

Abstract

When skin cells are healthy, they naturally produce reactive oxygen species. But when skin is exposed to external stressors or the aging process, the body can produce too many reactive oxygen species, which can lead to oxidative stress that damages skin cells and tissues. This study focused on how excess reactive oxygen species affect consequent skin damage. The authors suggest to redefine the selection criteria for skin antiaging and photoprotective ingredients to include natural antioxidants which have redox-balancing properties and should be used for antiaging skin care and sunscreen formulas.

Study details

Journal:

Antioxidants. 2022, 11, 471.

<https://doi.org/10.3390/antiox11030471>

Article title:

“Shedding a new light on skin aging, iron- and redox homeostasis and emerging natural antioxidants”

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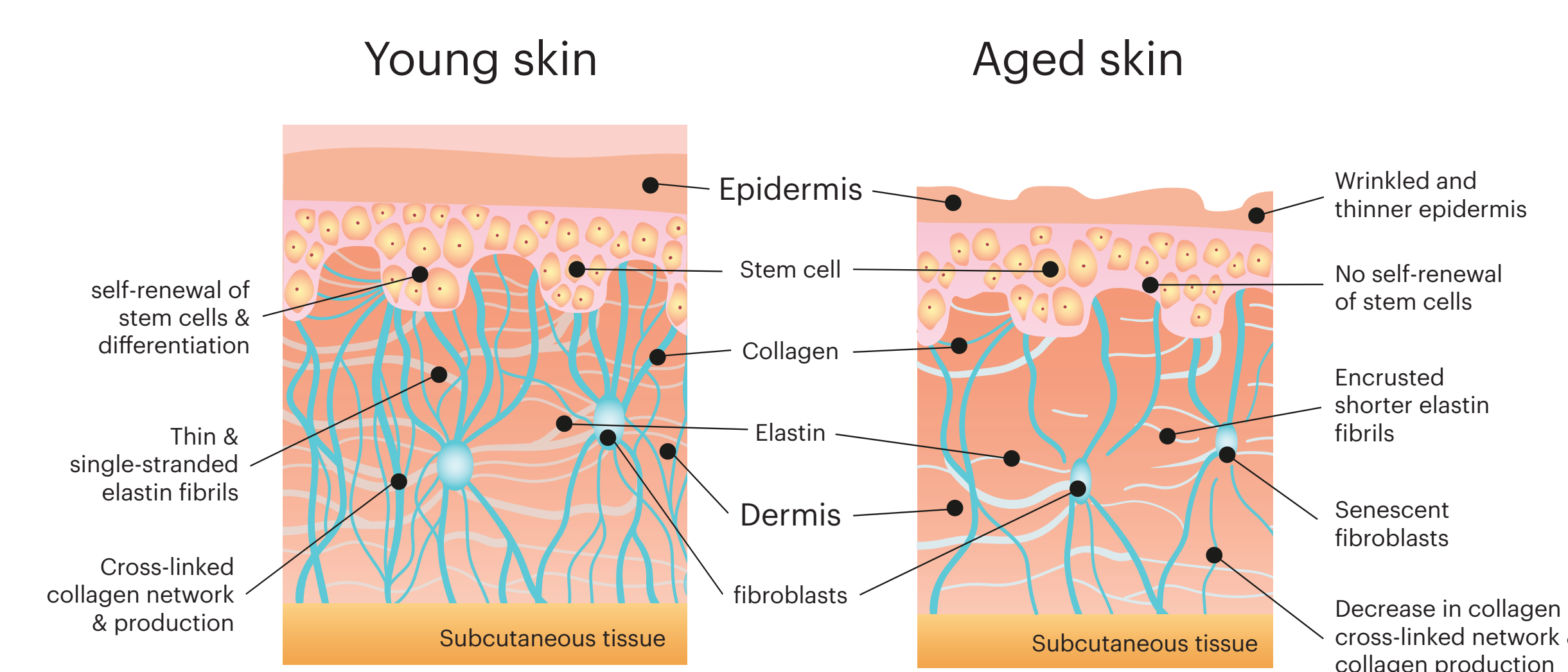
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Rationale + scientific evidence

- The skin is the human body's largest and most exposed organ
- Skin needs protection against microorganisms that can damage the body
- Skin needs protection against environmental influences
- Environmental factors (UV light, pollution, allergens, chemicals) lead to internal and external aging
- Redox homeostasis imbalance leads to internal and external aging $\text{UVA} + \text{UVB} = \uparrow \text{ROS} \downarrow$

External stressors and chronological aging affect the epidermis and dermis of the skin



(Adapted and modified from: Freitas-Rodriguez, S.; Folgueras, A.R.; López-Otin, C. The role of matrix metalloproteinases in aging: Tissue remodeling and beyond. *Biochim. Biophys. Acta Mol. Cell Res.* 2017, 1864, 2015-2025. doi:10.1016/j.bbamer.2017.05.007)

Why is it important to maintain the skin's redox balance?

Maintaining the skin redox balance is vital since the organ is constantly exposed to reactive oxygen species produced from external and internal factors

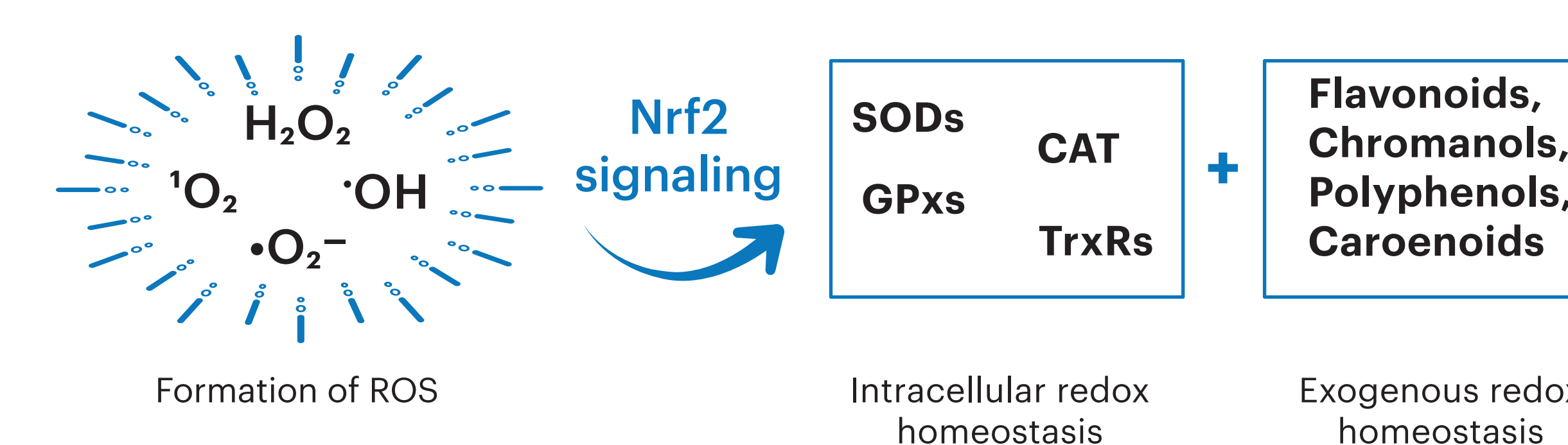
Natural-based components

Natural-based antioxidants for skin protection:

- Stimulate immune and anti-inflammatory responses, modulate antioxidants
- Detoxify the cells and tissues, alter gene expression
- Restore the redox homeostasis and protect the skin against the features of both chronological aging and external stressors

PROBLEM:

How to maintain the skin's redox balance?



Apigenin

A yellow crystalline powder is a common flavonoid found as a single ingredient in chamomile extracts



- Very potent antioxidant
- Demonstrated its angiogenic (helps form blood cells) and anti-inflammatory properties in the skin
- Affects Nrf2 expression and superoxide dismutases activity (ie antioxidant defense)
- Strong protection against UVA and UVB radiation-induced destruction of the skin collagen and the subsequent loss of elasticity and skin dryness
- Reduced collagen degradation in dermis skin cells

Natural-based components (continued)

Leontopodium alpinum or Edelweiss



A perennial herb commonly known as Edelweiss, which has a long tradition in Alpine countries in folk medicine

- Edelweiss extract consists mainly of leontopodic acid
- Balances reactive oxygen species
- Potent antioxidant activity in response to UVB treatment by suppressing inflammation and wrinkling
- Constant application on the face and skin tissues improved wrinkles around the eyes, skin elasticity, dermal density, and skin thickness

Summary

As the major organ of the body, skin is constantly exposed to environmental agents and continuously striving to maintain the balance of redox homeostasis through several interconnected pathways

The skin needs to be supplemented with nature-based ingredients to restore redox-related homeostasis when it is compromised by environmental stressors

Chromanols, apigenin, baicalein, and edelweiss are powerful plant-derived compounds for use as skin antioxidants, antiaging ingredients, and protection from sun damage