

Modulation of the psoriasis-associated microbiome with thermal water at Comano Terme

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Psoriasis & balneotherapy

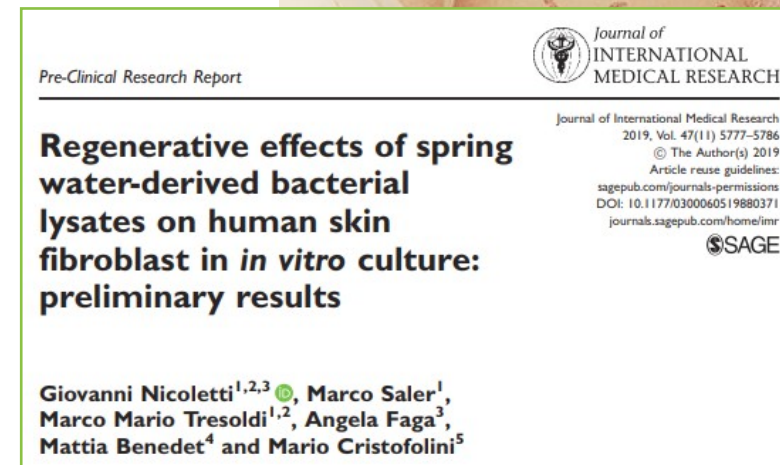
- Psoriasis (PSO) is an autoimmune condition
- It affects 2-3% of the worldwide population and lacks definitive treatments
- Balneotherapy is a successful adjuvant treatment
- Comano Terme spring water harbors a distinct environmental microbiota
- Lysates from these communities have positive effects *in vitro*



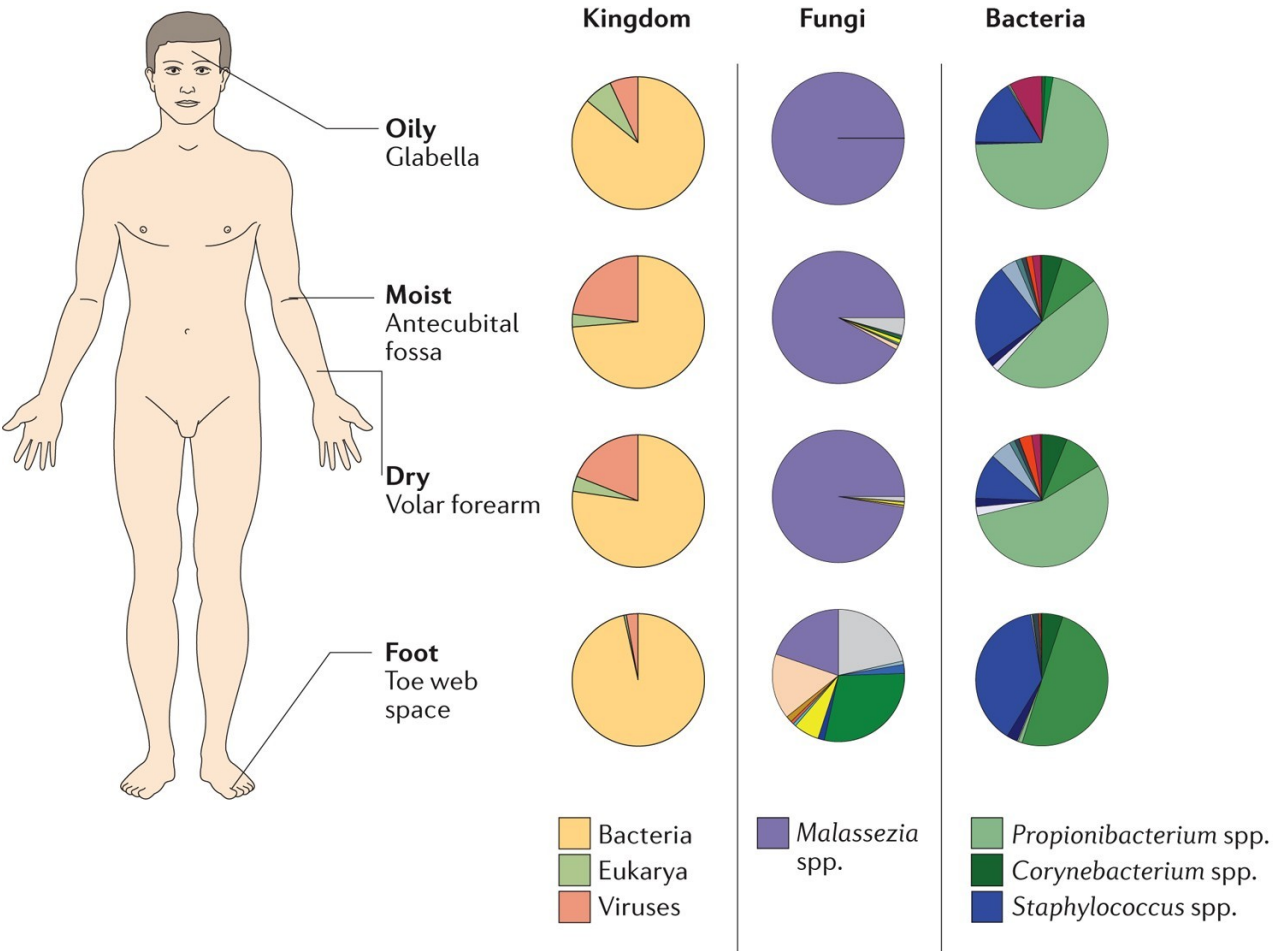
Genomic and metagenomic insights into the microbial community of a thermal spring



[Renato Pedron](#), [Alfonso Esposito](#), [Irene Bianconi](#), [Edoardo Pasolli](#), [Adrian Tett](#), [Francesco Asnicar](#), [Mario Cristofolini](#), [Nicola Segata](#) & [Olivier Jousson](#) 

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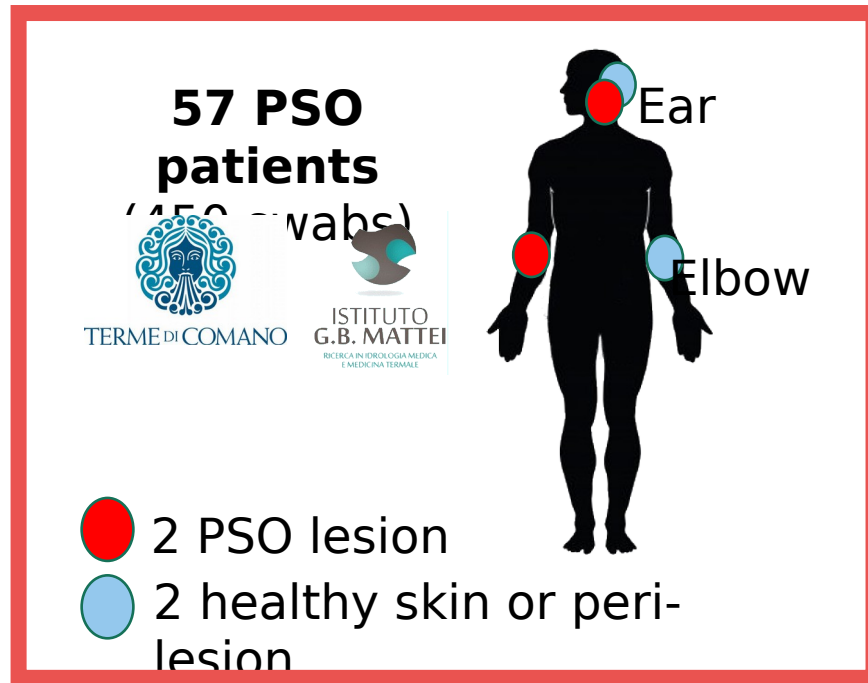
Psoriasis & the skin microbiome



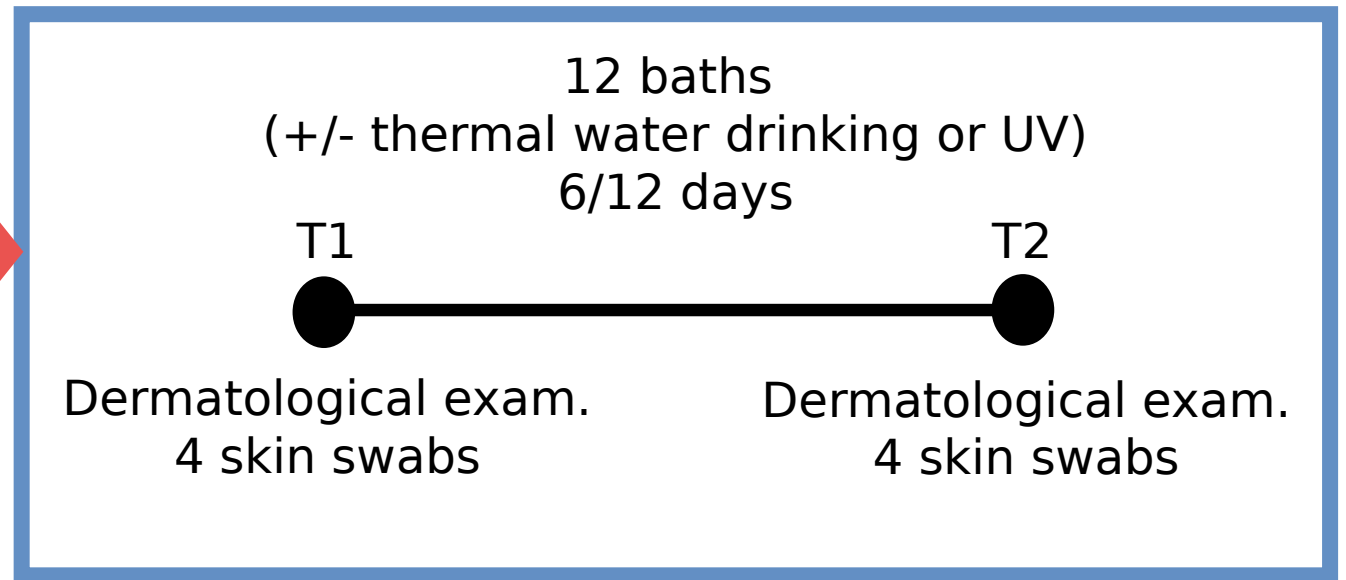
- Infections may cause disease exacerbation
- The skin microbiome
 - Educates the immune system 
 - Prevents pathogens colonization 

Does balneotherapy affect the skin microbiome in PSO patients?

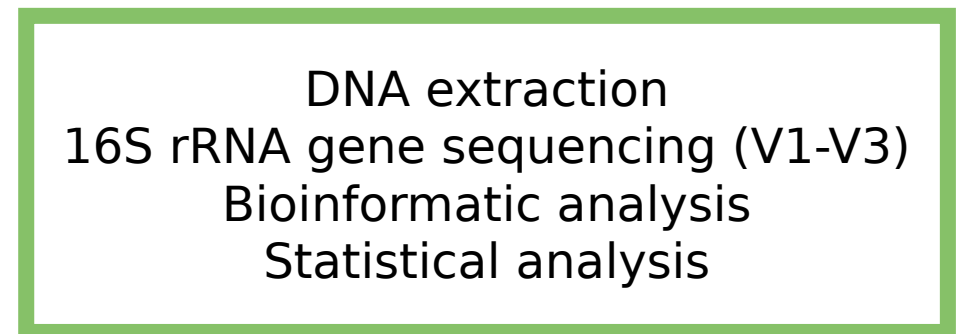
Cohort enrollment



Sample collection



Analytical workflow



39 PSO patients (312 swabs)

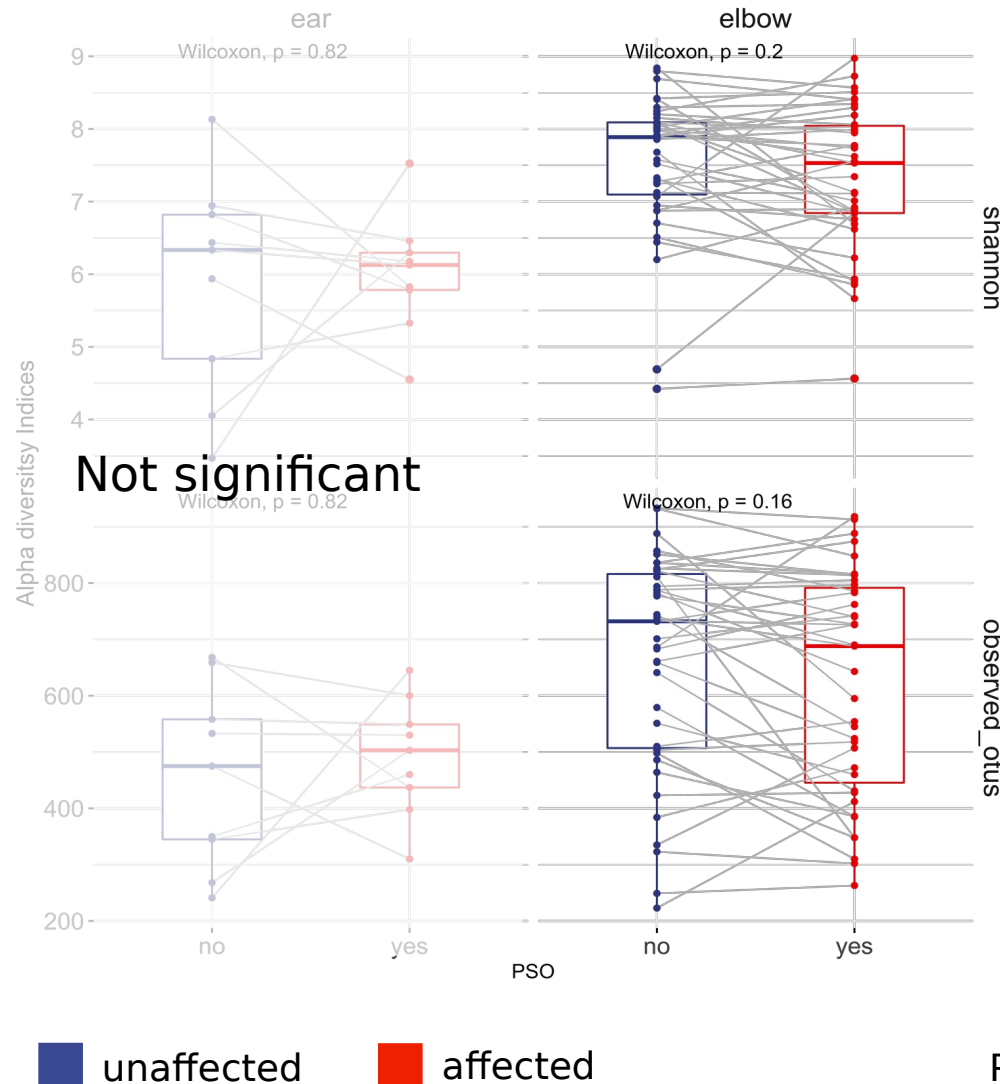
- ✓ T1 and T2 PSO lesion + healthy samples
- ✓ >5000 reads library size
- ✓ Sample composition normalization

PSO lesions and healthy skin harbour a similar microbiome

- Most abundant bacterial genera are usual skin-associated microbes
- Skin microbiome profiles are similar between healthy skin and PSO lesion



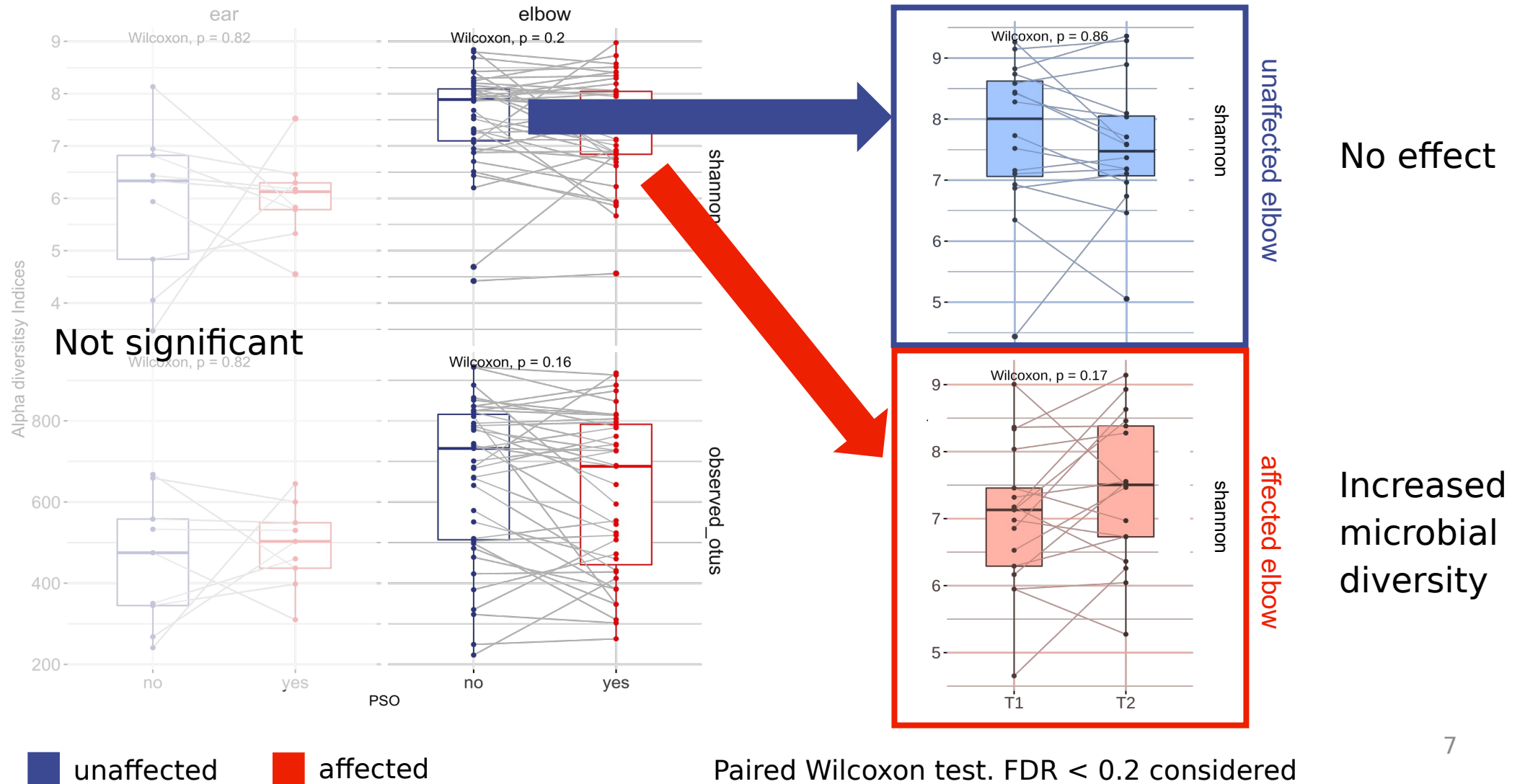
PSO is associated with lower microbial diversity...



- Alpha diversity is a measure of microbial community complexity in a sample
- Lowered alpha-diversity is associated with chronic and inflammatory diseases
- Before treatment, lower alpha diversity on elbow PSO lesions

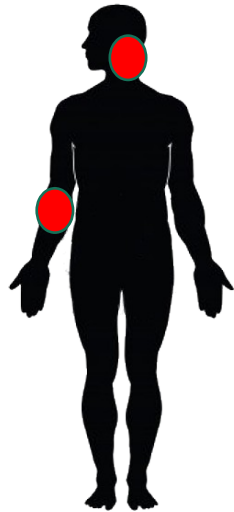
Paired Wilcoxon test. FDR < 0.2 considered

...that can be improved by thermal water treatments in PSO patients



Some bacterial genera are differentially abundant on PSO lesions

before treatment



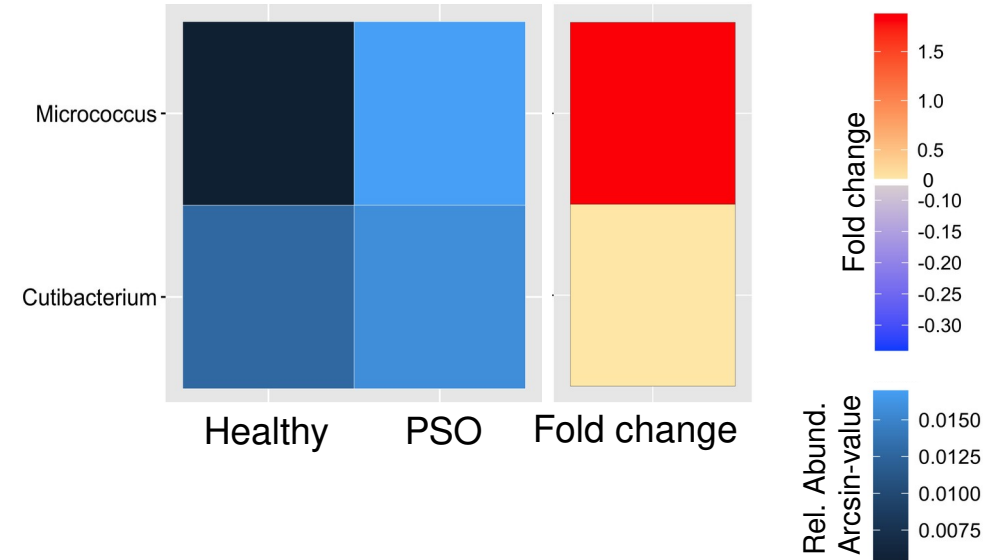
Micrococcus and
Cutibacterium spp.



Corynebacterium,
Pseudomonas, and
Staphylococcus spp.

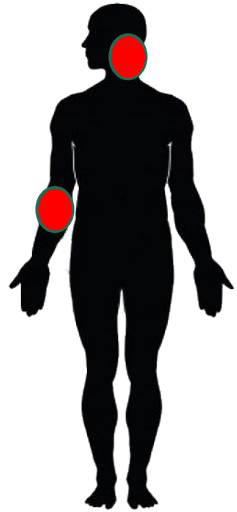
● PSO lesion

Ear samples

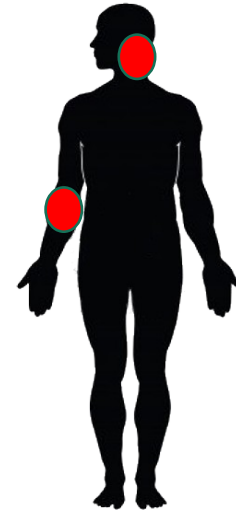


Balneotherapy restores PSO skin microbiome composition

before treatment



after treatment



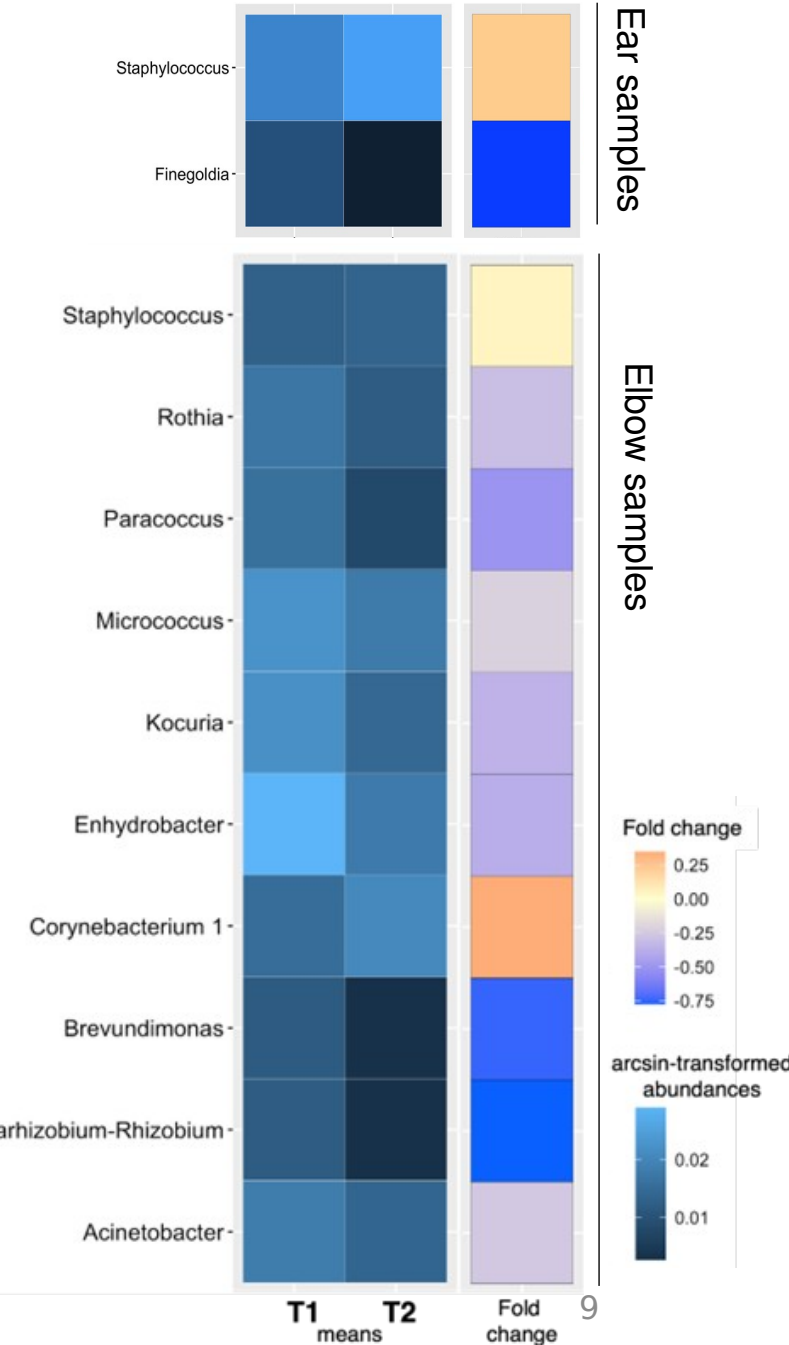
Staphylococcus spp. ↑

Finnegoldia spp. ↓

Corynebacterium and *Staphylococcus* spp. ↑

Micrococcus, *Kocuria*, *Enhydrobacter* spp. & other low abundant ones ↓

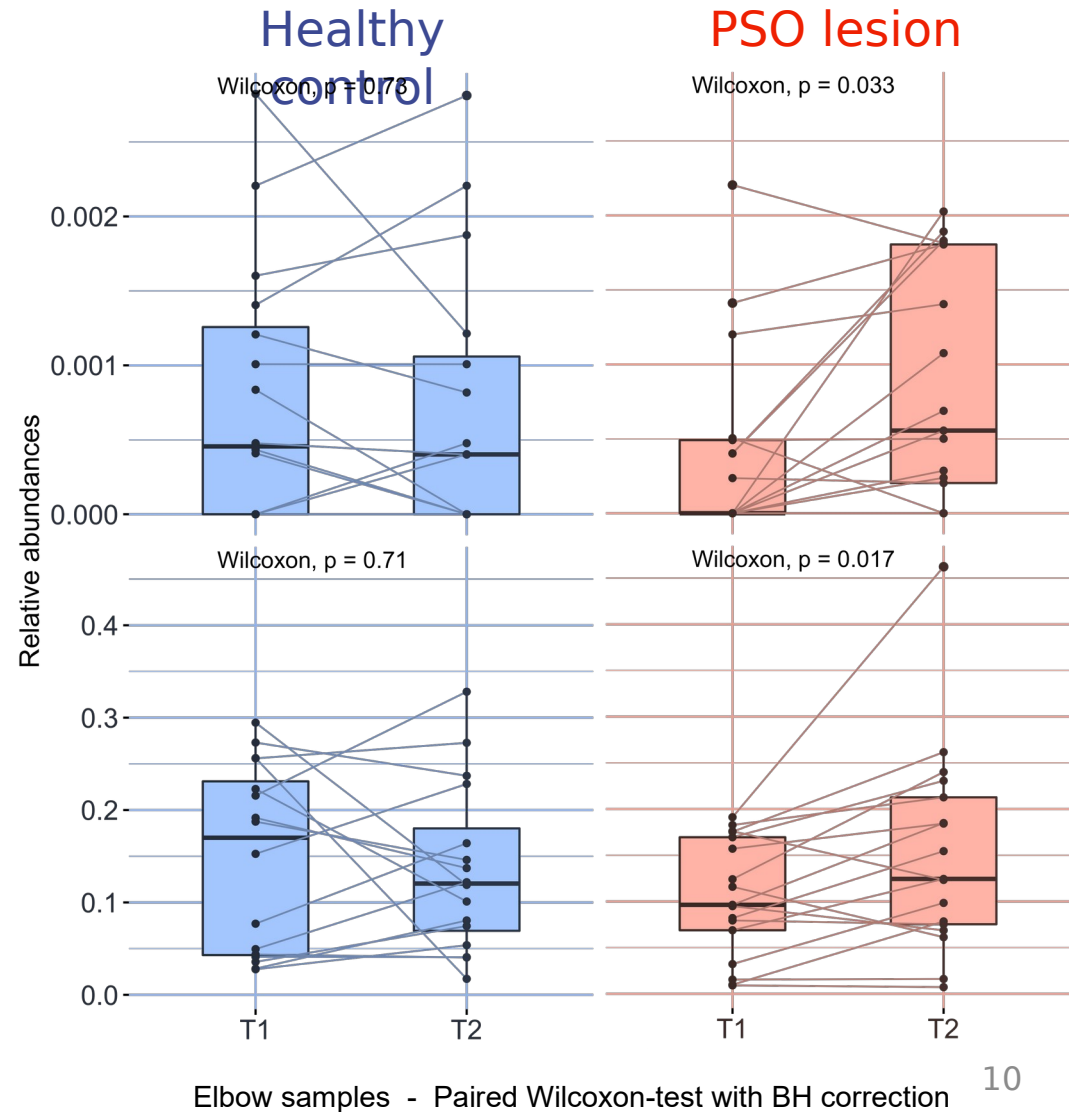
● PSO lesion



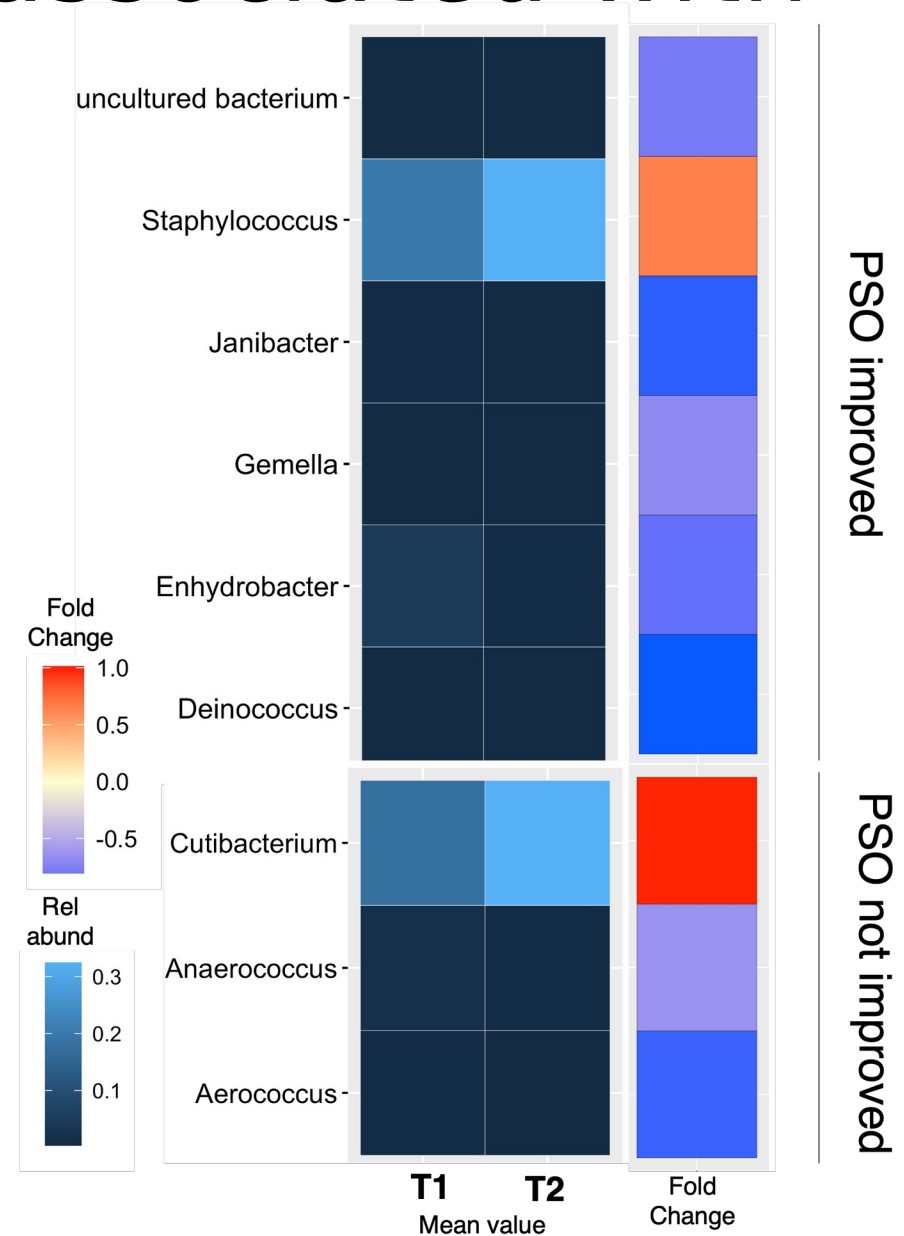
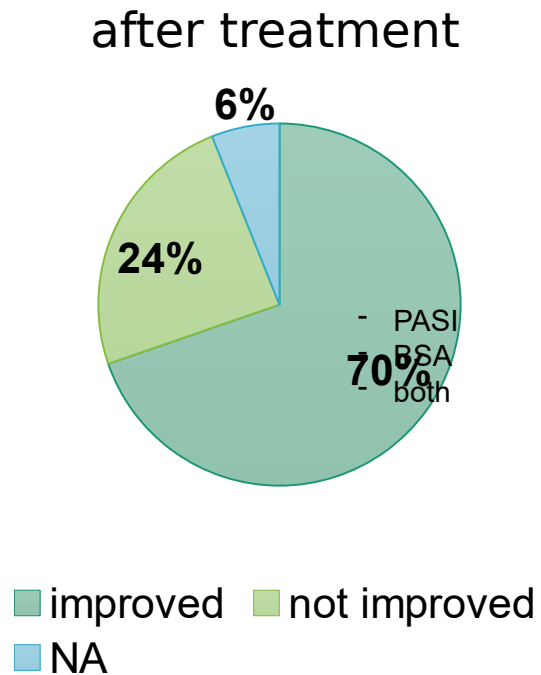
S. epidermidis abundance increases after balneotherapy

- Increased *S. epidermidis* abundance on PSO lesions after balneotherapy
- No significant difference in healthy control samples

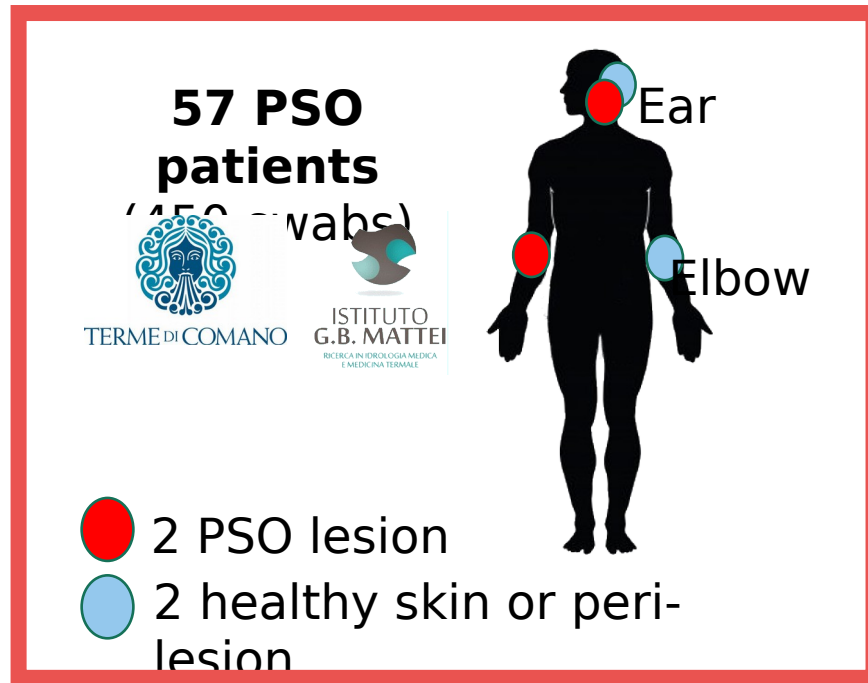
Balneotherapy may restore a healthy-like microbiome on the skin affected by PSO



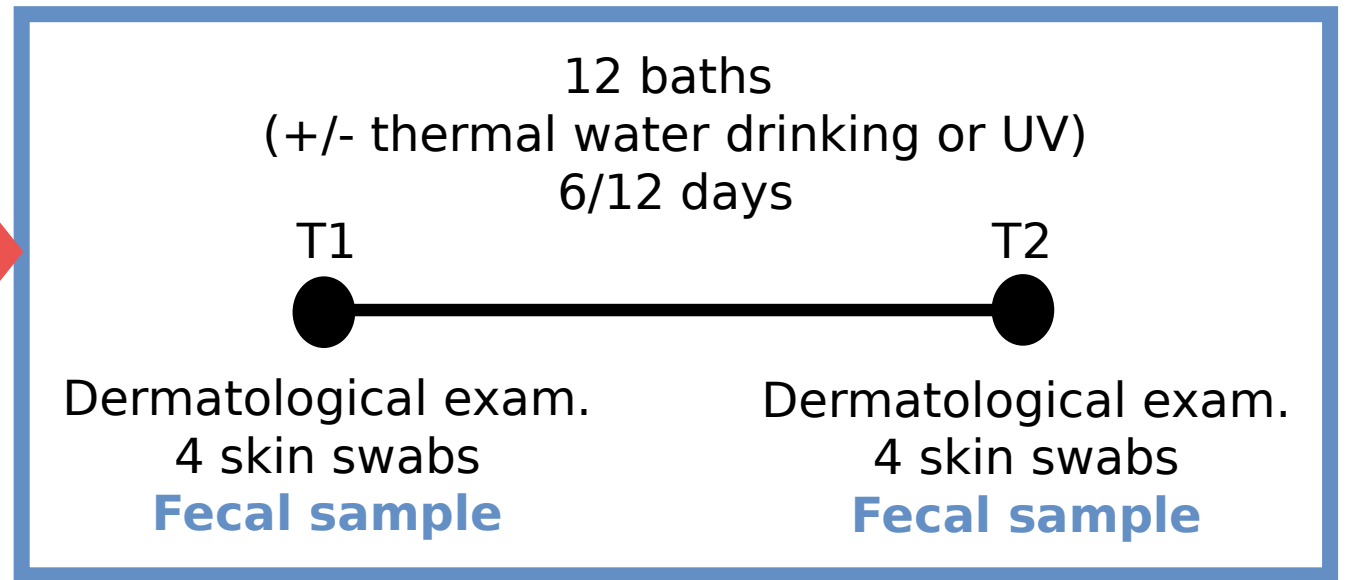
Are microbial genera associated with improvement?



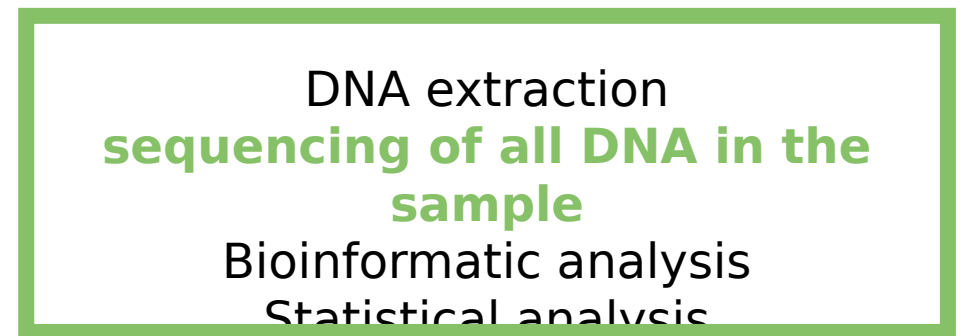
Cohort enrollment



Sample collection



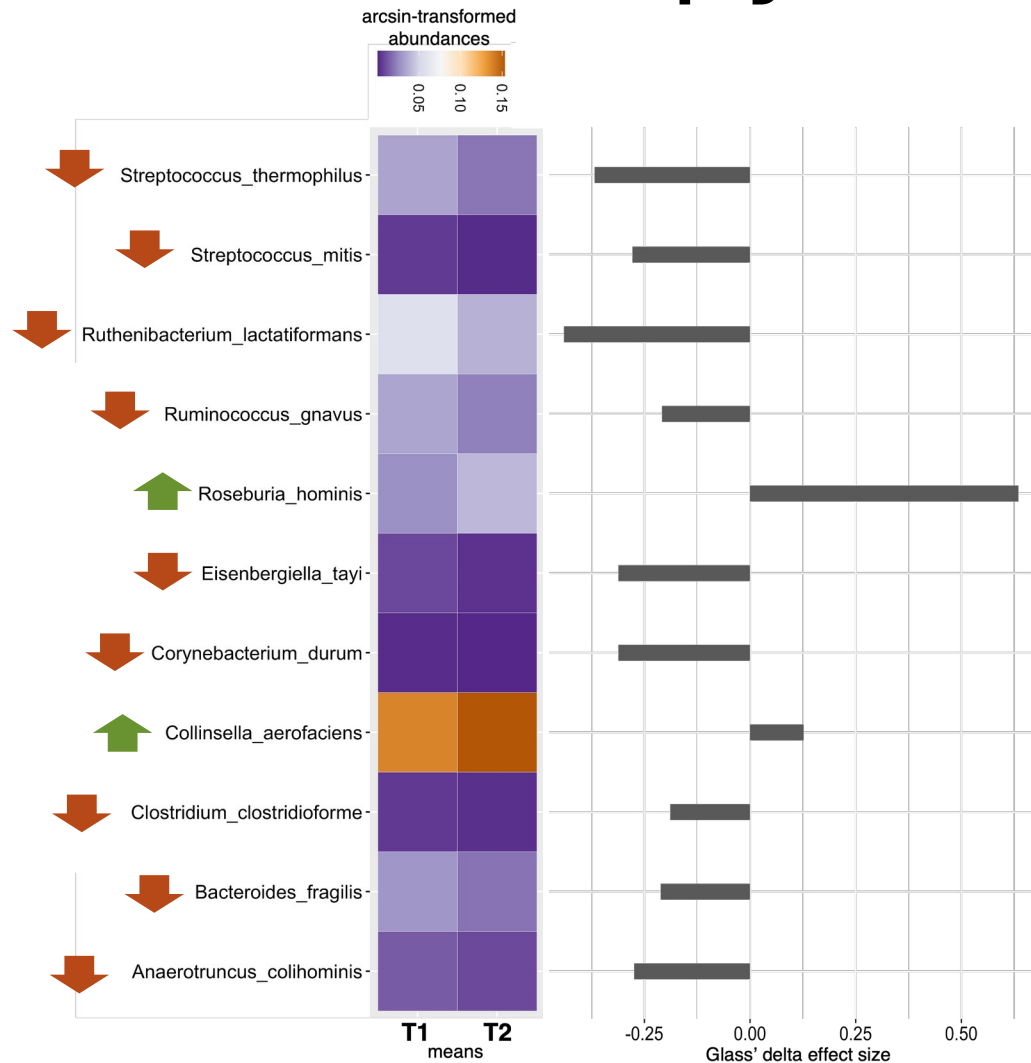
Analytical workflow



40 PSO patients (80 fecal samples)

- ✓ T1 and T2 fecal samples
- ✓ >10 Million reads library size

Fecal microbiome changes with balneotherapy



↓ Species decreased after balneotherapy are linked with **poor** metabolic health

↑ Species **increased** after balneotherapy are associated with **good** metabolic health

Balneotherapy might ameliorate the metabolic syndrome associated with psoriasis

Conclusions

- PSO lesions and healthy skin harbour a similar microbiome
- PSO is associated with lower microbial diversity, improved by balneotherapy
- Some bacterial genera are differentially abundant on lesions, restored by balneotherapy
- Changes in the abundance of some genera are associated with PSO improvement
- Balneotherapy is linked with a metabolically healthy composition of the gut microbiome

Take home messages:

Balneotherapy may restore a healthy-like microbiome on the skin affected by PSO
Balneotherapy might ameliorate the metabolic syndrome associated with psoriasis

Thank you for Your attention!

The Laboratory of Computational Metagenomics



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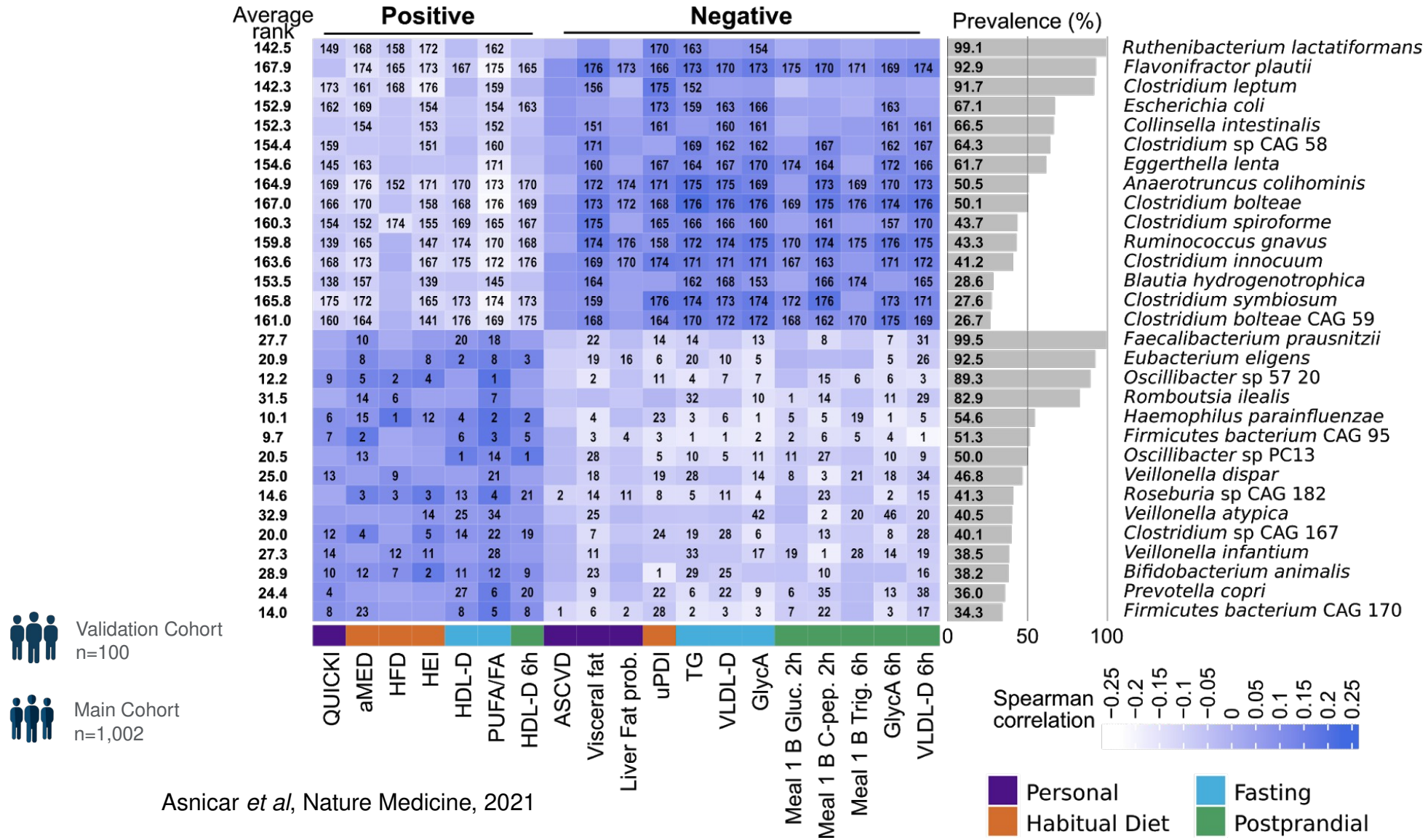
Mario Cristofolini



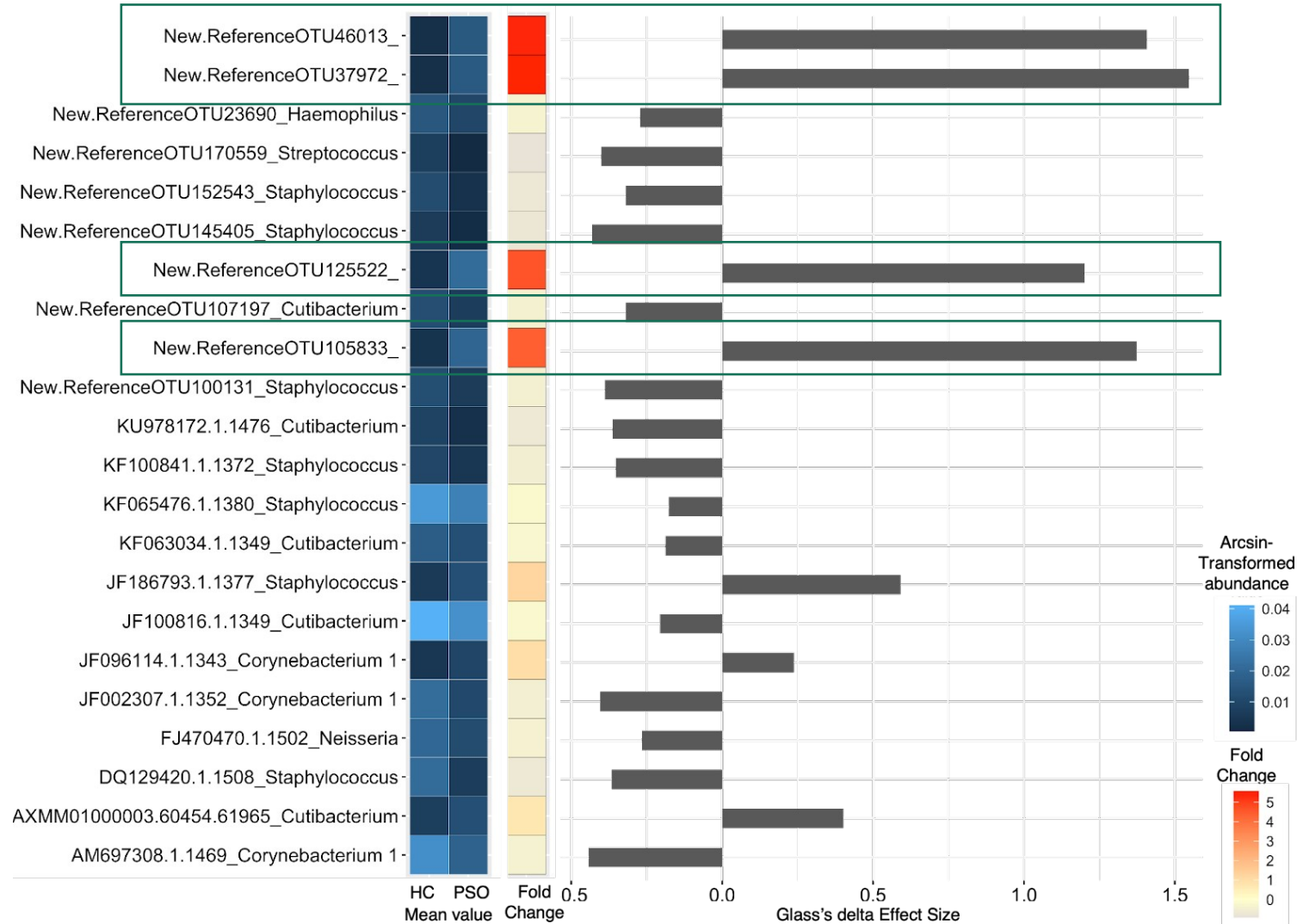
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Possiamo definire la composizione di un »microbioma sano«?



PSO lesions show increased abundance of unknown taxa



Further thermal treatments affect the gut microbiome

