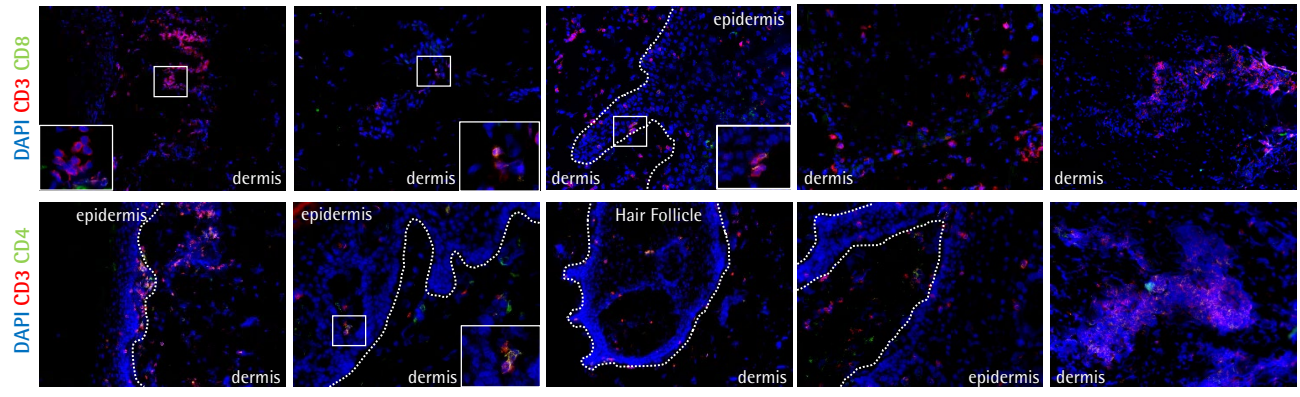
➢ Immune cell infiltration in lesional tissue from HS patients



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



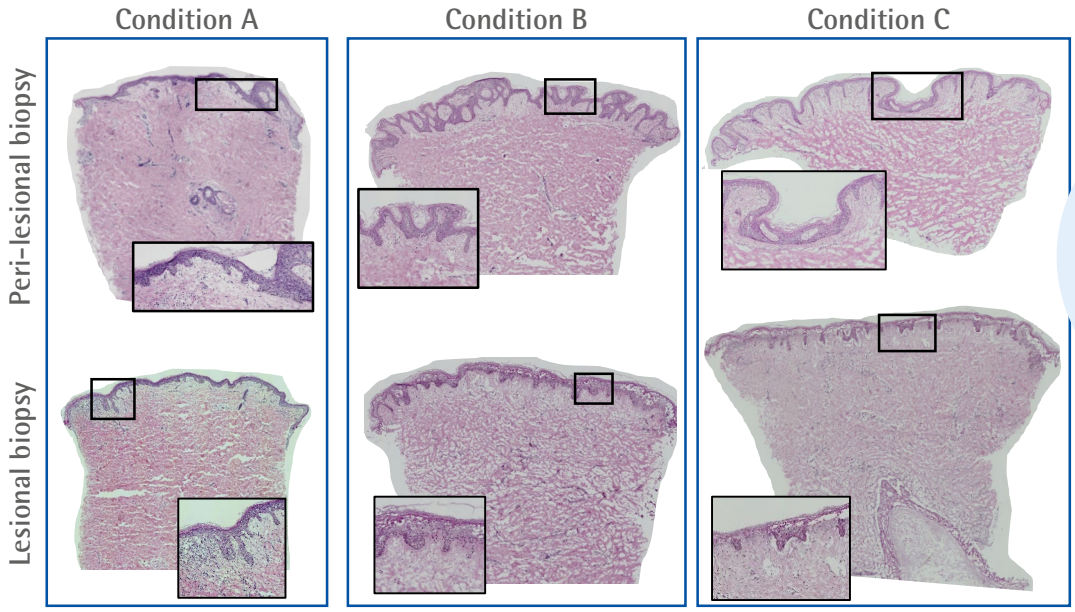
H&E staining of a lesional HS biopsy, containing a tunnel that has formed around a hair follicle and extends into the dermis, showing hyperplasia of the hair follicle epithelium. Scale Bar: 200µM



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

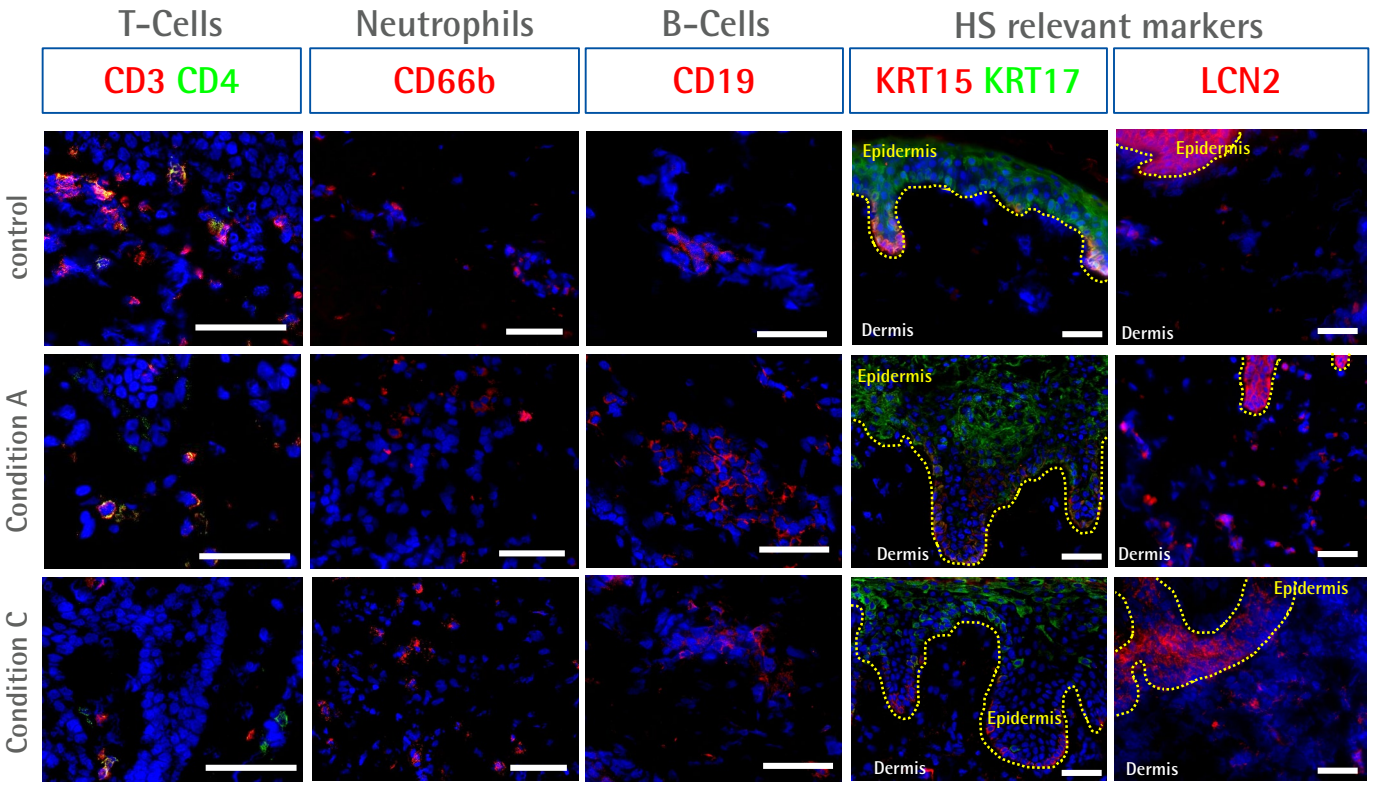
Perilesional and lesional skin organ culture: Our methods

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



Serum Starvation → provides a therapeutic window in which biologics or drugs can be administered to avoid interaction with serum components

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.

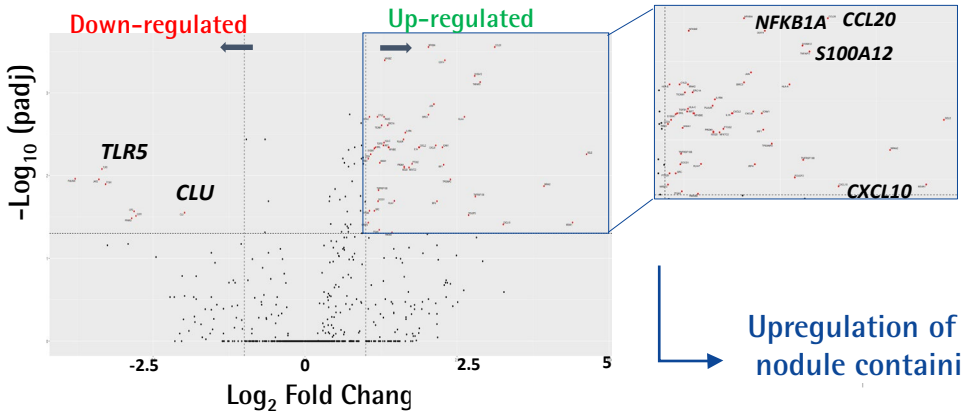


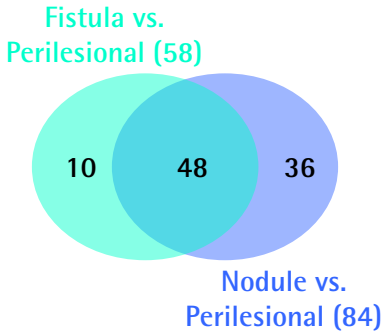
Immune cell detection in HS-biopsies cultured for 72h under different medium conditions. Lesional biopsies cultured under conditions A and C, together with non-cultured biopsy, were stained for several HS relevant markers (Lipocalin 2, LCN2, and keratin 15 & 17, KRT15/17) as well as immune cells: T-Cells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

Ex vivo model: Perilesional and lesional skin organ culture

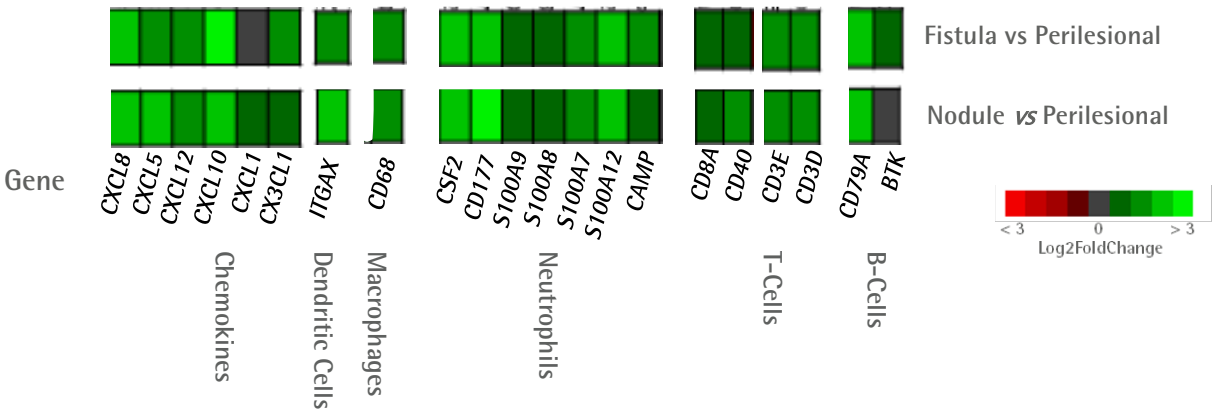
➢ Assessment of transcriptomic changes: validation of lesional HS organ culture

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

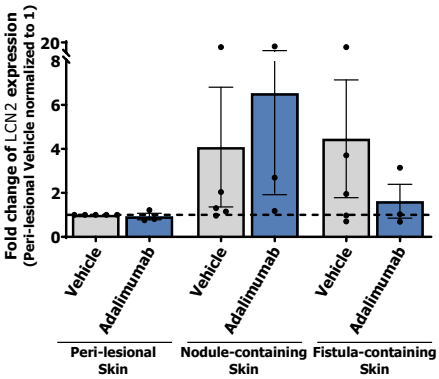




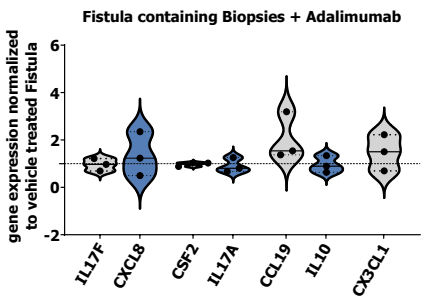
Upregulation of genes in lesional (fistula or nodule containing) vs. perilesional HS skin samples



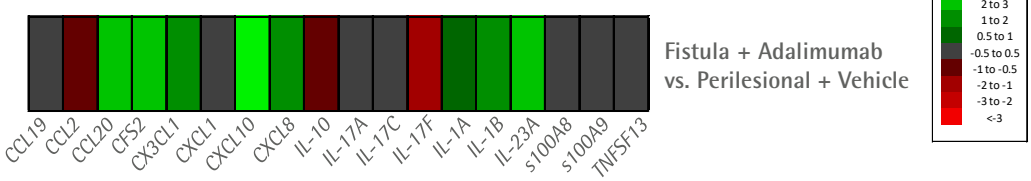
➢ Assessment of transcriptomic changes: validation of therapeutic screening



Fold-Change of Lipocalin 2 (*LCN*) expression. n=3-5 donors.



Variance in expression levels between different donors (n=3) → distinguish responders and non-responders



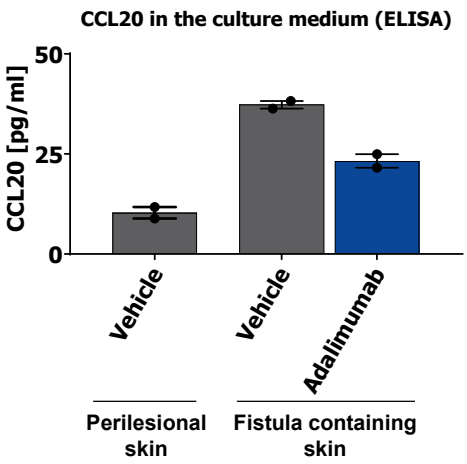
Fistula + Adalimumab vs. Perilesional + Vehicle

Heatmap showing the expression of genes (log2FC) that are reported to be affected by Adalimumab treatment in fistula containing biopsies ± Adalimumab compared to perilesional biopsies + vehicle. Dysregulation of several HS-relevant genes is counteracted by Adalimumab treatment.

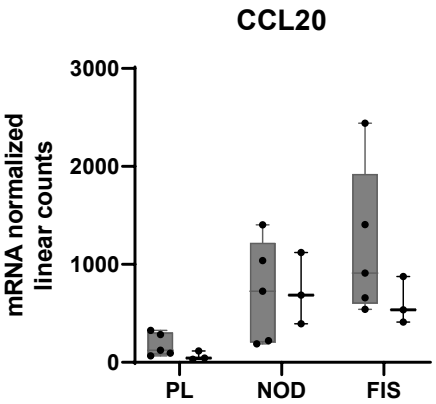
→ Adalimumab treatment reduces pro-inflammatory characteristics in lesional HS skin samples

Ex vivo model: Perilesional and lesional skin organ culture

➢ Assessment of cytokine production: validation of therapeutic screening



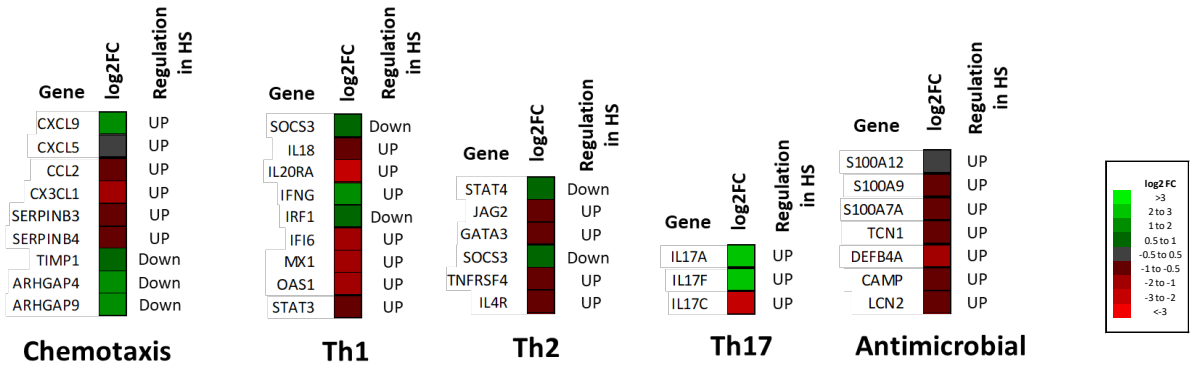
CCL20 ELISA of supernatant from perilesional skin + vehicle, and fistula containing skin ± vehicle or adalimumab. n=2.



CCL20 mRNA expression in perilesional (PL) or lesional nodular-containing (NOD) or fistula-containing (FIS) samples (NOD) ± vehicle or adalimumab. n=3-5.

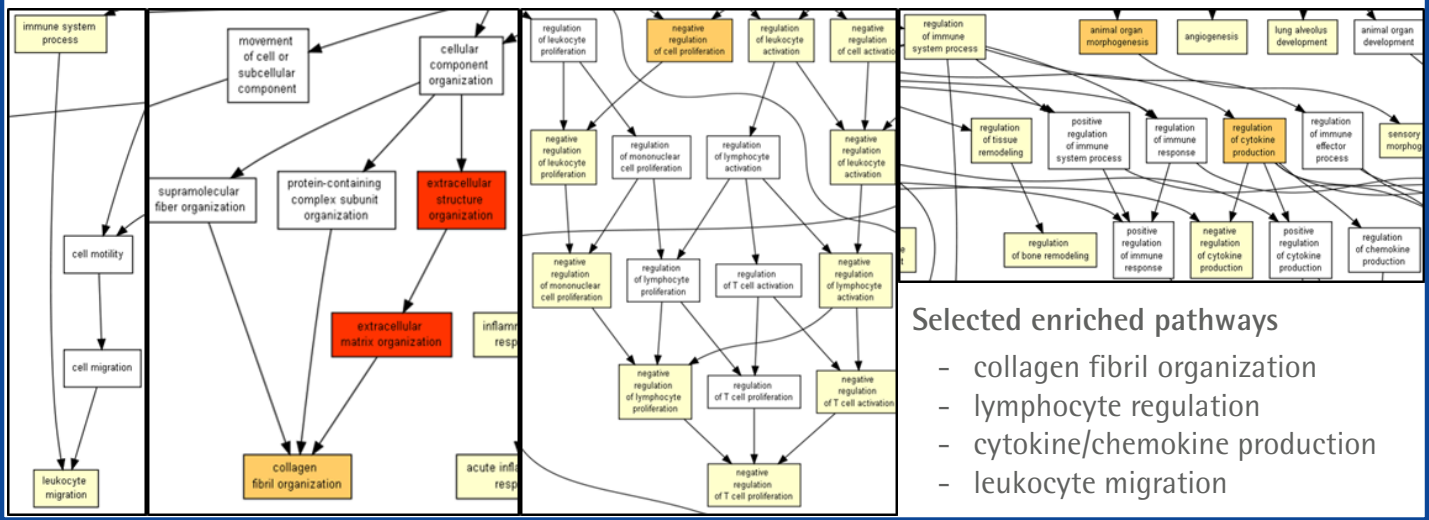
Also Available: Cytokine Arrays for other cytokines and chemokines important for disease pathogenesis and progression. Analysed from supernatants, tissue lysates or plasma …

➢ 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



Selected enriched pathways

- collagen fibril organization
- lymphocyte regulation
- cytokine/chemokine production
- leukocyte migration

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.

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Monasterium Laboratory
Skin & Hair Research Solutions GmbH
Mendelstr. 17, 48149 Muenster, Germany

www.monasteriumlab.com

Contact us for a customized study:

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

m.bertolini@monasteriumlab.com
j.edelkamp@monasteriumlab.com
+ 49 (0)251 93263-080