



# Inflammation



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Inflammation is a necessary biological response of the immune system which affects all the major organs of the body. When not controlled, it is considered a key causative factor in many diseases and disorders.

The standard symptoms of inflammation consist of warmth, redness, swelling and pain, with eventual loss of function. When you think about inflammation, you typically think of conditions like acne where the inflammation is visually present in red, raised pustules. Or you think of infection following a recent injury. But have you ever stopped to consider the role inflammation might play on the skin? And not just in the obvious conditions like acne and rosacea, but how inflammation is possibly tied to pigmentary conditions, ageing and other sensitive skin conditions? And what role does the skin microbiome play in all of this?

When presented with a potential threat, cellular stimulation triggers inflammatory processes through the release of pro-inflammatory cytokines and chemokines. So why is it that something that is meant to be a mechanism of protection can also be the key element in cell damage?

During acute inflammation cells and molecules effectively interact to minimise injury or infection. This ultimately contributes to restoration of tissue homeostasis, wound repair and the end of the acute inflammation.

In order to return to and maintain homeostasis, an understanding of the mechanisms that shut down the inflammatory cascade are important.

A disruption or dysregulation of one or more steps in the resolution of inflammation may lead to chronic inflammatory diseases.

The pro-resolving pathway is activated to:



*Shutdown white blood cell recruitment.*



*Reprogram cytokines and chemokines to stop signaling pathways associated with white blood cell survival.*



*Programmed cell death of white blood cells.*



*Clearance of dead white blood cells by macrophages.*



*Reprogram macrophages to switch from being pro-inflammatory to being pro-resolving.*



*Return of other cells to the vascular and lymph system.*



*Initiate healing process and return to homeostasis.*

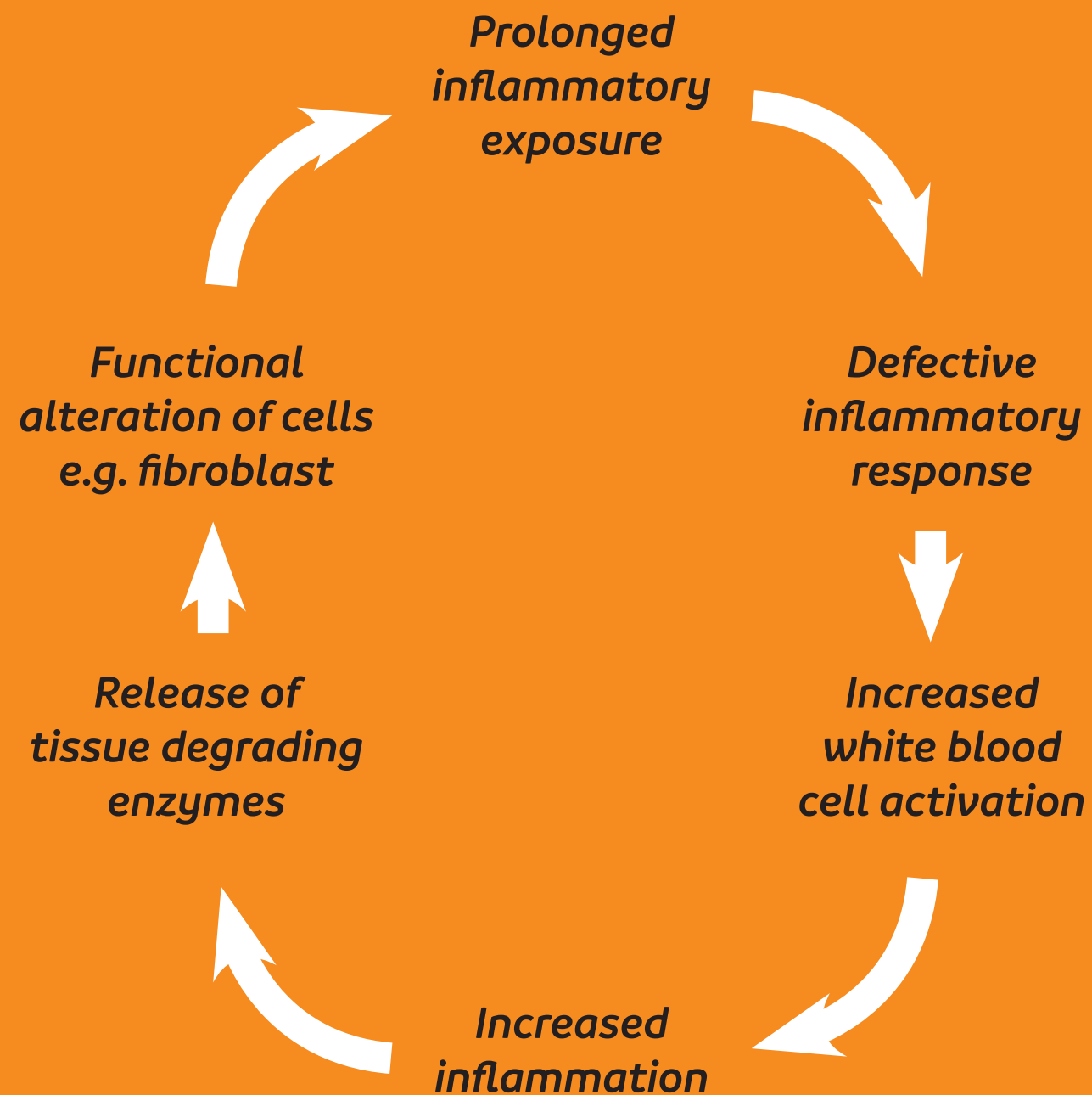
**Chronic inflammation occurs when acute inflammatory mechanisms fail to eliminate tissue injury and the inflammation continues, contributing to a variety of associated conditions and tissue degradation.**

**Chronic inflammation has similar features to acute inflammation but it is usually of a low grade and persistent, resulting in responses that lead to tissue degradation.**

**The incidence of chronic inflammatory skin diseases appears to be significantly increasing in all age groups.**



# Acute inflammation can become chronic inflammation

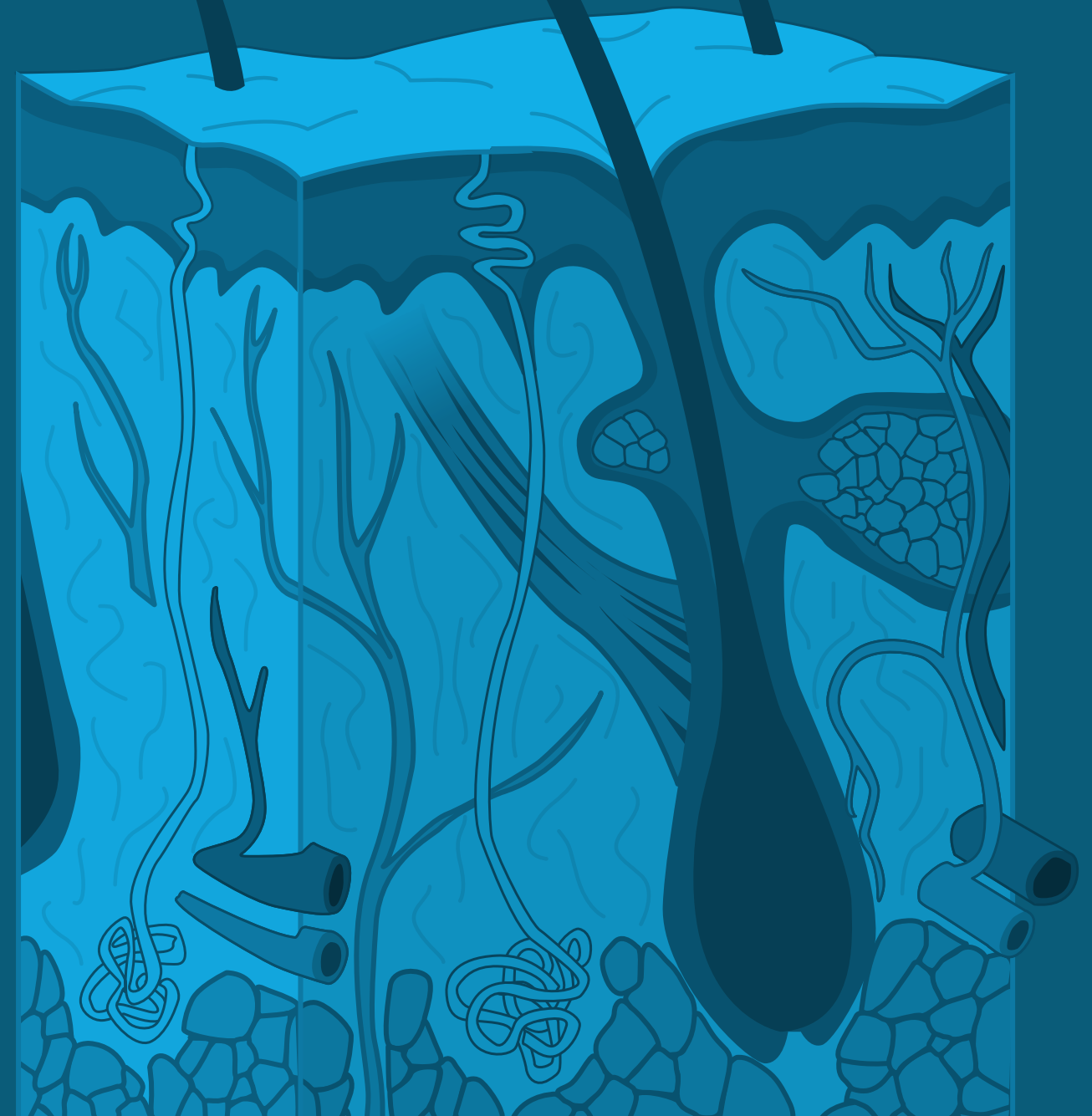




# The skin microbiome and inflammation

Your skin protects you against pathogenic micro-organisms, but it also promotes and facilitates a symbiotic relationship with beneficial microbes. As an example, hair follicles create a unique habitat for commensal microbes that play a role in skin immunity. The interdependent, mutualistic relationship between commensal microbes and their host (you) maintains tissue homeostasis, inhibiting local inflammation.

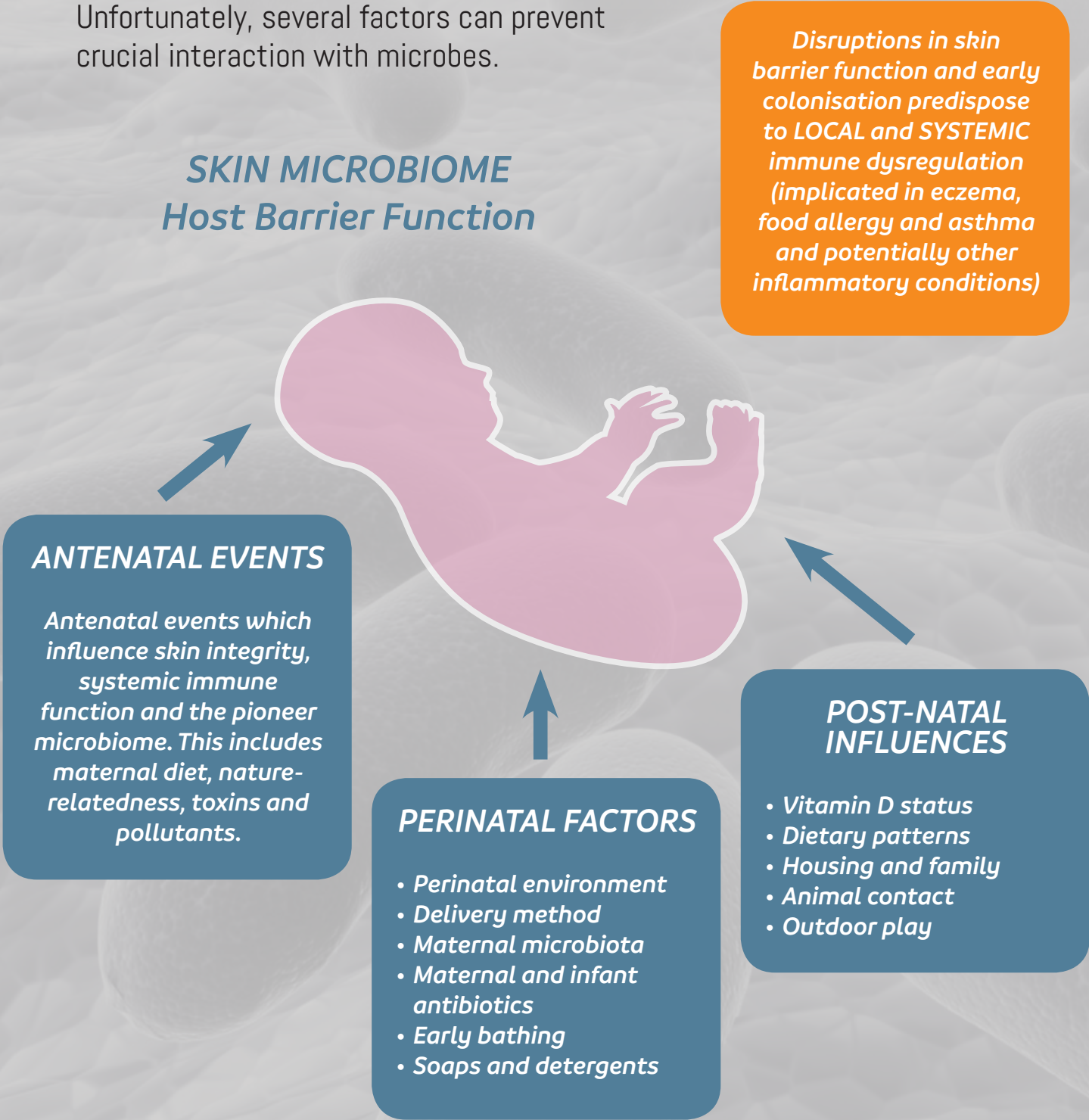
The microbial-immune interaction of the skin is crucial to ensure optimal skin barrier function, protection against opportunistic microbes and pathogens and the maintenance of tissue homeostasis by producing anti-microbial and anti-inflammatory compounds.





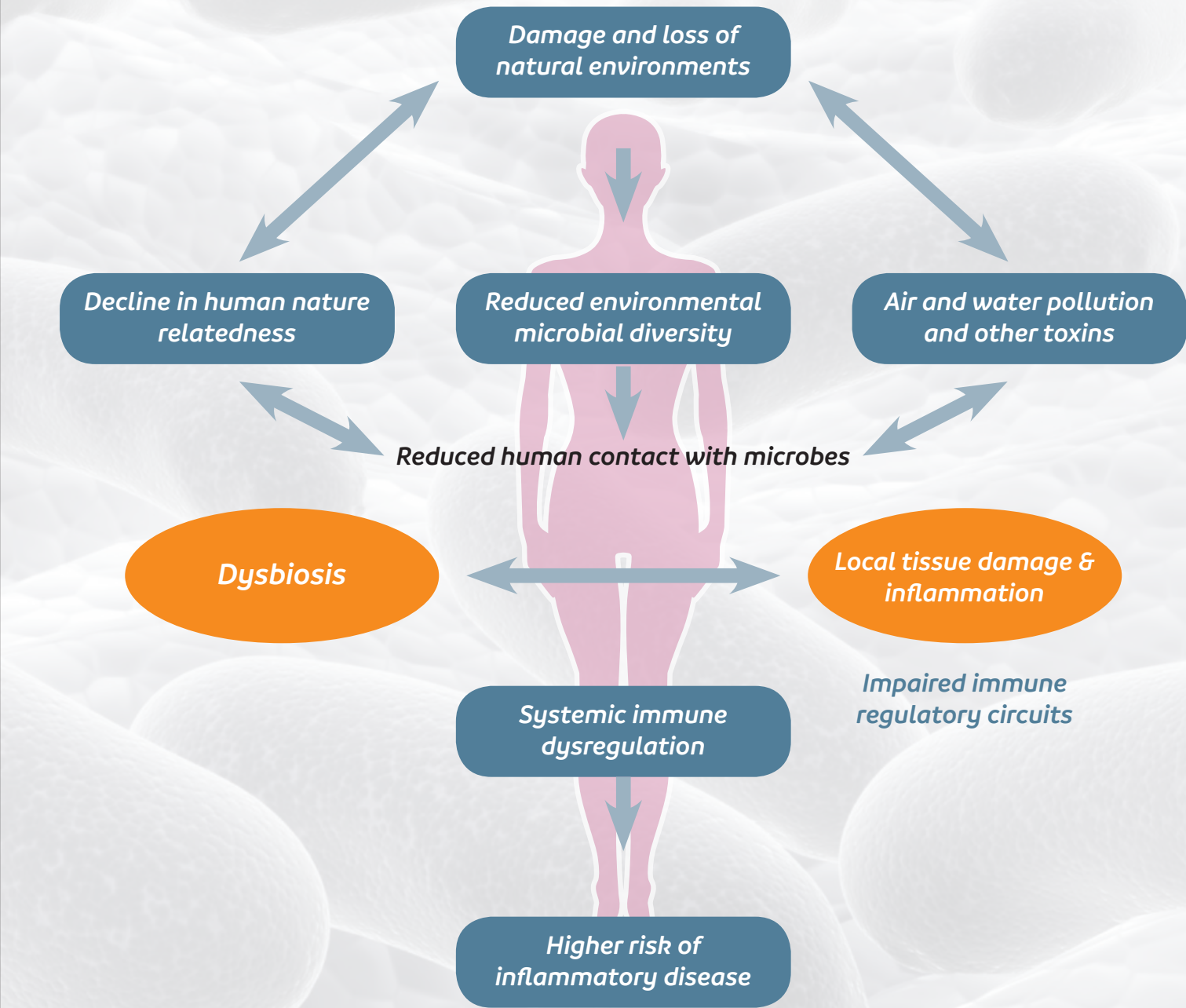
# Early life is a critical period for the establishment of both the microbiome and immune responses.

Without the necessary exposure to microbes in early life, long term faulty immune system responses can occur. Unfortunately, several factors can prevent crucial interaction with microbes.



# A reduced interaction with nature and our modern lifestyle hampers the development and maintenance of our microbiome.

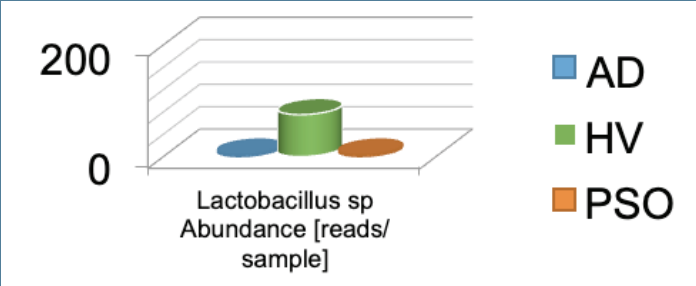
We have lost about one-third of our microbial diversity due to habits associated with modern life such as bathing in hot water, the use of colour cosmetics and fragrances, overuse of antibiotics and living fairly sterile lives. The erosion of environmental ecosystems also affects biodiversity and microbial ecology.





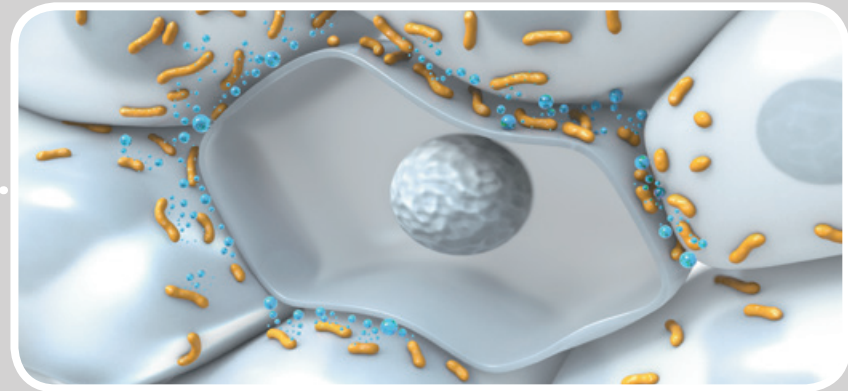
# Imbalances in microbial populations or diversity has also been associated with inflammatory skin disorders such as atopic dermatitis and psoriasis.

From a study conducted in 2019 it was observed that both *Lactobacillus* and *P.acnes* were lower in abundance in both atopic dermatitis and psoriasis vs healthy skin.

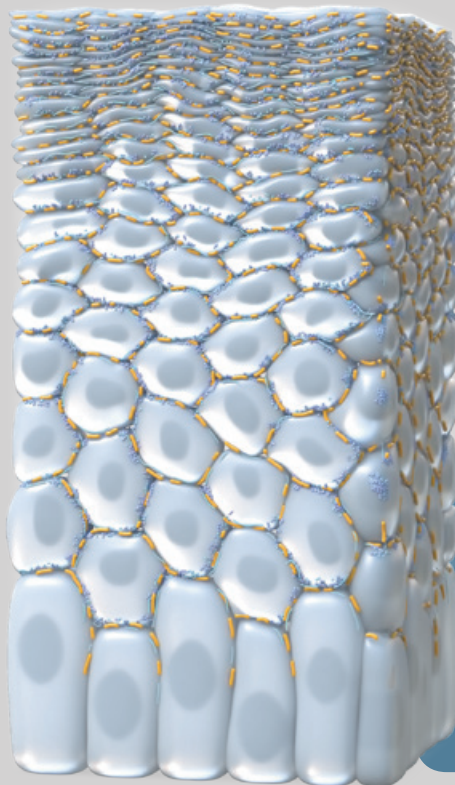


The interactions between the skin microbiome and the immune system also assist with maintaining healthy skin. The skin microbiome communicates with the immune system to reduce inflammation and ensure appropriate response to stimuli or triggers.

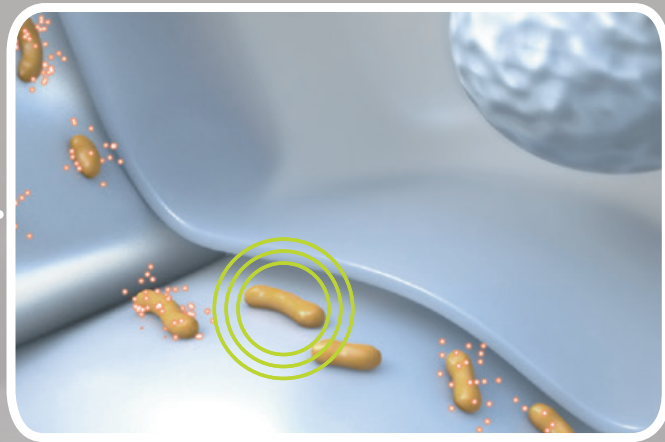
The microbes that form part of the microbiome regulate the immune system in the following ways:



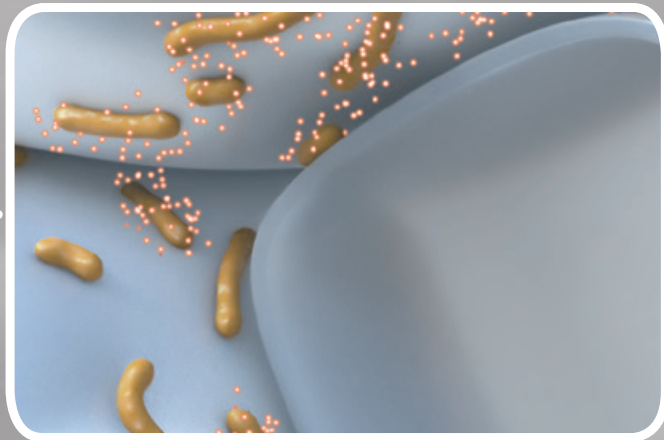
They produce natural moisturising factors like hyaluronic acid and lactic acid. Hyaluronic acid hydrates skin, but it is also anti-inflammatory. Lactic acid contributes to skin moisture and maintaining a slightly acid skin pH. Both molecules actively contribute to maintaining an intact skin barrier function.



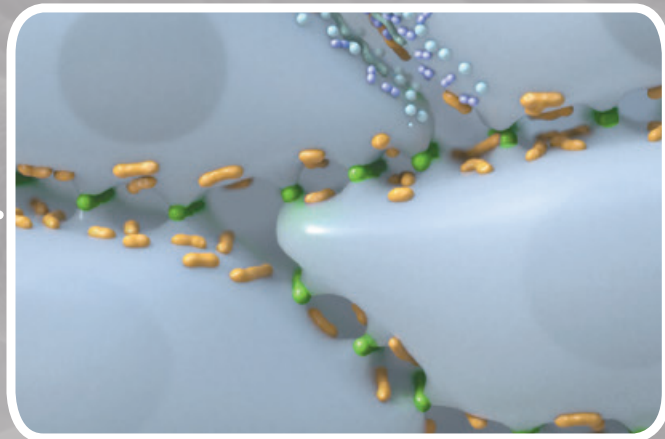
There are strong populations of microbes throughout the epidermis, below the basal membrane and all the way into the adipose layer below the dermis.



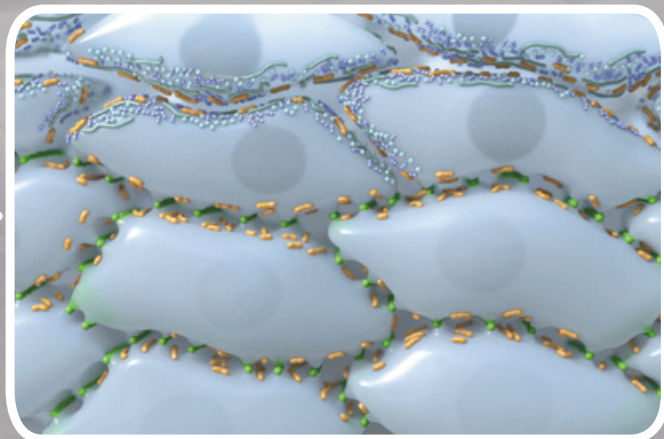
They play a role in cell-to-cell communication, ensuring an accurate and appropriate immune response to potential triggers and aggravating factors.



They secrete anti-microbial peptides, which protect against incoming pathogens but also contribute to maintaining a slightly acid skin pH.



They maintain skin barrier function by increasing the quality and quantity of tight junctions between skin cells.



By maintaining barrier function there will be a reduced rate of transepidermal water loss, a lowered risk of unnecessary sensitisation and reduced susceptibility to pathogenic microbial invasion.

All these microbe actions contribute to lowering inflammation, protecting the skin and maintaining skin health.





# Barrier Function

## SKIN METABOLOME

- Microbial metabolites
- Antioxidant systems
- Cytokines
- Hormones and cortisol
- Substance P
- Neuropeptides and neurohormones
- Antimicrobial peptides

## BRICK AND MORTAR

- Intercellular lamellar lipids
- Corneodesmosomes
- Ceramides, cholesterol and fatty acids
- Moisturising molecules e.g. hyaluronic acid
- Photoprotection by means of melanin

## SURFACE INTERACTIONS (with barrier and microbes)

- Nature related interactions such as animals, plants and soils
- Toxins and irritants
- Pathogens and allergens
- Physical stressors and trauma
- Dryness or humidity
- Exposure to UV rays and sunlight

***It is important to note that inflammation doesn't just come from an external stimulus, but that it can be internally generated as well. This image illustrates how both exogenous and endogenous factors interact with the physical and functional aspects of the skin barrier unit.***

## SYSTEMIC INTERACTIONS

- Diet
- Vitamin D status
- Gut microbes
- Internal stress and inflammation





# Skin conditions associated with inflammation

***Sensitive skin conditions***

***Ageing skin conditions due  
to both intrinsic and extrinsic  
factors and includes conditions  
like glycation, photodamage  
and premature ageing***

***Different types of acne***

***Pigmentation irregularities  
such as hypo- and  
hyperpigmented conditions***

***Body conditions including  
cellulite and keratosis pilaris***

Other causes of inflammation include psychological stress, environmental stress and various imbalances in different microbiomes e.g. gut microbiome.

You can prevent and regulate inflammation to a certain extent as your lifestyle can greatly influence the number of pro-inflammatory markers in your skin and body. By subscribing to a healthy, balanced lifestyle and diet, you will be able to contribute towards bringing homeostasis to your body.

Maintaining a balanced microbiome is also a key factor in regulating an appropriate immune response and reducing inflammation. This is where our Sensitive line comes in.



EVOLVED



***The basic philosophy behind the Esse Sensitive line is to use evolutionary first principles to work with the skin microbiome to restore the conditions for which it has evolved.***

***Skin did not evolve to deal with synthetic chemicals and neither did its microbiome. This is why we minimise the stripping of sebum from the skin and also why we use oils that can feed the microbiome. With live and tyndallised Lactobacillus we can assist with repair and maintenance of barrier function, regulation of the immune response and reducing inflammation.***

***Balancing the positive and negative effects of the inflammatory reaction and maintaining a diverse, healthy microbiome is important in maintaining healthy skin and preventing disease.***



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