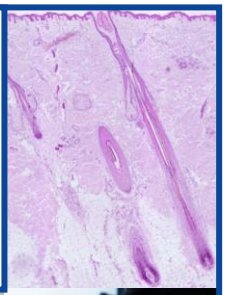
MONASTERIUM LABORATORY
A QIMA Life Sciences Company

All about skin and hair bioscience!

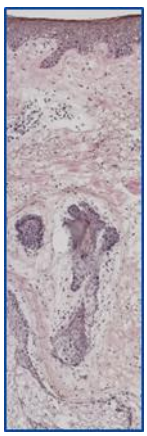
State-of-the-art technology and expertise for all your pre-clinical, mechanistic, and clinical needs in dermatology research.



- Pre-clinical Research
- Clinical Research
- Education

Alopecia Areata

chronic AA



acute AA

"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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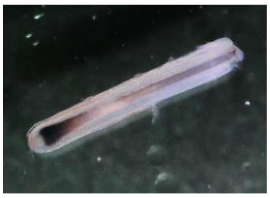
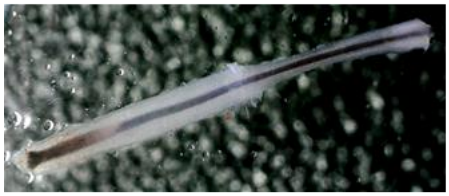
Modeling alopecia areata-like phenotype in human HEALTHY hair follicles *ex vivo*

Effect of a drug on hair shaft production



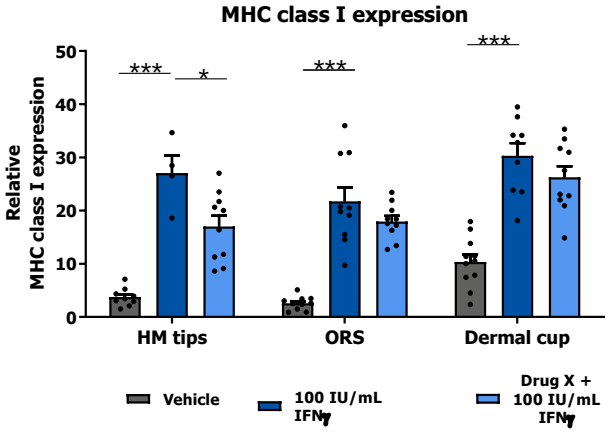
Amputated microdissected hair follicle at day 0, after isolation



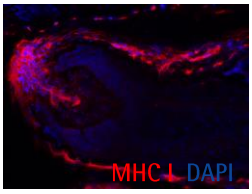
Amputated microdissected hair follicle at day 6 of organ culture: Note the newly formed hair shaft and outer root sheath

Our models can be utilized to identify the role of specific cytokines in disease pathogenesis as well as beneficial effects of new therapeutics.

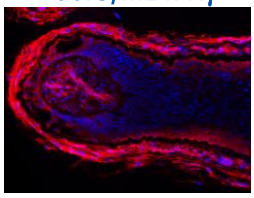
Prevention or rescue of immune privilege collapse



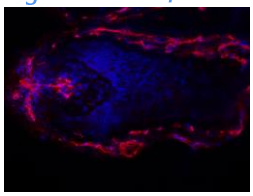
Vehicle



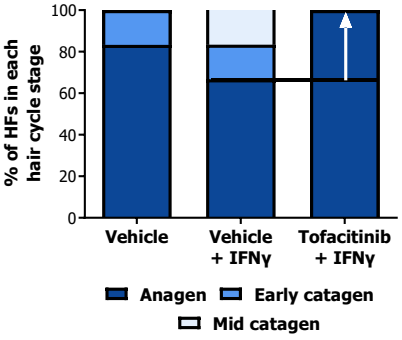
100IU/mL IFNγ



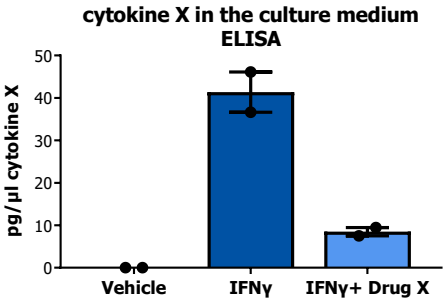
Drug X + 100IU/mL IFNγ



Prevention or rescue of catagen induction

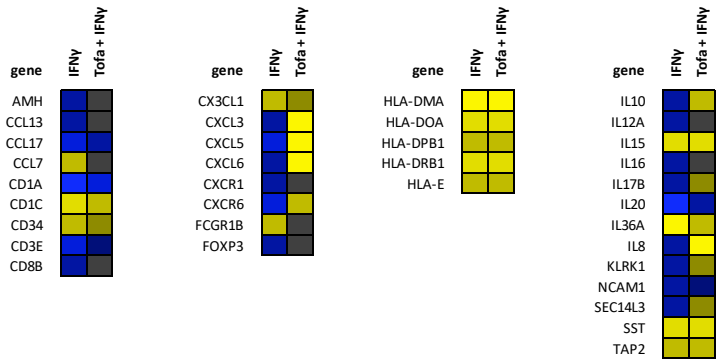


Inhibition of cytokine release

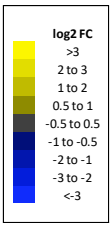


IFNγ:
Key cytokine involved in alopecia areata pathogenesis inducing hair follicle immune privilege collapse, catagen promotion and activation of resident immune cells (Bertolini et al., Exp Dermatol 2020)

Short-term effect on hair follicle transcriptional changes induced by IFNγ



Transcriptional profiling hair follicles treated with IFNγ and IFNγ + Tofacitinib (Tofa) versus vehicle

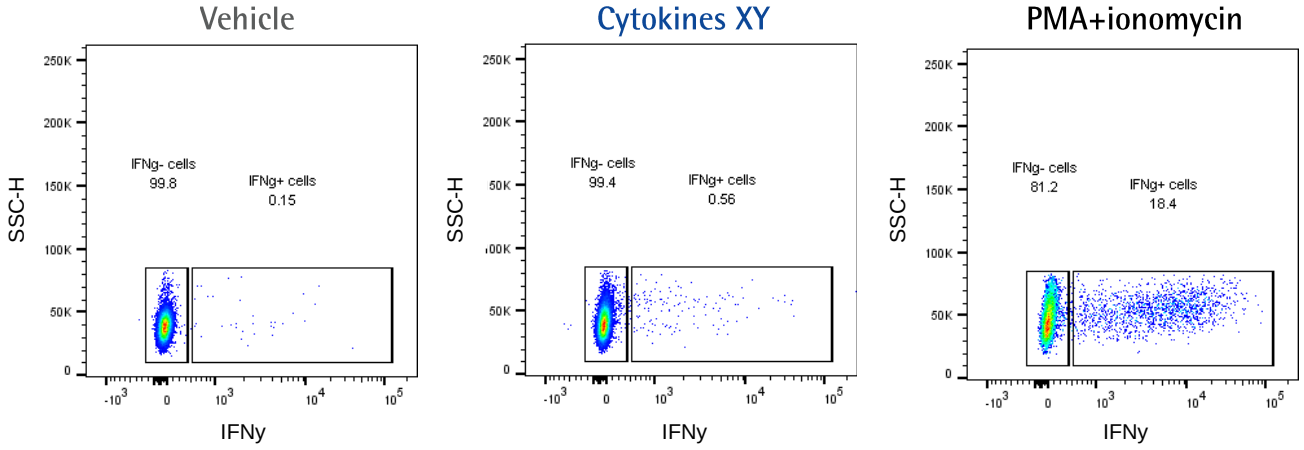


Uchida et al., J Autoimm 2021; Fehrholz et al., Methods Mol Biol 2021; Bertolini et al., Br J Dermatol 2016; Kinori et al., Exp Dermatol 2012; Meyer Br J Dermatol 2009; Meyer et al., Br J Dermatol 2008; Ito et al., Am J Pathol 2008

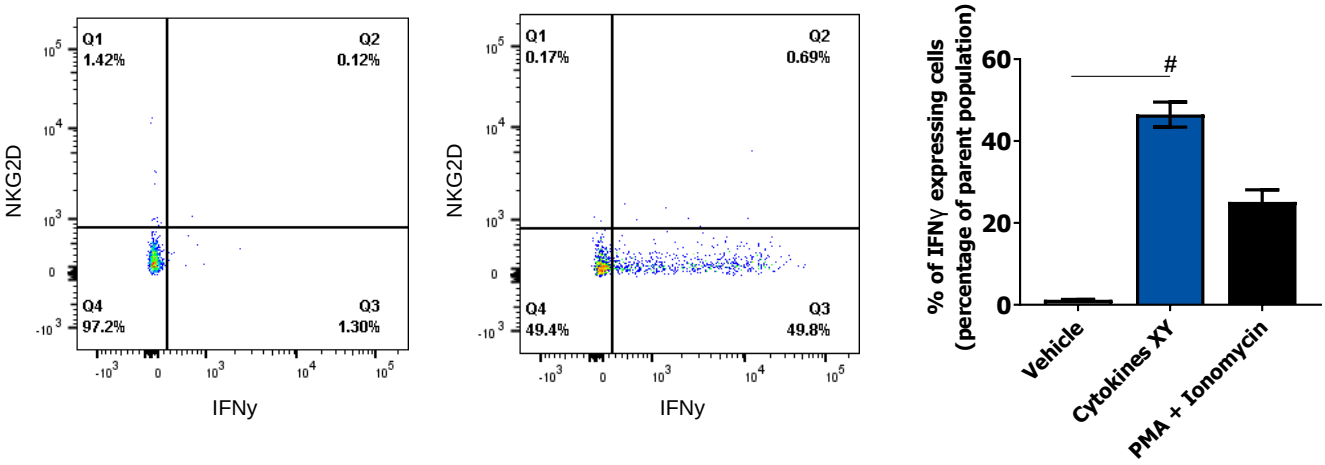
Investigating responses of circulating immune cells

Study Example: Investigating the effect of cytokines XY in inducing IFNγ production in CD45+ cells isolated from PBMCs:

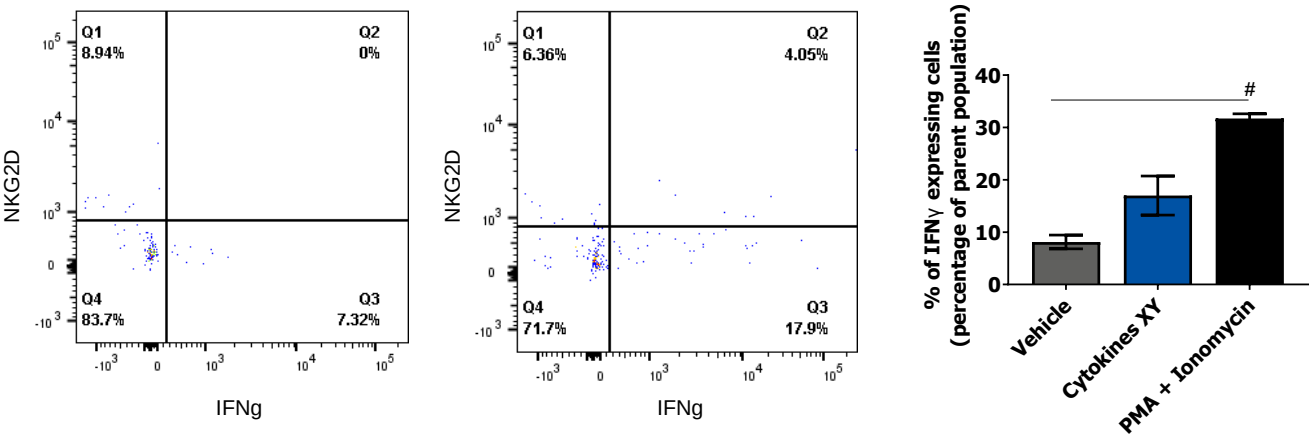
Gated on CD3⁺ cells (T cells)



Gated on CD56⁺CD3⁻NKG2D⁻ cells (NK cells)



Gated on CD56⁺CD3⁺CD8⁻gdTCR⁻NKG2D⁻ cells (NKT cells)



Characterization or validation of a target in diseased tissue or blood:

Selected immune cell populations can be isolated from skin or PBMCs for phenotypic characterization in patients versus healthy subjects. Additionally, the effects of selected stimuli on cell phenotypes or the inhibition of pro-inflammatory responses by a drug can also be investigated.

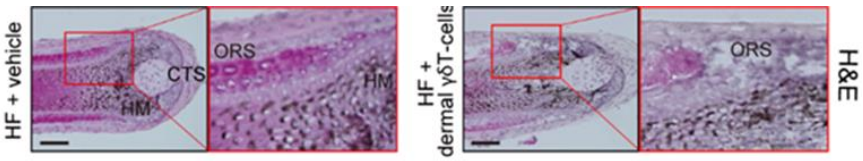
Investigating the inhibitory effect of a drug on immune cell attacks against "weak/stressed" hair follicles

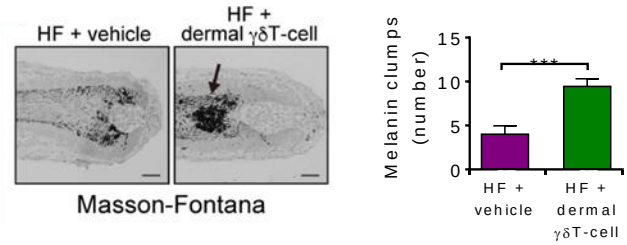
Study example: Isolated primary skin-resident γδT-cells attack human "weak/stressed" autologous hair follicles *ex vivo*

Our **methods:** Primary γδT-cells are isolated from human scalp skin, labelled, and co-cultured with human "weak/stressed" hair follicles microdissected from the scalp skin of the same donor

"Weak/Stressed": Microdissected hair follicles which show weak immune privilege (protection towards immune-cell attack), and express molecules/cytokines as well as chemokines to attract immune cells

Induction of hair follicle cytotoxicity and dystrophy

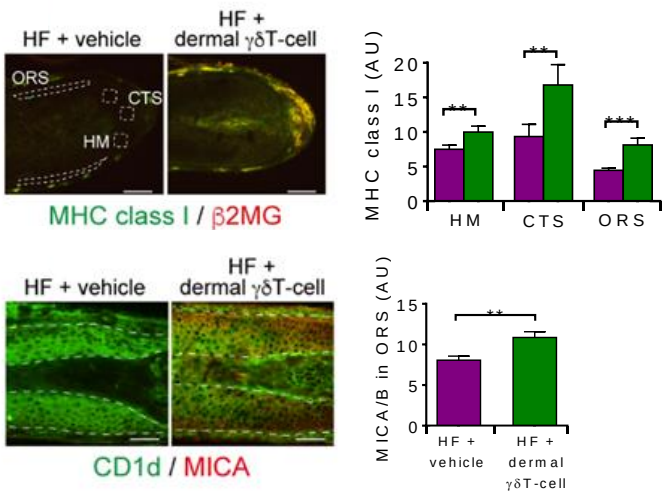




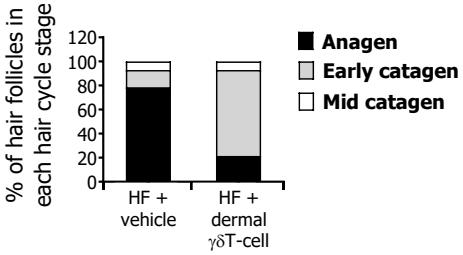
Also possible: FACS to analyse activation status of immune cells, and customized read-out parameters *in situ*

Additional info: Uchida et al., J Autoimmun. 2021

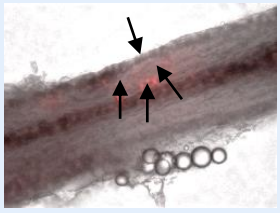
Induction of hair follicle immune privilege collapse and MICA/B overexpression



Premature catagen induction



HF+ dermal γδT-cells



"Weak/Stressed" hair follicles co-cultured with γδT-cells in absence of Drug X→ γδT-cells infiltrate into the hair follicle (see arrows)

HF+ dermal γδT-cells + Drug X

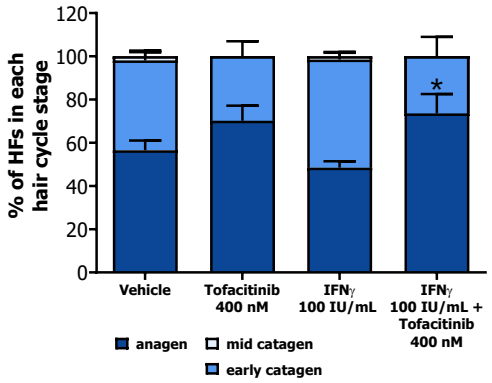
"Weak/Stressed" hair follicles co-cultured with γδT-cells in the presence of Drug X→ γδT-cells DO NOT infiltrate into the hair follicle

Drug X prevents infiltration of γδT-cells in "weak/stressed" hair follicles *ex vivo*

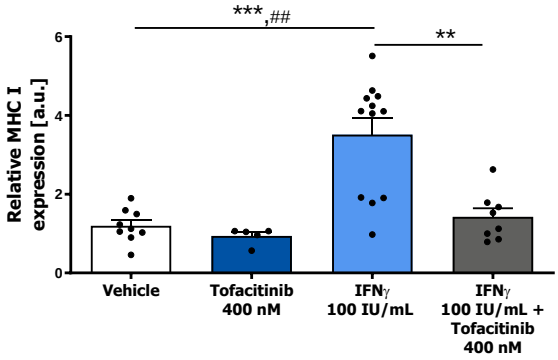
Modeling alopecia areata-like phenotype in human HEALTHY scalp skin *ex vivo*

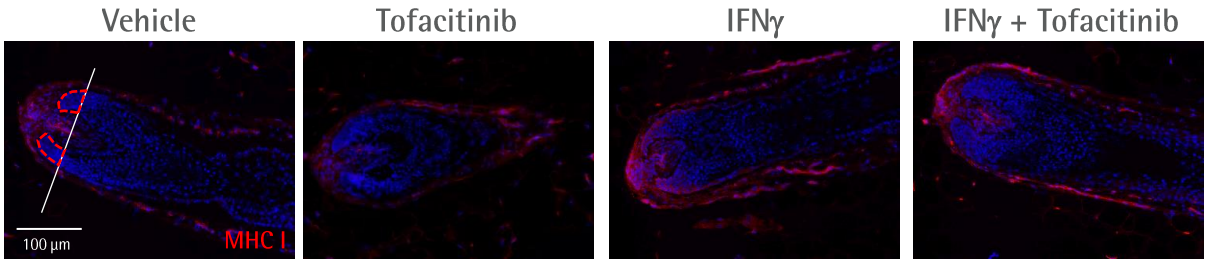
Study Example: Tofacitinib inhibits IFNγ-induced premature catagen induction, immune privilege collapse and expansion of perifollicular CD8+ T-cells

Hair cycle stage



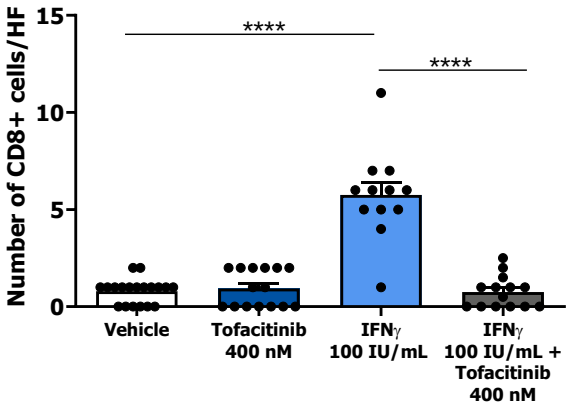
Immune privilege collapse: MHC class I expression in the hair matrix



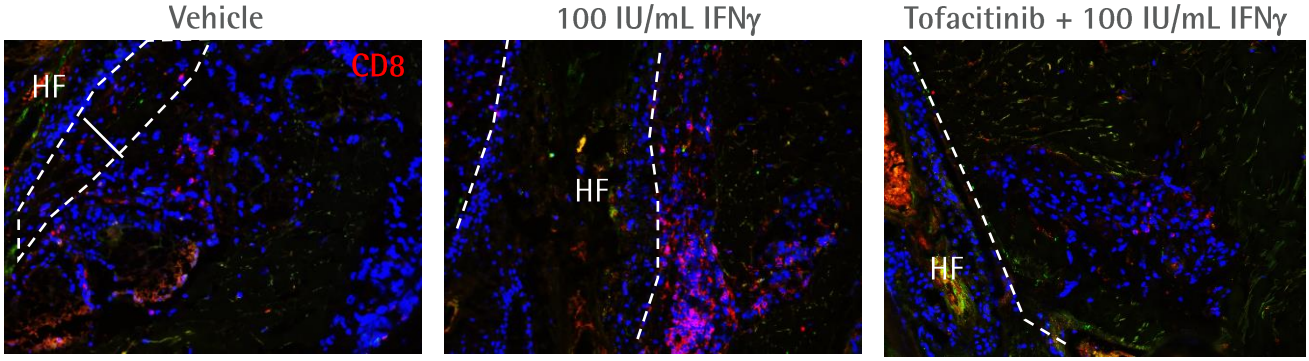


Immune cell infiltrate (perifollicular CD8+ cells)

Resident skin immune cells still present and responding to IFNγ



Additional standardized read-out parameters associated with alopecia areata pathogenesis available!



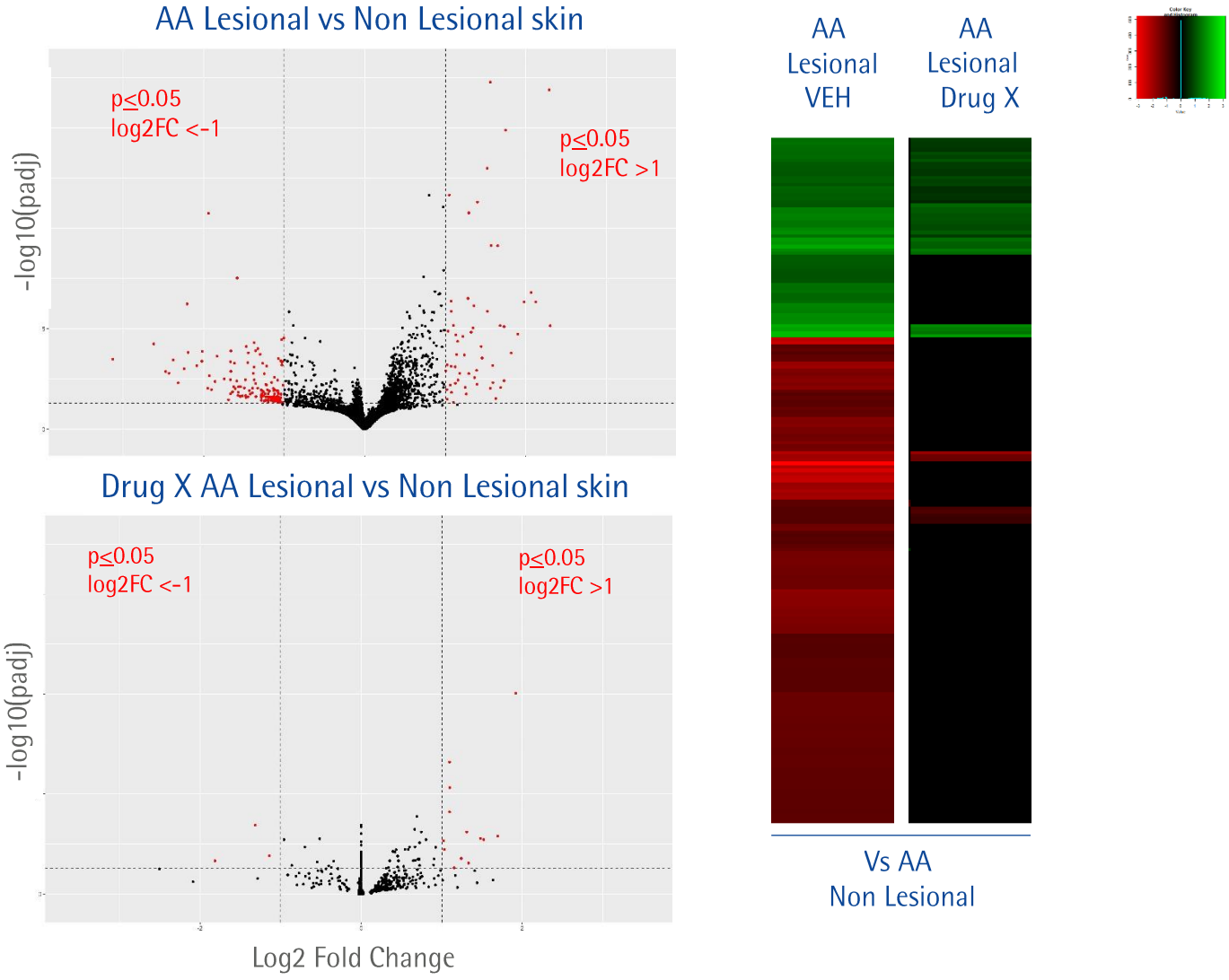
HF: Hair follicle

Customized markers:

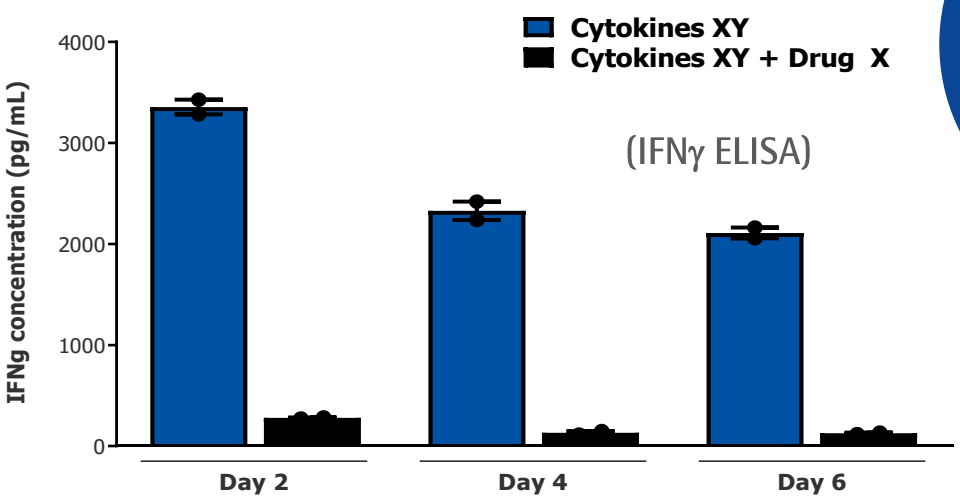
We customize multiplex immunostainings, FACS panels, ELISA and cytokine arrays according to your target or cell type of interest.

Investigating the effect of a drug in scalp skin from patients *ex vivo*: lesional and non-lesional alopecia areata skin organ culture

Transcriptional profiling showing deregulated genes lesional or drug X treated vs. non-lesional scalp skin from alopecia areata patients

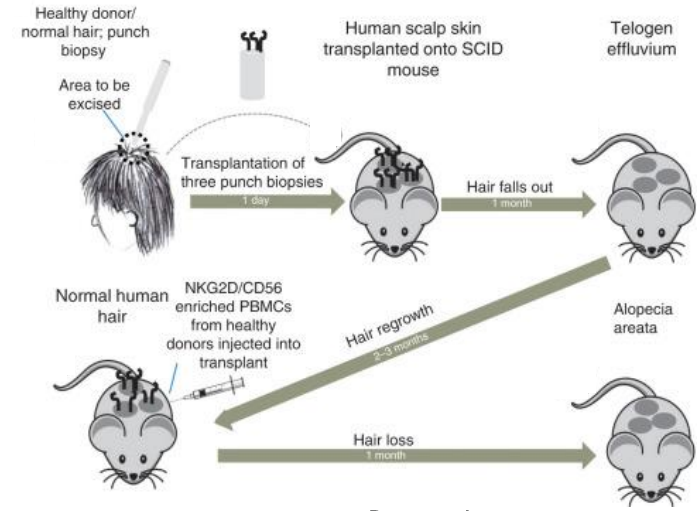


Treatment with cytokine XY induces IFNγ release into the medium in affected scalp skin from alopecia areata patient *ex vivo*



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

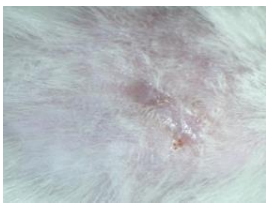
Investigating the effect of a drug on inhibiting alopecia areata-like phenotype *in vivo*: Humanized mouse model



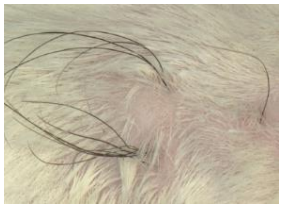
At least 8 weeks

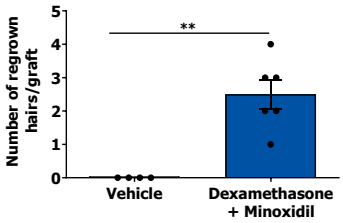
Selected publications on the model:
Laufer et al., Br J Dermatol. 2019; Ghraieb et al., J Autoimmun 2018; Gilhar et al., Autoimmun Rev 2016; Keren et al., J Dermatol Sci. 2015; Bertolini et al. PloS One 2014; Gilhar et al., J Invest Dermatol 2013; Gilhar et al., J Invest Dermatol 2013

Vehicle



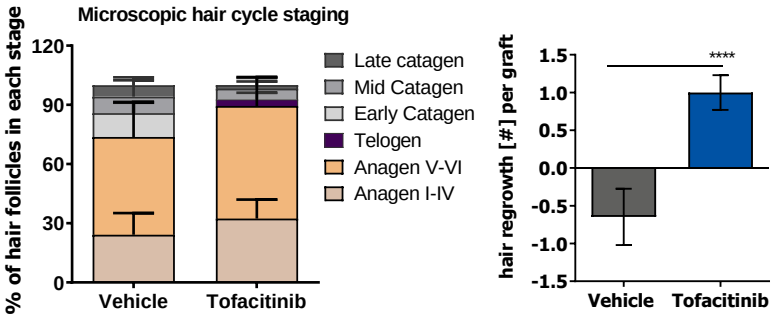
Dexamethasone + Minoxidil



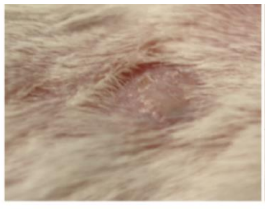


Hair regrowth promoted by dexamethasone+ Minoxidil (Macroscopic analysis)

Hair regrowth promoted by Tofacitinib (Macroscopic and microscopic analysis)



Vehicle

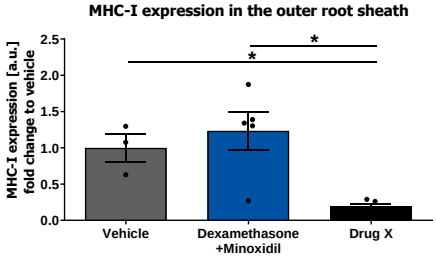


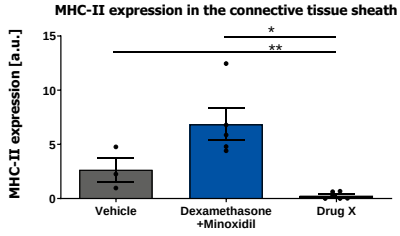
Tofacitinib

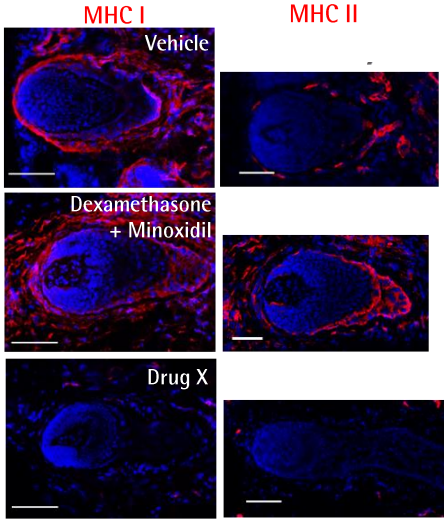
Study example: Drug X also inhibits immune privilege collapse and the number of perifollicular CD8+ T-cells

Additional standardized read-out parameters associated with alopecia areata pathogenesis available!

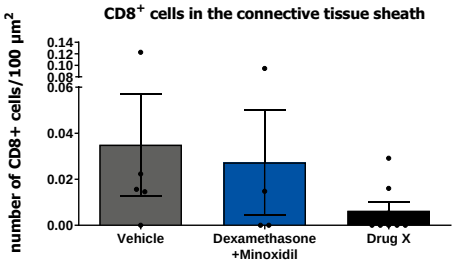
Immune privilege







Immune cell infiltration



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:

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!

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