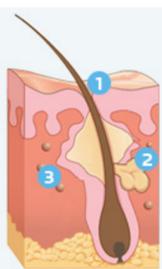


# Why should we consider the skin microbiota of acne patients in daily practice?

ACNE BASIC

Acne is a chronic inflammatory disease that affects the pilosebaceous follicle.

Three main factors are involved in the development of acne<sup>1</sup>:



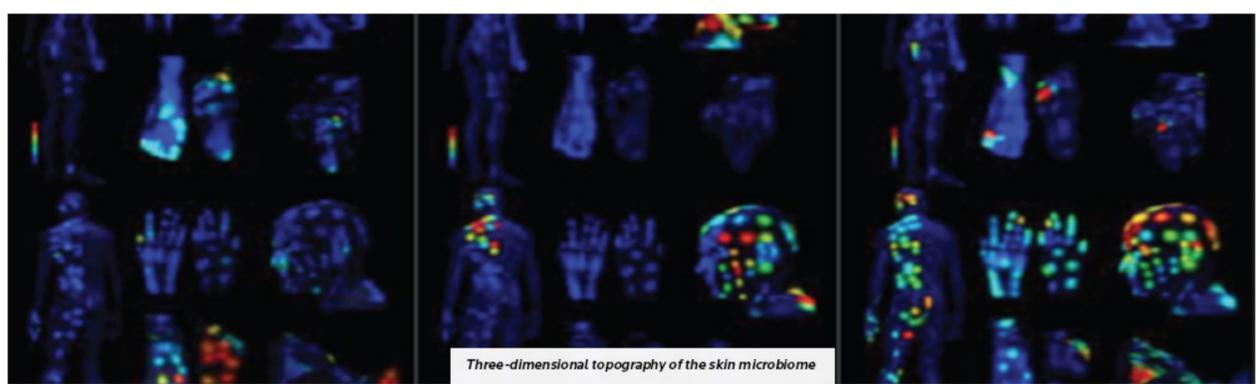
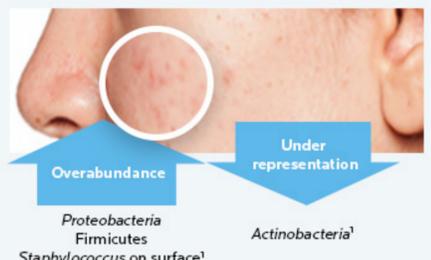
- 1 Abnormal keratinization** of the sebaceous duct and comedone formation.
- 2 Increased sebum production** caused by the stimulation of the sebaceous glands via the activation of several receptors, including those for androgens, neuropeptides, insulin-like growth factor 1 and peroxisome proliferator-activated receptors (PPAR).
- 3 Inflammatory immune response** in which *Propionibacterium acnes* (*P.acnes*) and innate immunity play an important role.

## Acne: dysbiosis of skin microbiota plays a key role

Altered bacterial colonization is believed to be one of the main elements contributing to the development of acne. This dysbiosis is associated with inflammation, one of the main factors in acne development.

A recent study showed that bacterial landscape is different on the skin surface of acneic patients, when on the same cheek of the same acneic patient, a non-affected zone is compared with an affected one.

Greater focus on the interactions between skin microbiota and the innate immune response should make it possible to design more effective acne treatment strategies.



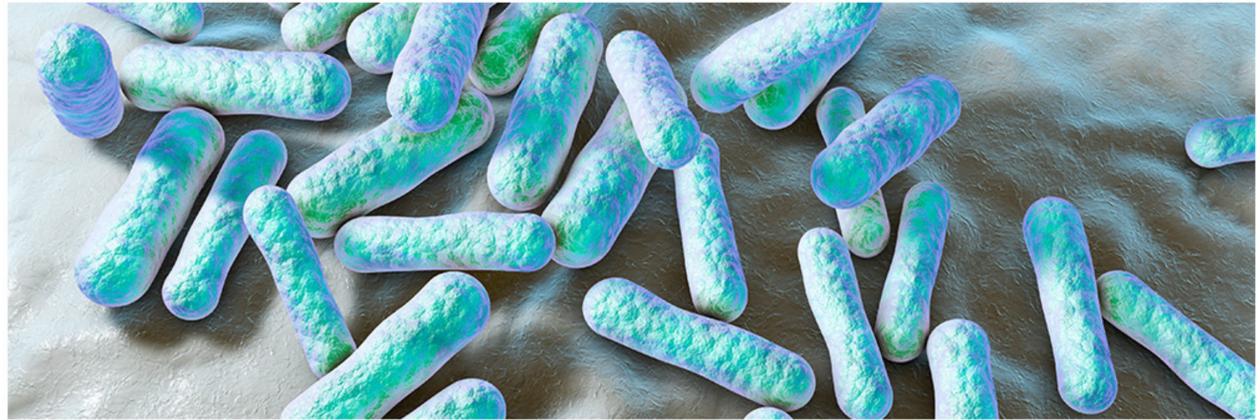
PHYLUM	GENUS
Actinobacteria	Propionibacterium
	Corynebacterium
Firmicutes	Staphylococcus
Proteobacteria	

For the record: Main bacterial phyla and genus of skin microbiota<sup>2</sup>

## *P.acnes*: there may be another bacterium involved!

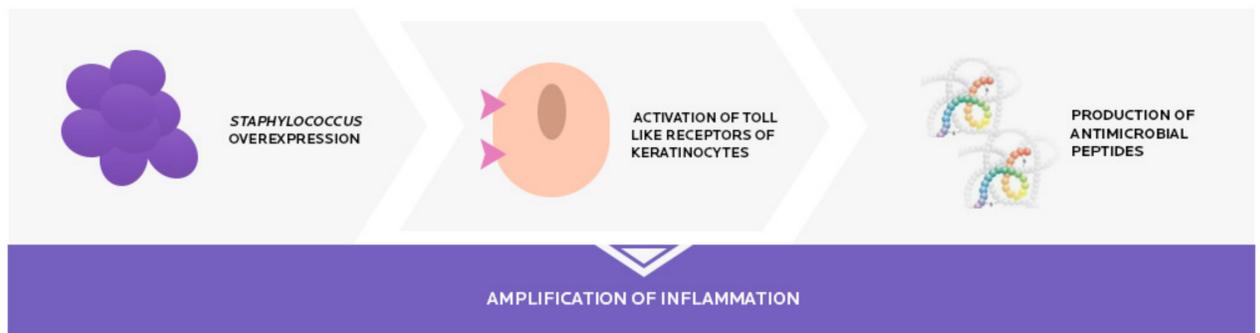
*P.acnes*, the primary disease-associated bacterium, is an anaerobic commensal bacterium of the pilosebaceous follicle, growing particularly in the sebaceous areas of the forehead, retroauricular crease and back.<sup>3</sup>

It plays a well-known key role in inflammation.



Although it has been acknowledged that the sebaceous follicle microbiota is predominantly inhabited by *P. acnes* in acne patients, a recent study showed that their skin surface microbiota is dominated by *Staphylococcus*.<sup>1</sup>

In addition, this study indicated that the concentration of *Staphylococcus* increases with acne severity.<sup>1</sup>



Reducing *Staphylococcus* could be a new therapeutic approach.

## GOING FURTHER

### The role of *P.acnes* in acne

*P.acnes* plays a physiological role by inhibiting the invasion of pathogenic bacteria such as *S. aureus* and *S. pyogenes*. It also maintains the acidic pH in the skin, including the sebaceous glands, by hydrolyzing triglycerides, releasing free fatty acids and secreting propionic acid.<sup>2</sup>

*P.acnes* interacts with the innate immune system to promote inflammation in two ways.

- As a first-defense mechanism against infection, the skin acts as an immunological barrier, and *P.acnes* directly modulates innate immunity by identifying Pathogen Recognition Patterns (PRPs) and activating innate immune responses via toll-like receptors (TLRs), peroxisome-activated receptors (PARs), node-like intracellular receptors (NLRs 1-3), retinoic acid-inducible gene-like intracellular receptors (RLRs) and antimicrobial peptides (AMPs), thereby regulating cutaneous inflammation. Optimal skin health and innate immunity are maintained when the skin's microbiota and immune system are balanced.<sup>2</sup>

- The second mechanism by which *P.acnes* activates the skin's innate immunity is by quantitatively and qualitatively modifying the skin microbiota. Hyperseborrhea induces the proliferation of specific bacteria, creating changes in the skin microbiota that stimulate the activation of cutaneous innate immunity, including the secretion of interleukin-1 $\beta$  by keratinocytes and monocytes, and development of comedones and inflammatory lesions.<sup>3</sup> A recent study has shown that acne is not necessarily the result of *P.acnes* proliferation alone as it predominates on both healthy and disease-associated skin.<sup>4</sup>

Genome comparison of *P. acnes* strains has identified different profiles of commensal *P.acnes* subtypes between healthy skin and acne lesions, demonstrating phenotypic and functional differences of *P.acnes* as a commensal in health and pathogen in acne.<sup>2</sup>

### Bibliography

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