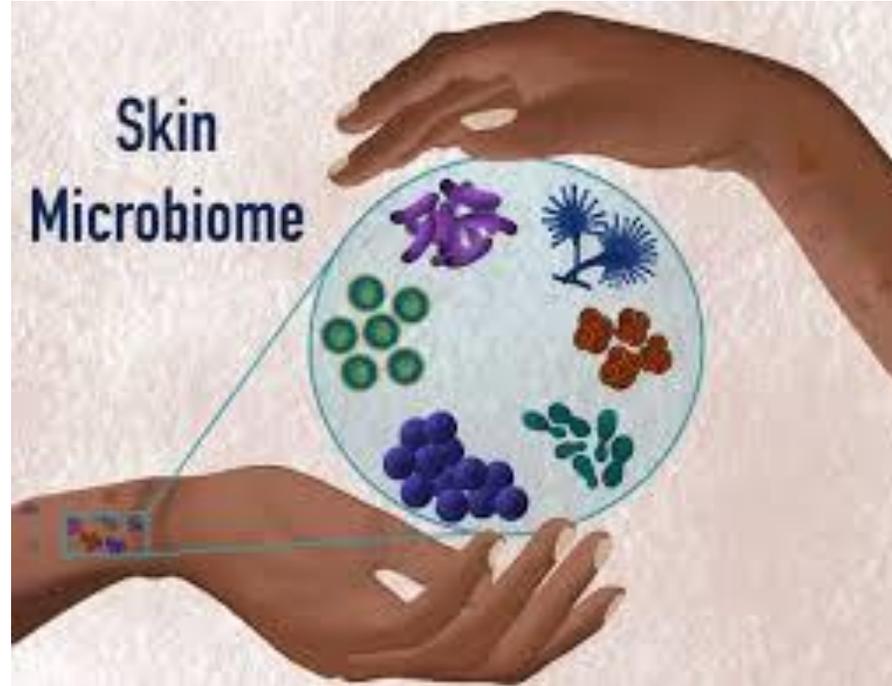


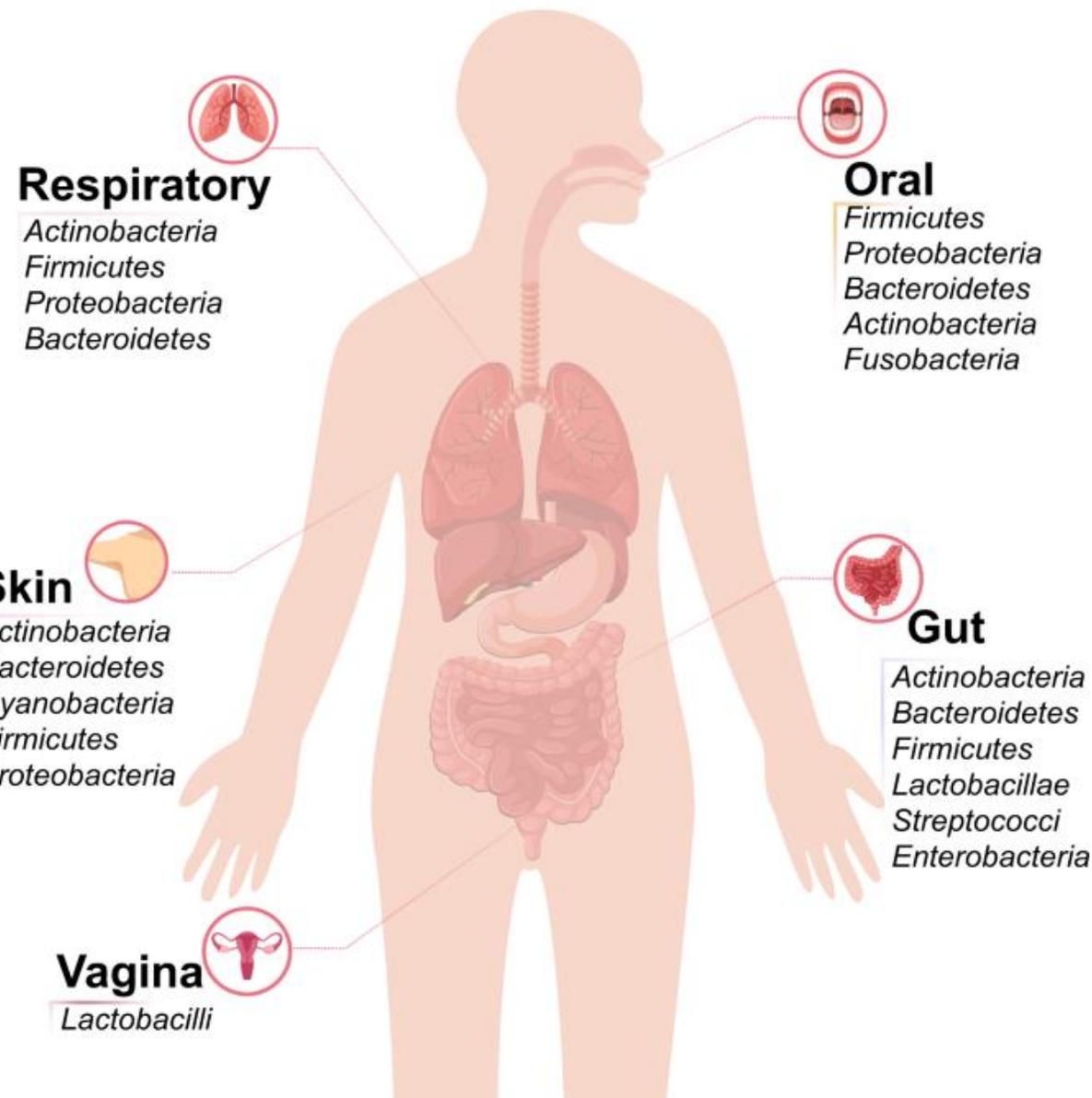
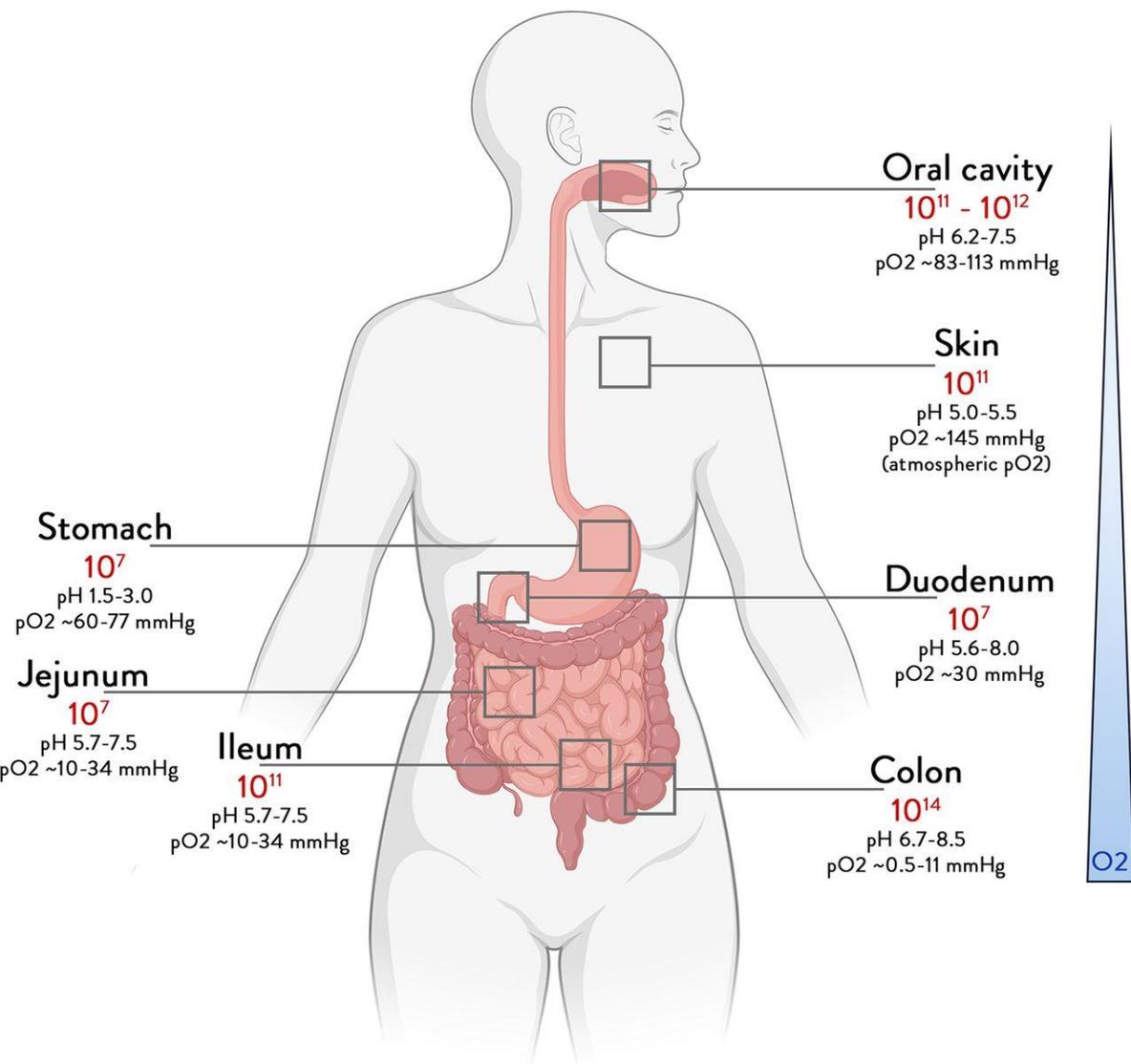
# Postbiotics and Microbiome in Skin Repair and Protection



**Shalini Jain, PhD**

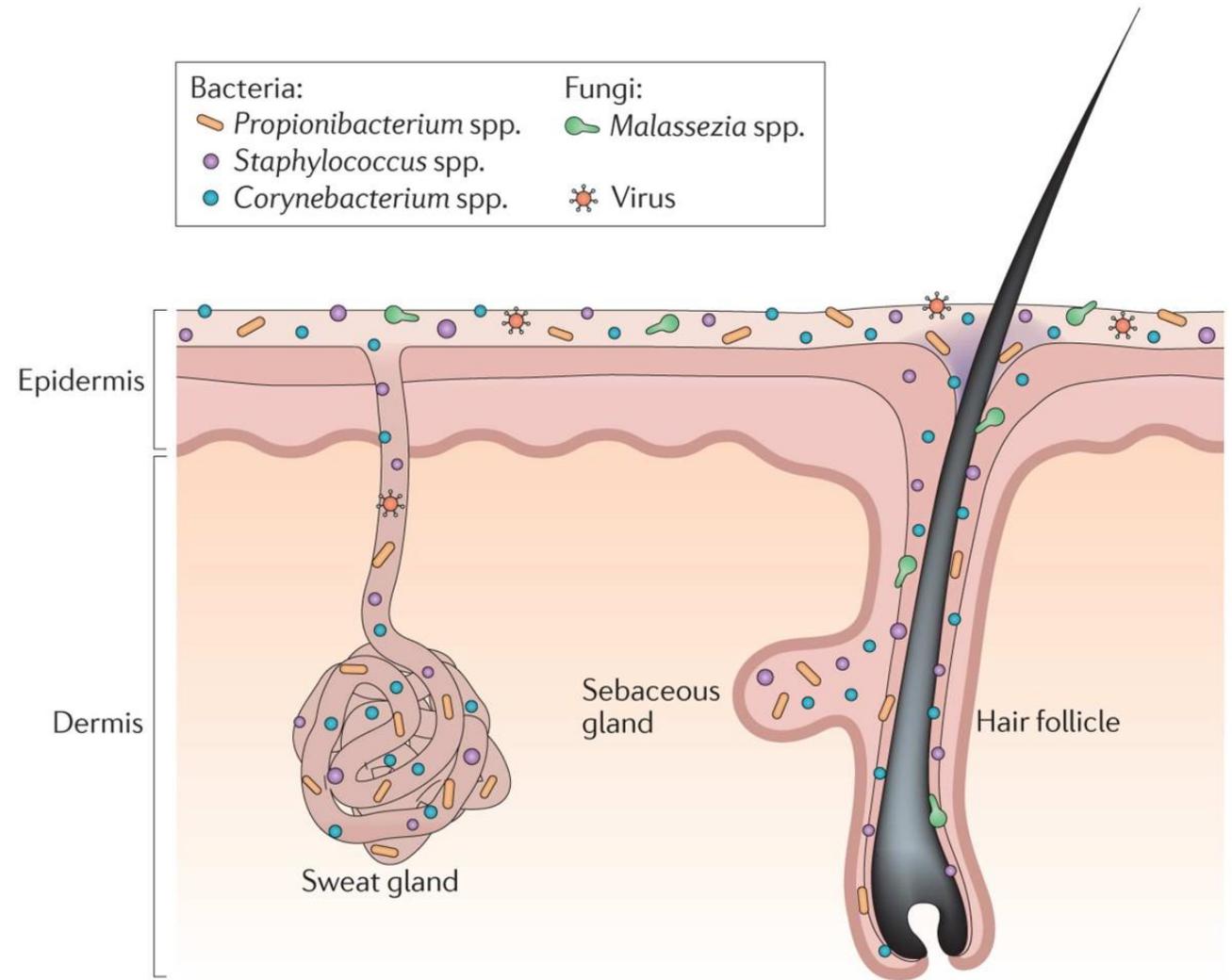
**Assistant Professor in Department of Neurosurgery, Brain and Spine  
USF Center for Microbiome research  
University of South Florida, Tampa, FL**

# Microbiome in different regions of human body

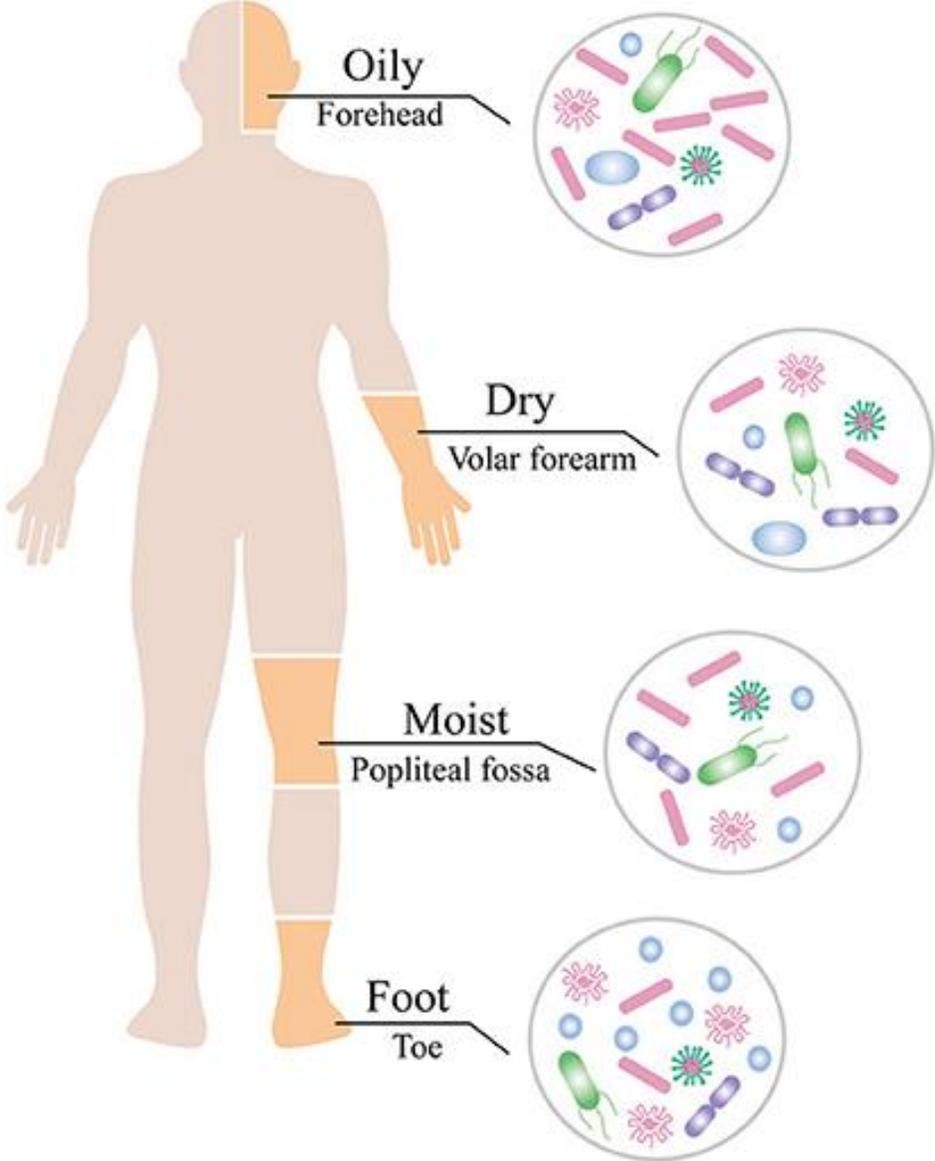


# Skin Microbiome

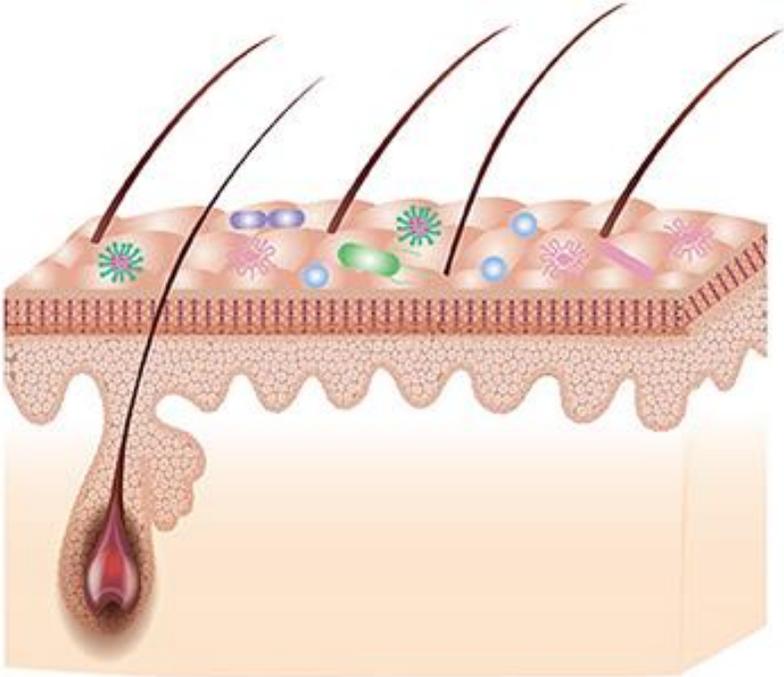
- ✓ The skin is the largest organ of the human body
- ✓ A complex community of microorganisms, including bacteria, fungi, and viruses, that live on the skin.
- ✓ Plays a critical role in skin health, protecting against pathogens, aiding in nutrient absorption, enhancing barrier function and supporting immune function.



# Skin Microbiome

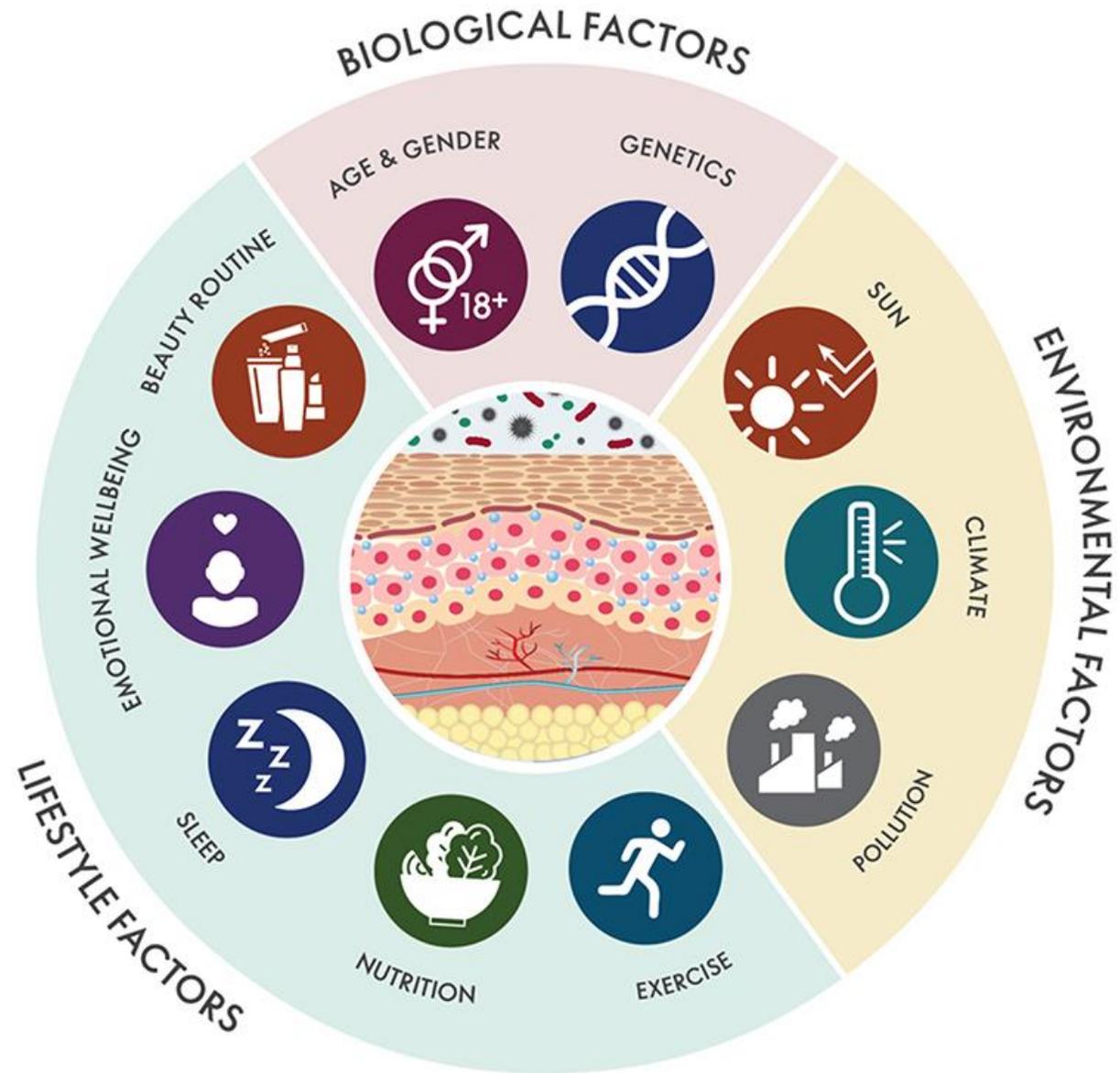


Human skin landscape



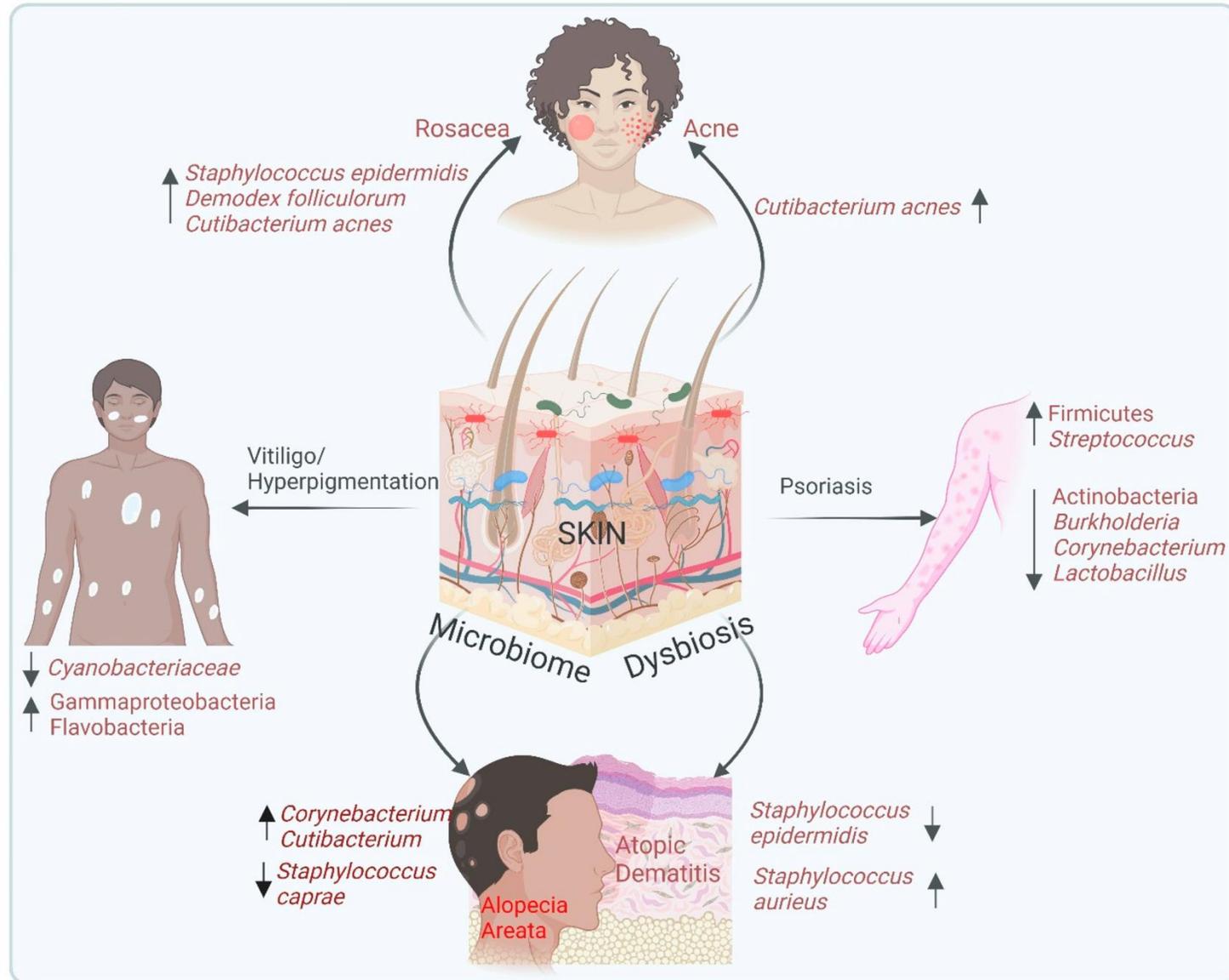
   Bacteria     Virus     Fungi

# Factors affecting the skin microbiome

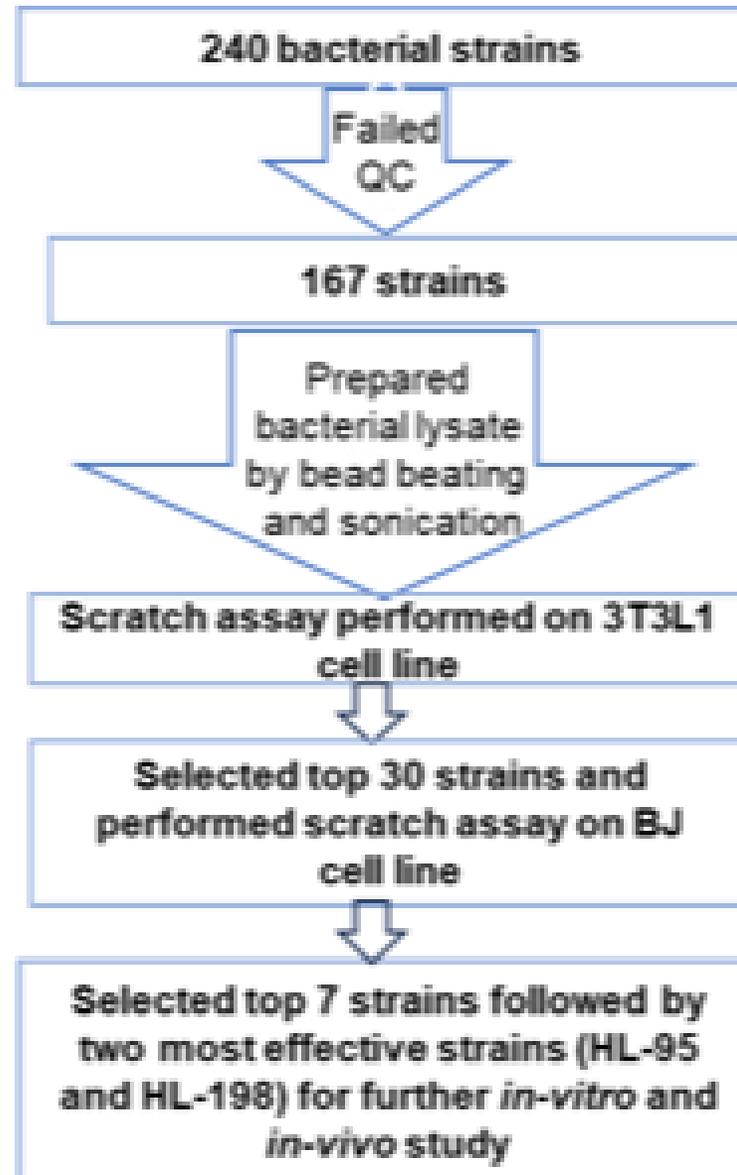


# Role of microbiome in different skin diseases/disorders

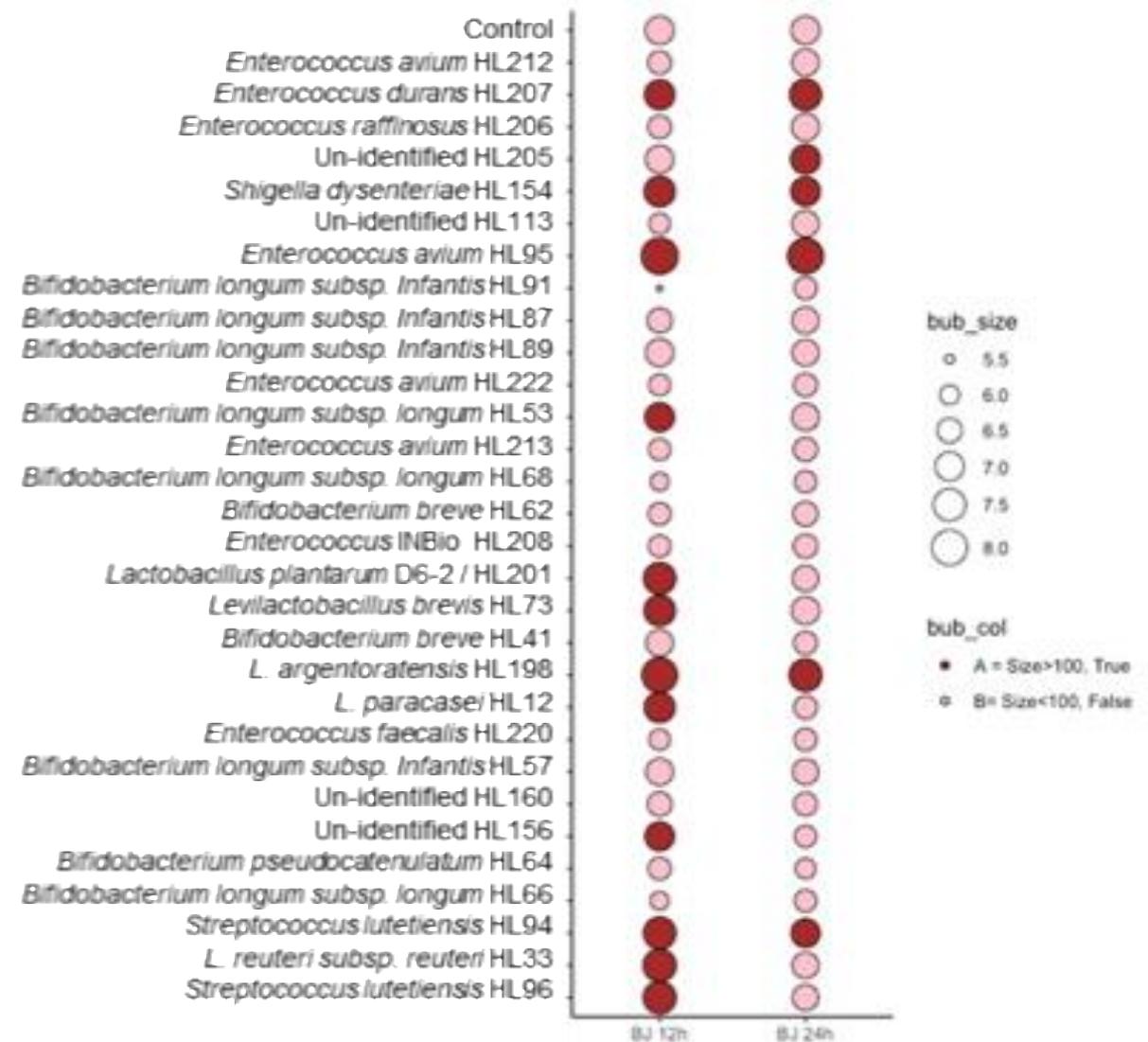
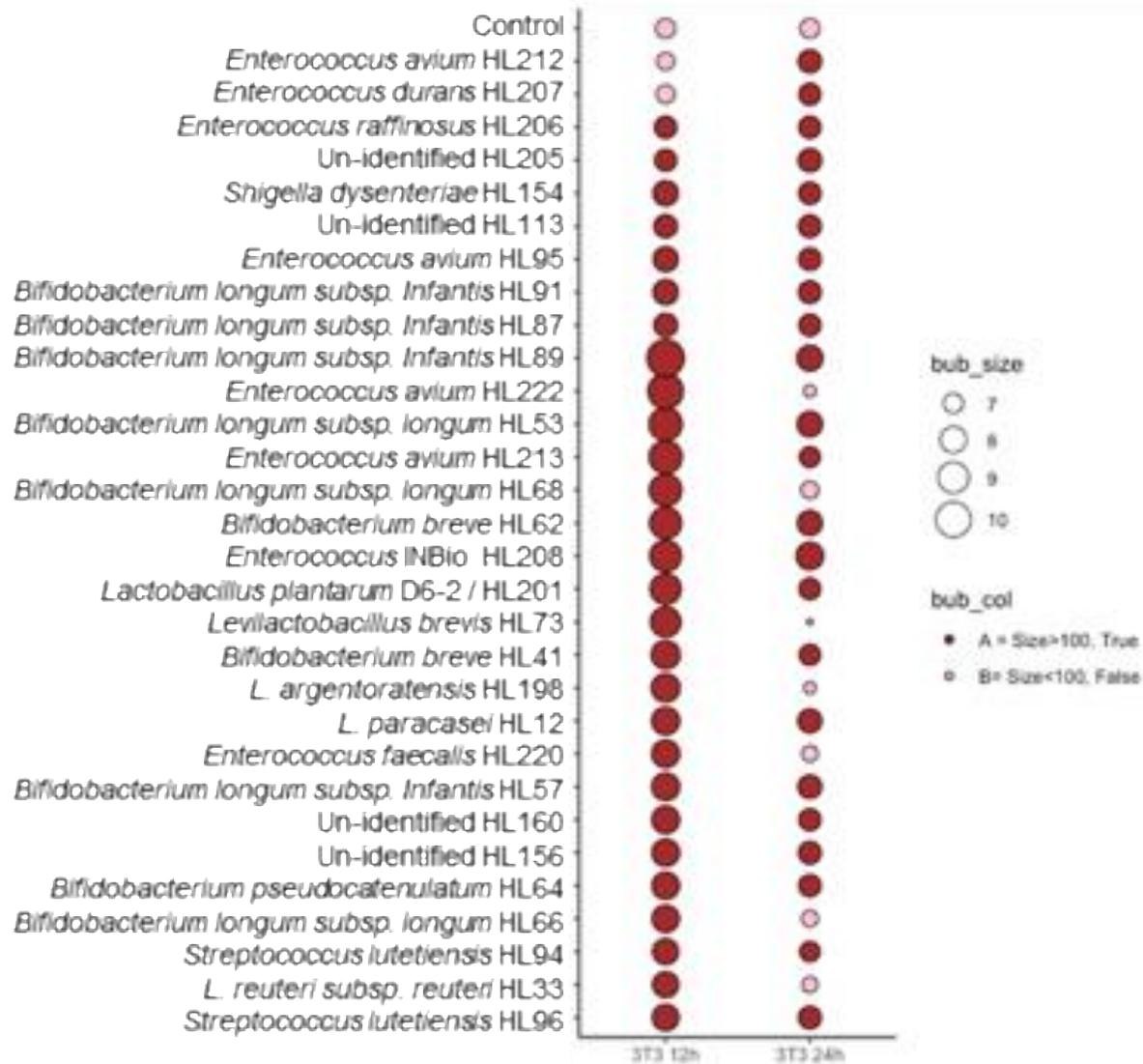
- Approximately one in four American sought treatment for skin disease
- 84.5 million Americans — were impacted by skin disease
- Roughly 50% of Americans over age 65 have at least one skin disease.
- Among them, two are significant:
  - Skin Scars
  - UV Damage of Skin
- Natural and safer solutions are elusive for these conditions.



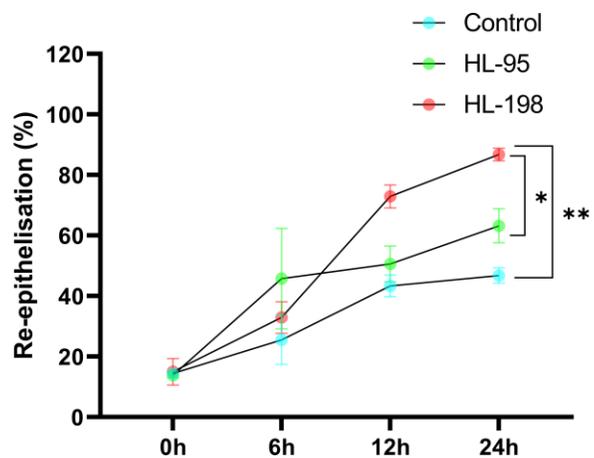
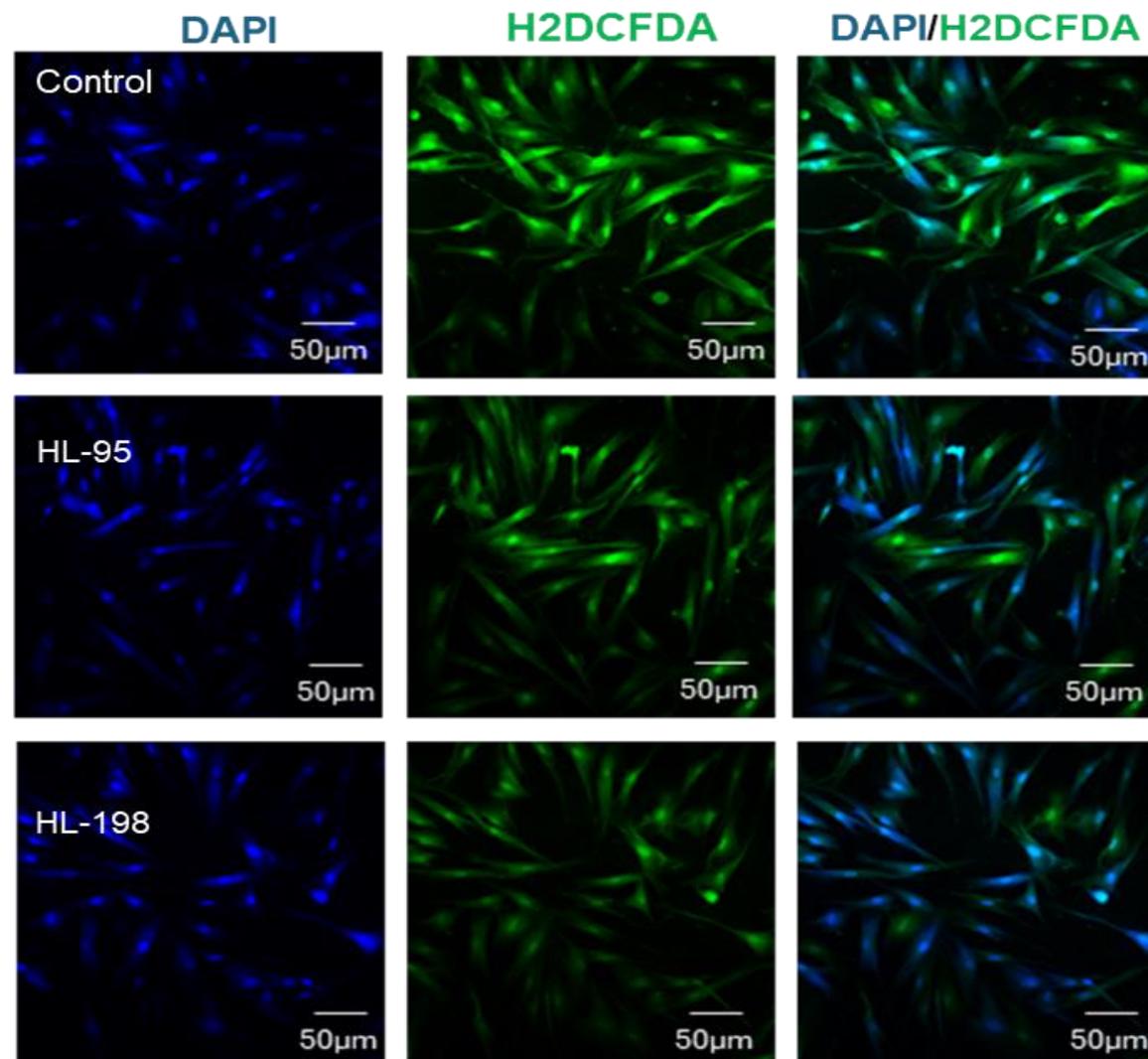
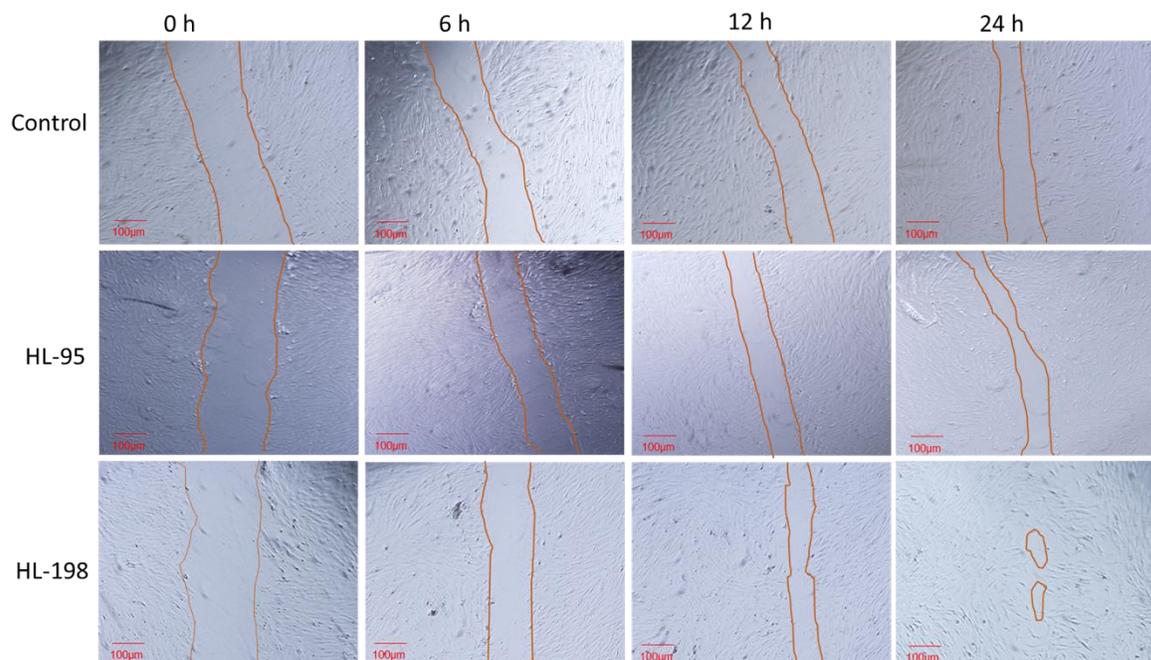
# We discovered selected postbiotics strains fasten wound healing



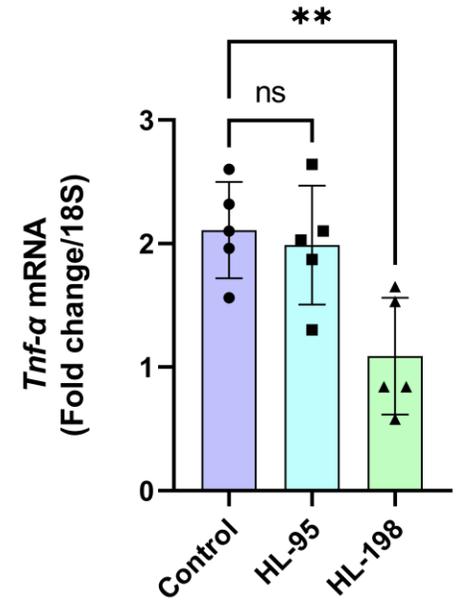
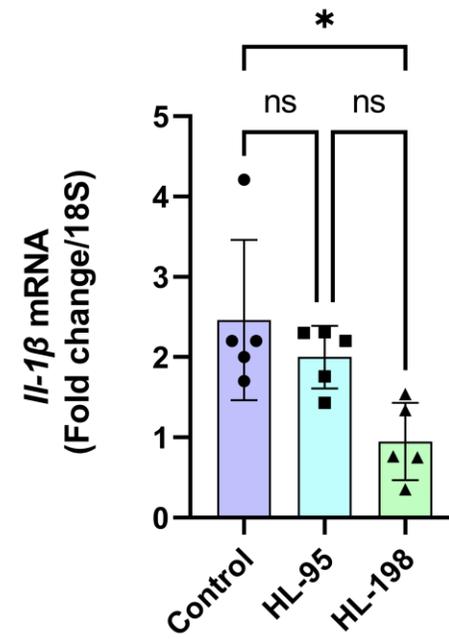
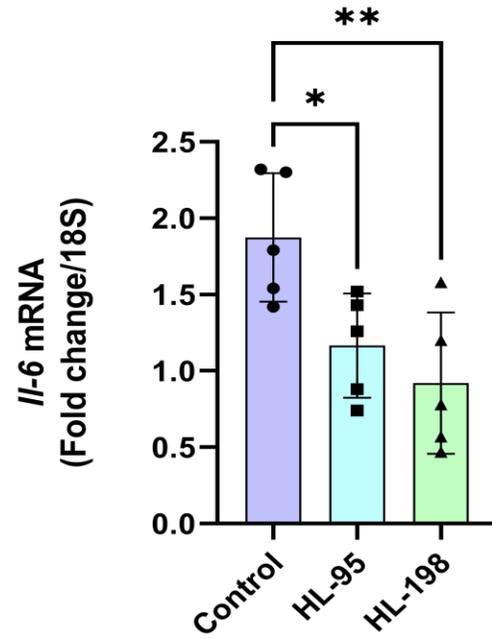
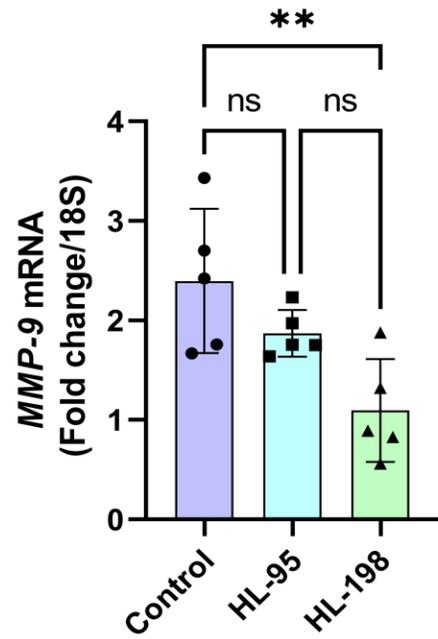
# We discovered selected postbiotics strains fasten wound healing



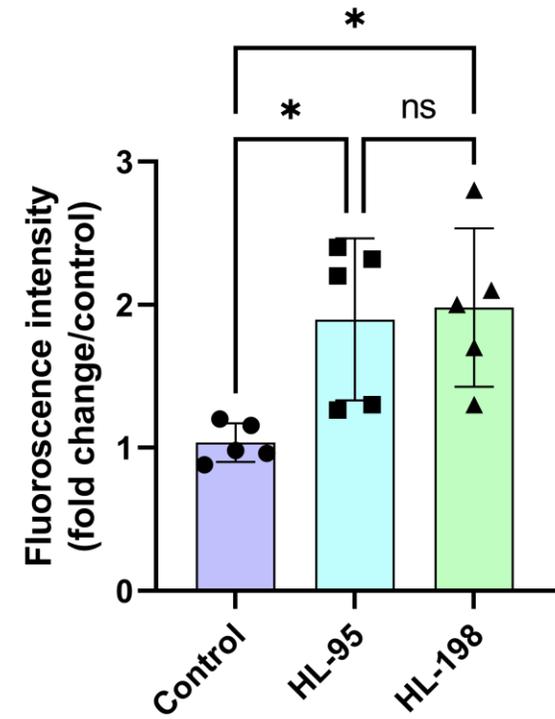
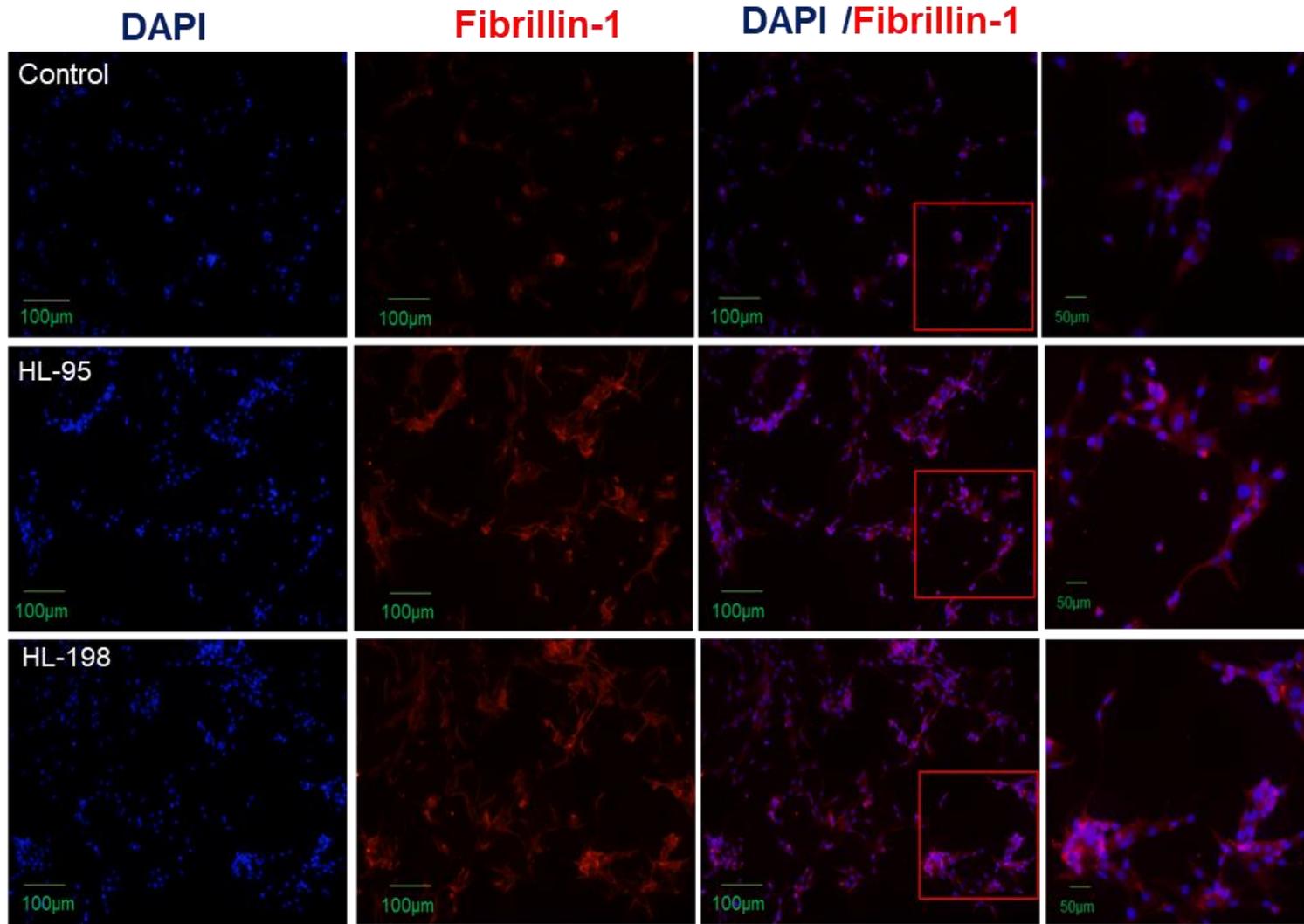
# HL-198 potentiates re-epithelialization by reducing oxidative stress



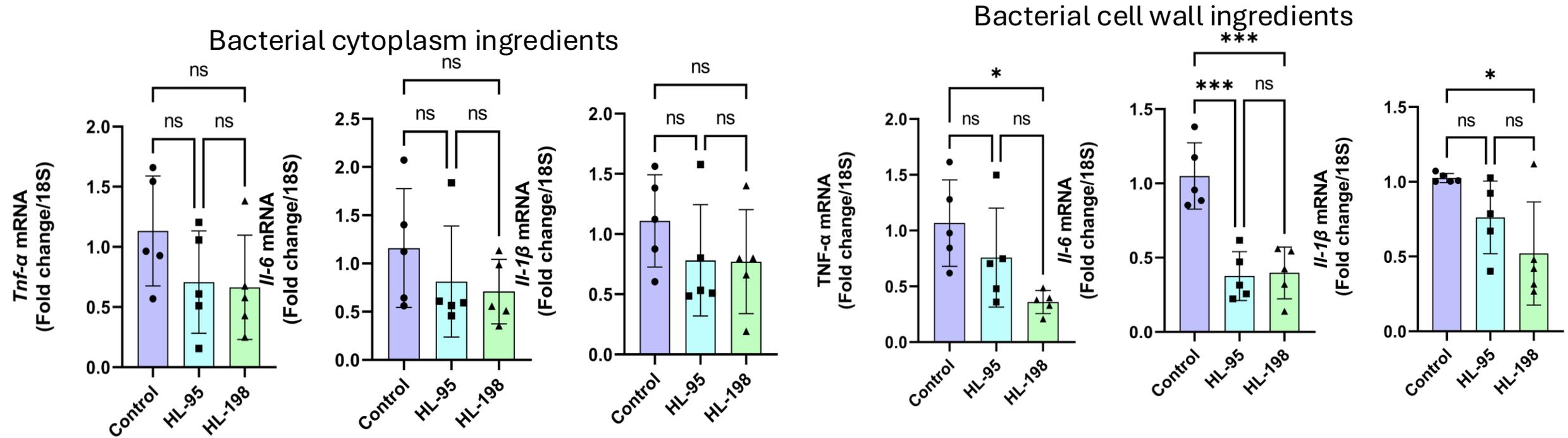
# *L. plantarum* HL-198 reduces inflammation during wound healing



# HL-198 enhances Fibrillin-1 expression during wound healing

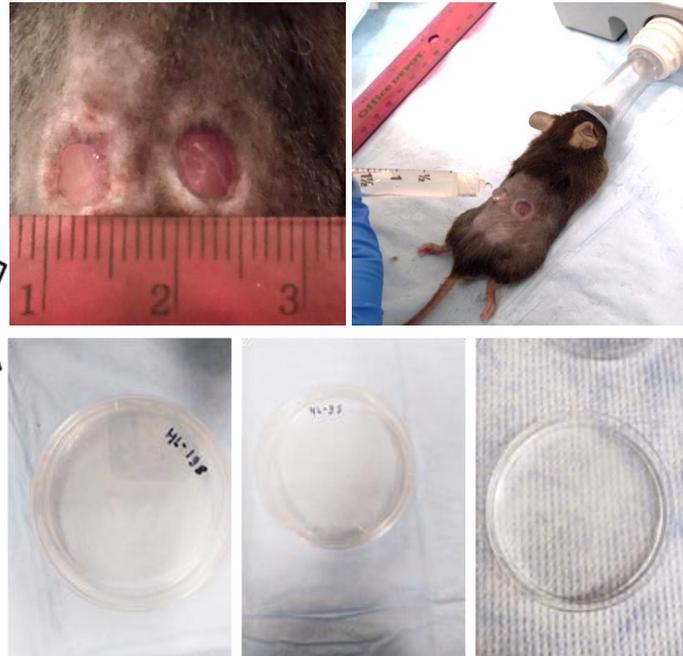


# Cell wall ingredients of HL-198 more effective to suppress inflammation than cytoplasmic fractions



# Translation potential from cells to mouse models: Bacterial Extract Derived hydrogEL (BEDEL) Development for Atopic Applications

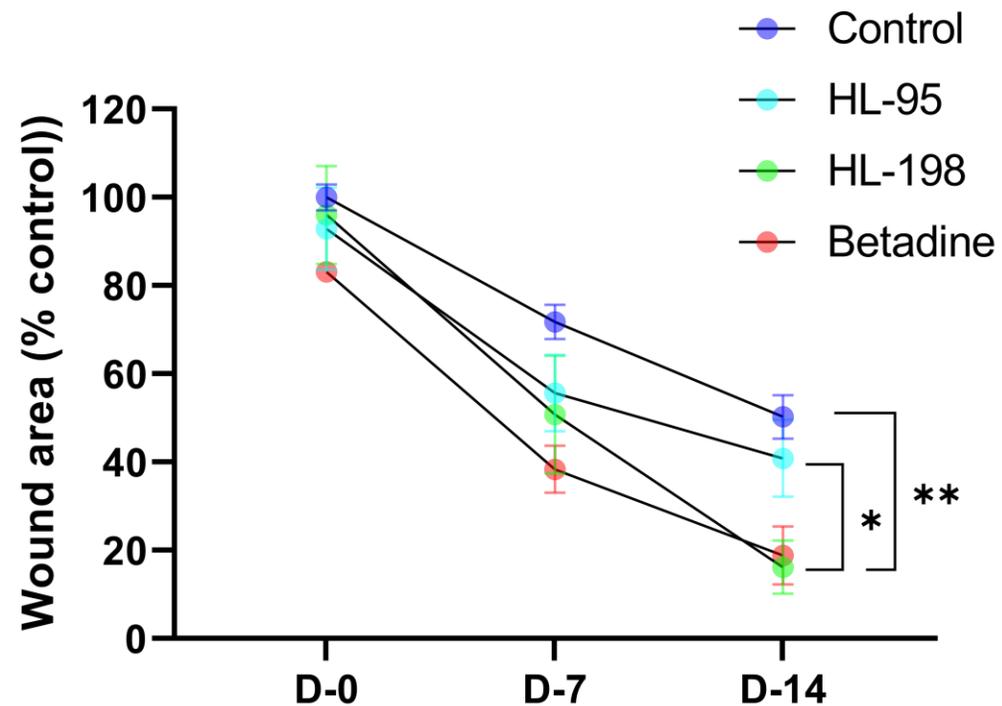
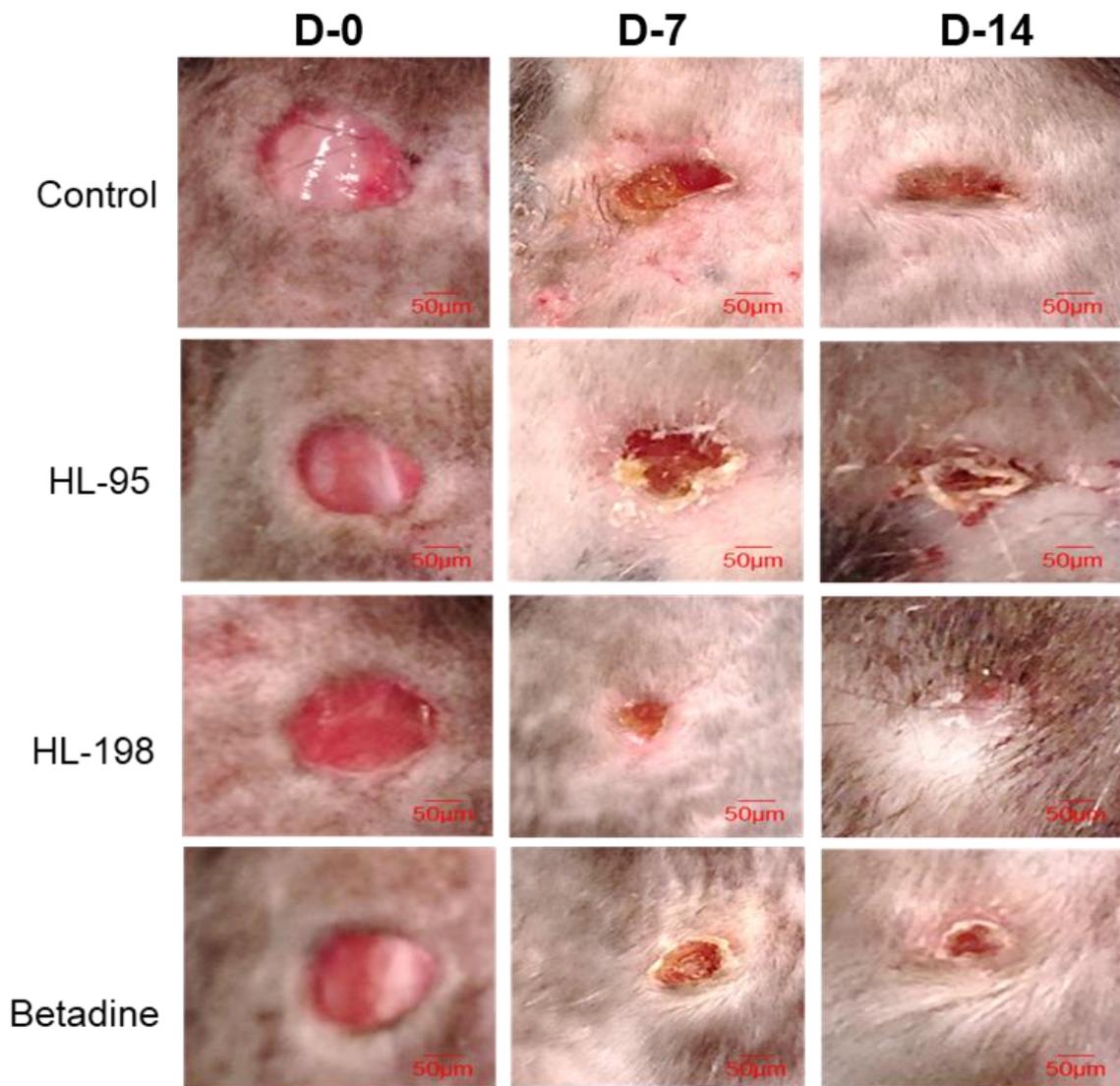
## *In-vivo* wound assay



## **BEDEL preparation**

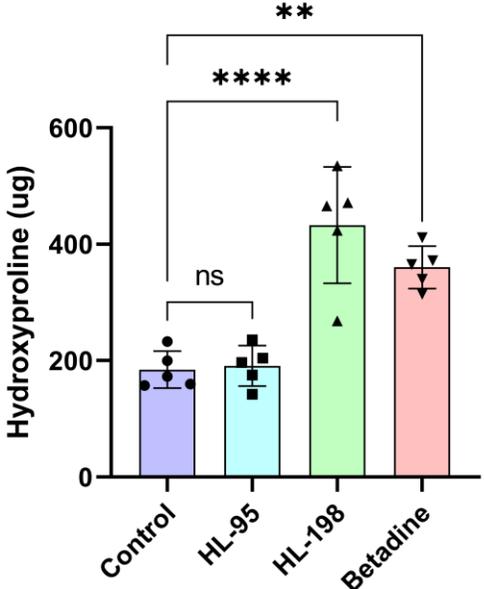
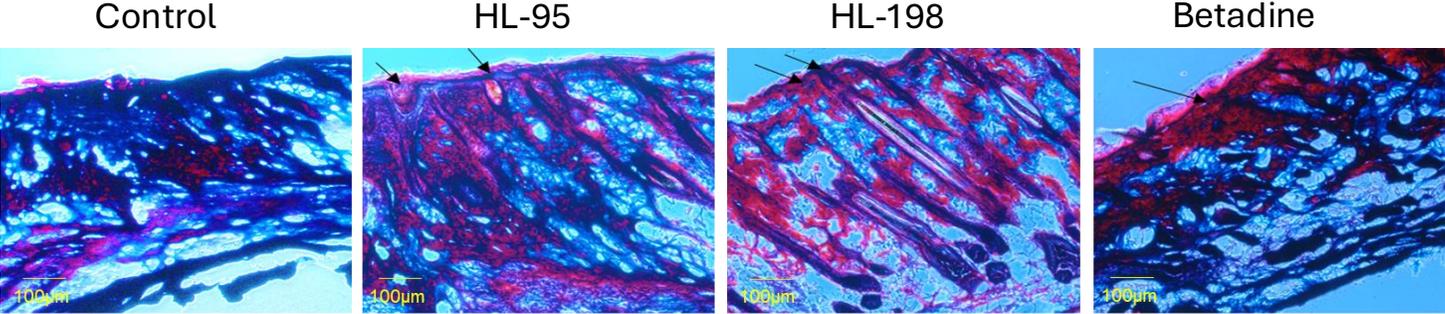
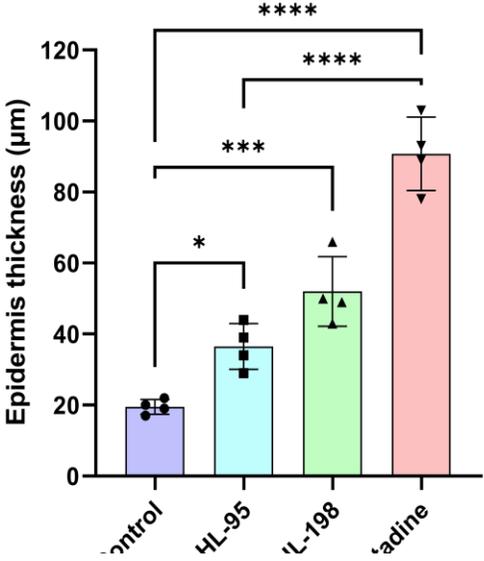
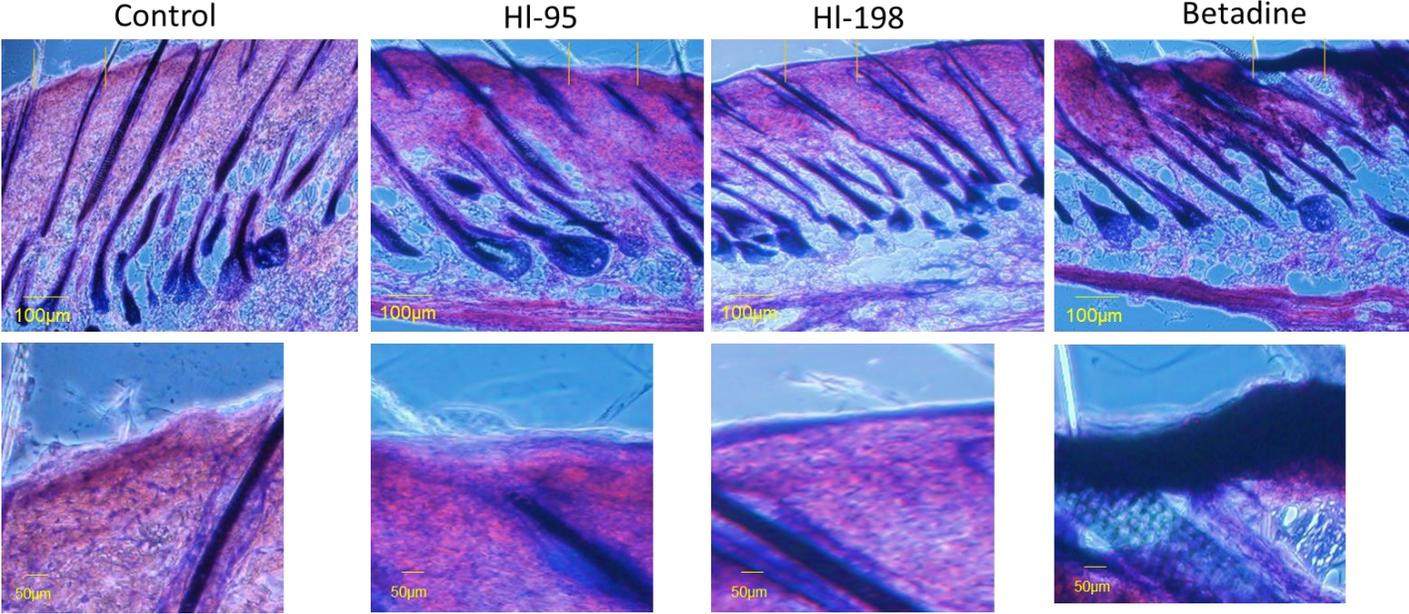
1.5-2.0 % Hydroxypropyl cellulose dissolved in sterile distilled water. The final protein concentration of bacterial extract in the gel is 100 ug/ ml.

# HL-198 dramatically potentiated wound closures



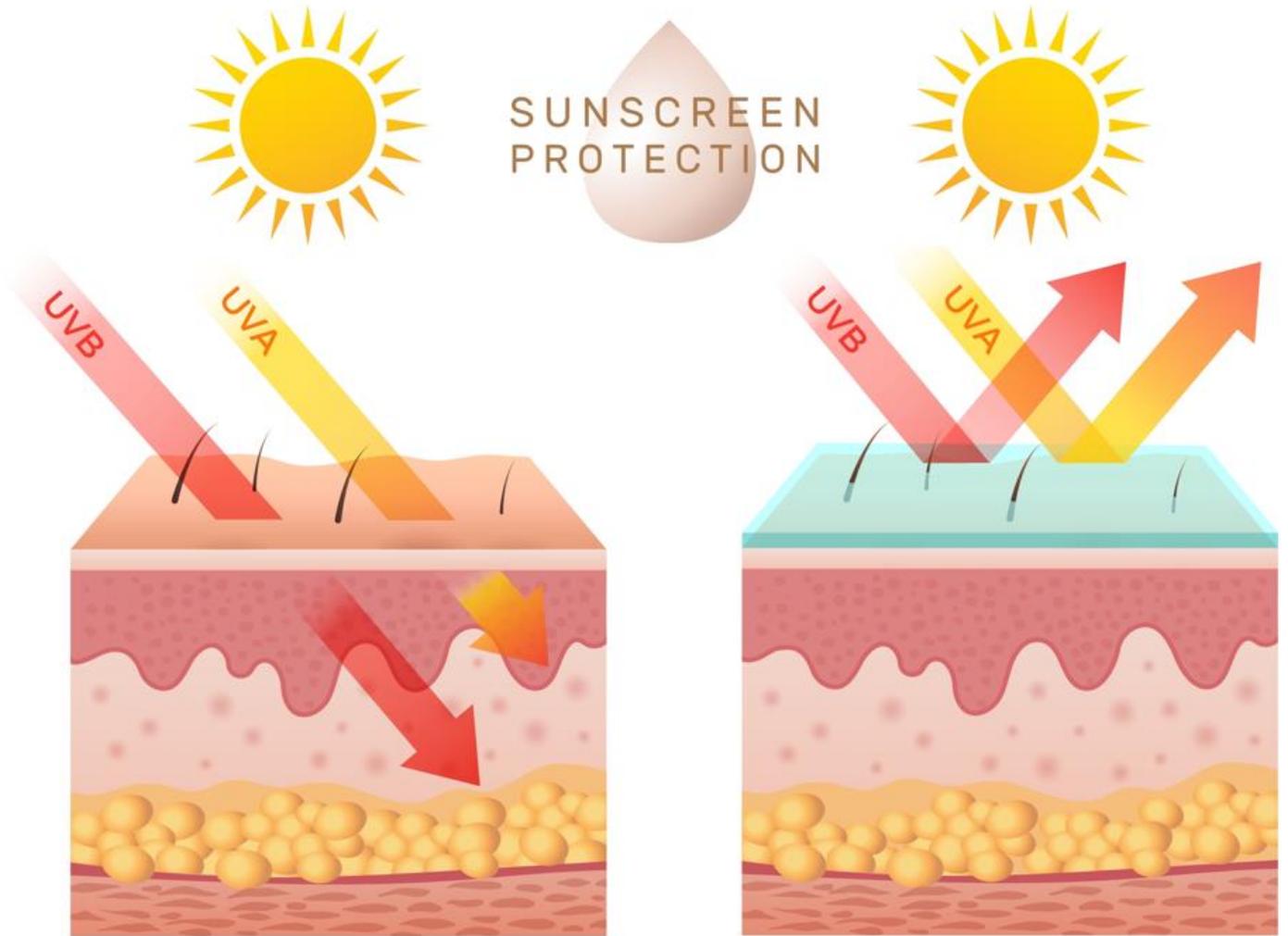
5 mm wound created using biopsy punch

# HL-198 better promoted epithelization and collagen formation during wound healing



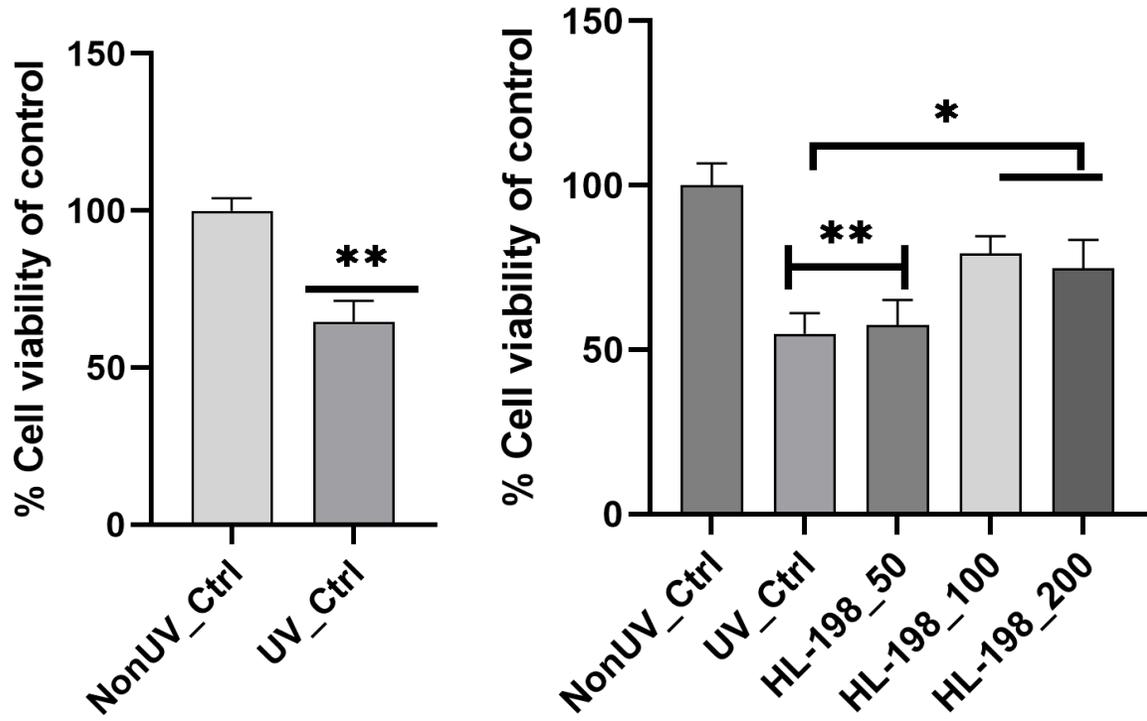
# UV light exposure and associated conditions are significant

- UV damages our skin epithelial cells
- Also disrupt microbial balance
- Sunscreens gives protection, but lot of chemical exposure
- After UV exposure solutions are elusive
- Natural scientifically proven solutions are limited



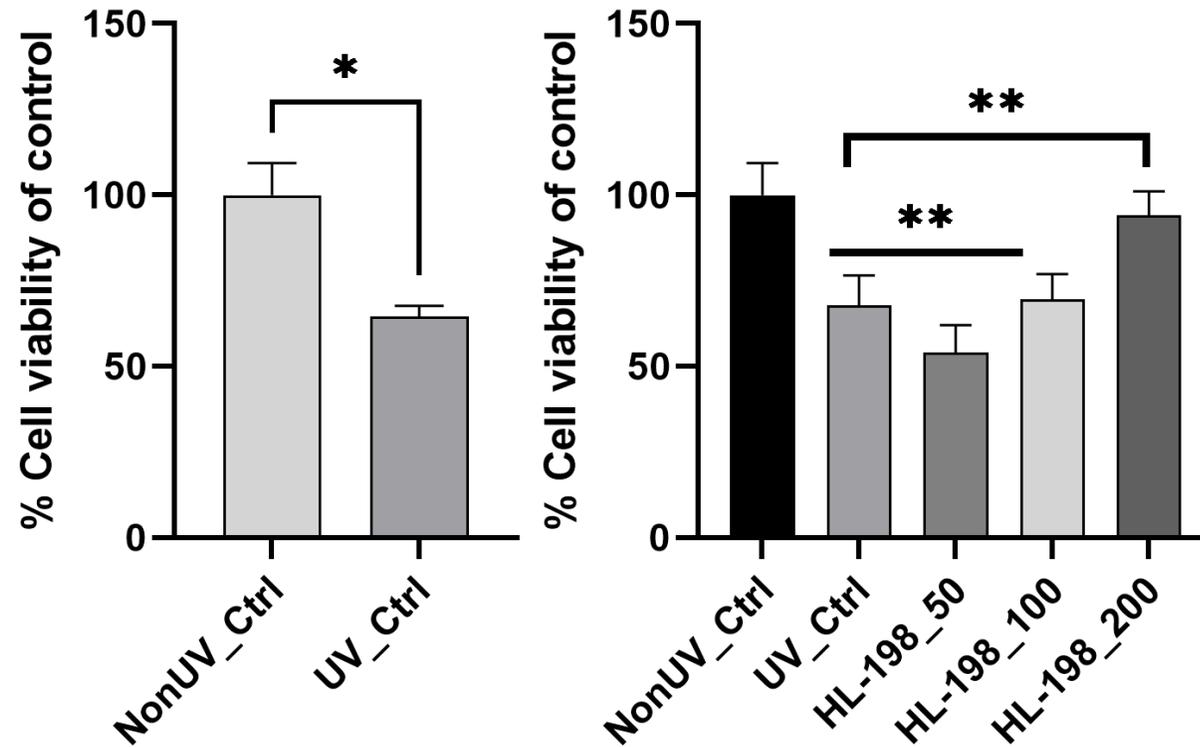
# HL-198 provides skin protection against UV rays

*In-vitro* Skin protection against UV exposed model



# HL-198 promotes recovery after UV exposure

Therapeutics effect against UV exposed model



# Summary

- HL-198 enhances re-epithelialization by reducing oxidative stress and lowering inflammation in an in-vitro wound model.
- HL-198 accelerates wound closure and does so without scar formation, unlike betadine, which resulted in scarring.
- HL-198 supports multiple phases of wound healing by decreasing inflammation, promoting epithelialization, and enhancing collagen formation.
- Different components of HL-198 have distinct effects, the cell wall fraction is more effective at reducing inflammation.
- HL-198 provides protection and promotes recovery against UV exposure in an in-vitro model.

Overall, HL-198 contribute complementary therapeutic effects, highlighting HL-198 as a promising candidate for advanced wound-care applications.

# Acknowledgements

## Team members

Brandi Miller  
Rohit Shukla, PhD  
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Out of 1000 Strain



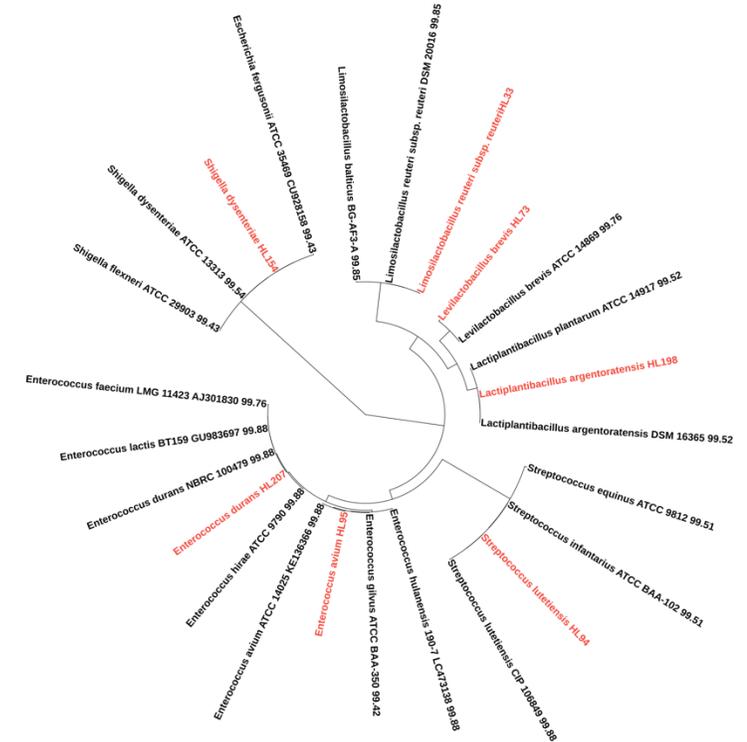
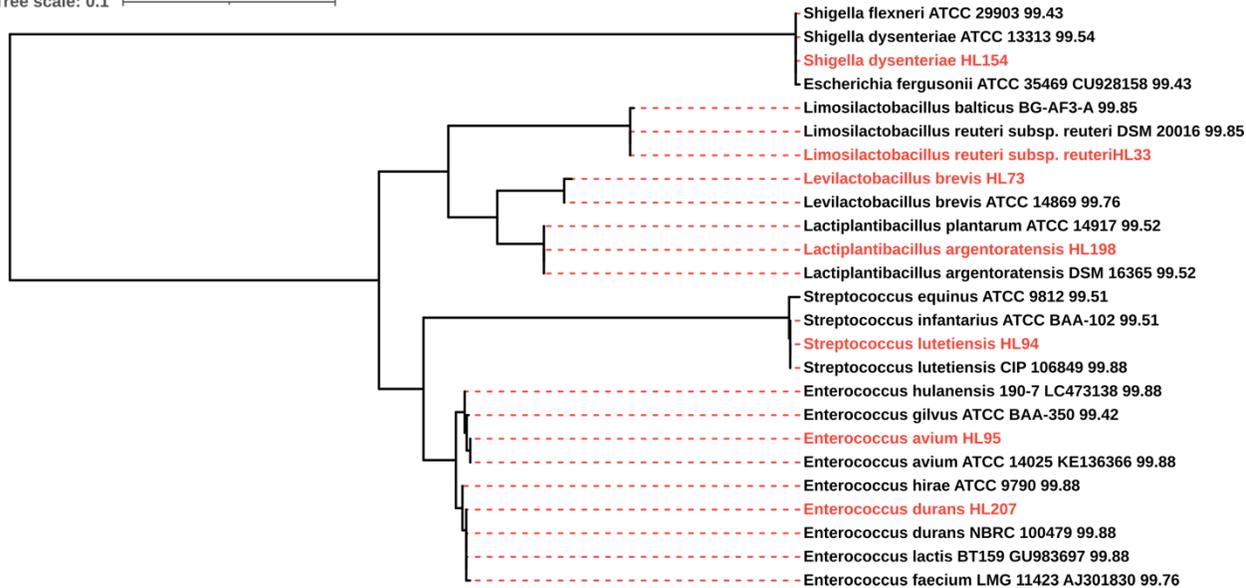
Strain identified for wound healing



Virulence genes, antibiotic resistance, gram staining and cataladt activity

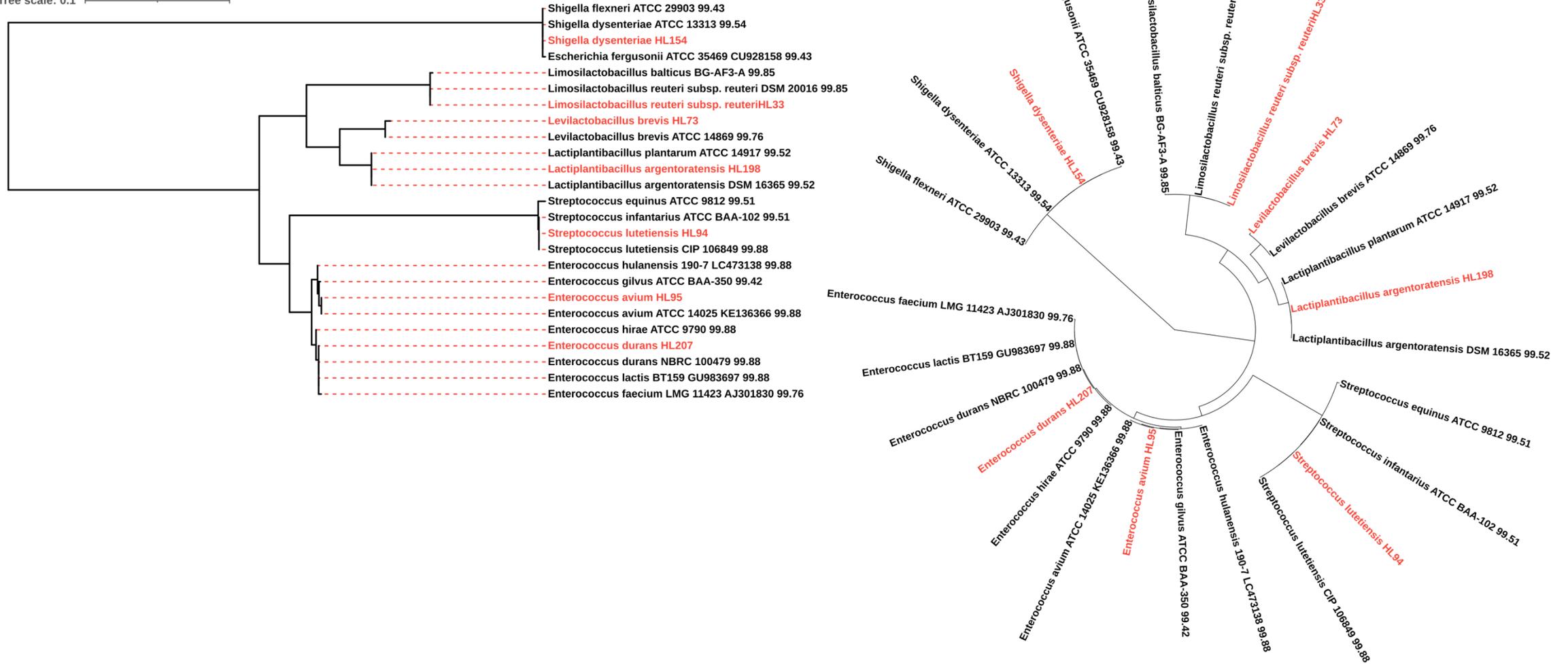
## *Lactobacillus Plantarum* (subsp. *L. argentoratis*) HL-198

Tree scale: 0.1



# Phylogenetic Divergence of *Lactobacillus Plantarum* (subsp. *L. argentoratis*) HL-198

Tree scale: 0.1



# Skin Microbiome and modulators

- Microbiome-targeted treatments offer novel avenues for addressing skin diseases.
- Postbiotics have gained significant attention for their safety and efficacy. Postbiotics are non-viable microbial cells or their metabolites, which reduce safety concerns while providing functional benefits such as UV protection and wound healing.

# Mechanism of wound healing

