



# SKIN BASICS

The Uniqueness of Dermatopoietin®  
The Signalling Cosmetic®



PROPERTY OF UNITED TECHNOLOGIES UT AG AND UNITED COSMECEUTICALS GMBH

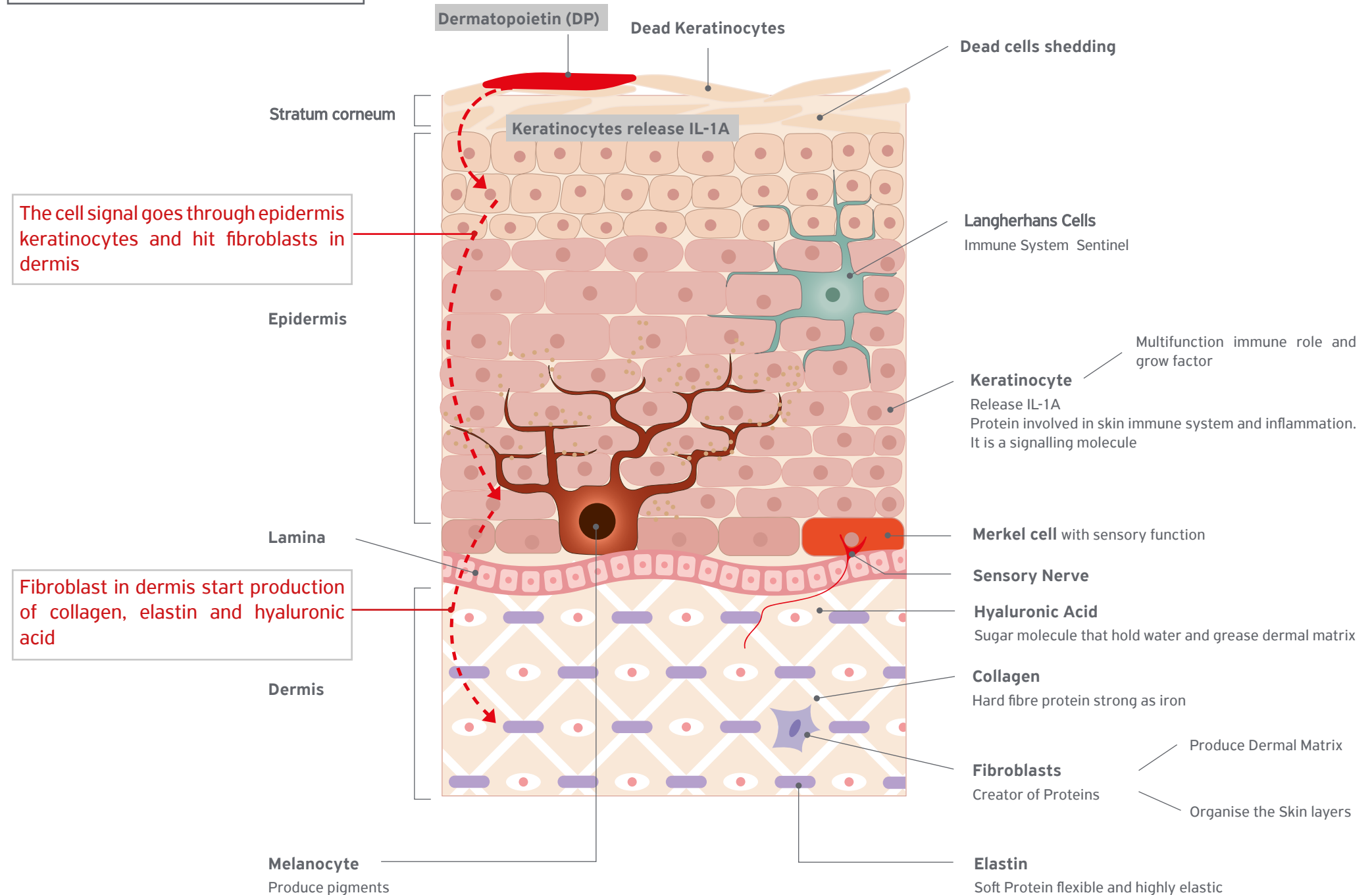




SKIN STRUCTURE	3
KERATINOCYTES	4
LANGERHANS CELLS (THE SENTINEL)	6
COLLAGEN	7
ELASTIN	9
HYALURONIC ACID	10
FIBROBLAST	11
WRINKLE FORMATION	12
INTERLEUKIN 1 ALPHA (IL1A)	13
WHAT IS DERMATOPOIETIN® (DP)?	14
TIPS: PEPTIDE / AMINO-ACID / PROTEINS	16
THE PRODUCTION OF INTERLEUKIN-1 ALPHA	17
DERMATOPOIETIN® AND ITS FUNCTIONS	18
CONVENTIONAL vs DERMATOPOIETIN	21
INTELLECTUAL PROPERTY OF UNITED TECHNOLOGIES UT AG	22
CLINICAL STUDIES	23
FLUORESCENCE SPECTROSCOPY STUDY	24
TIME COURSE OF COLLAGEN BUILD UP	25
ANTI-SKIN AGING STUDY	26
ANTI-CELLULITE STUDY	28
EVENSWISS LINE	29

# content

# SKIN STRUCTURE



## KERATINOCYTES

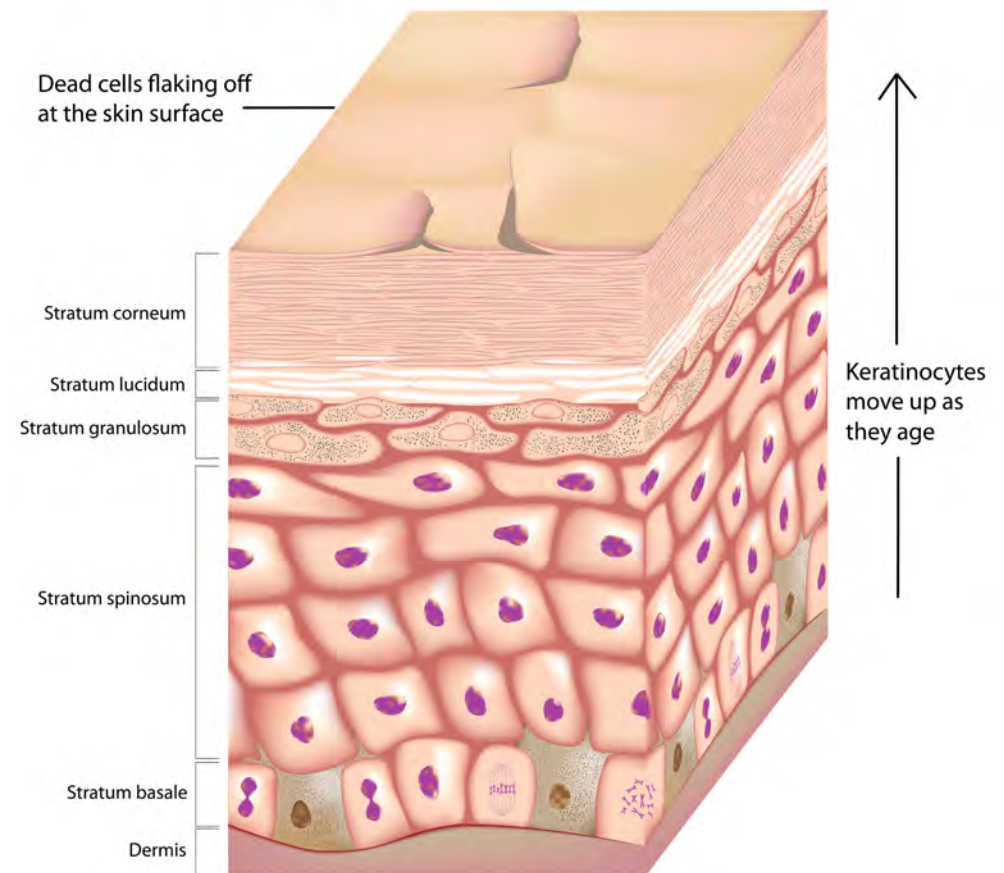
Keratinocytes represent the major cell type of the epidermis, the outermost of the layers of the skin, making up about 90 percent of the cells there.

They originate in the deepest layer of the epidermis and move up to the final barrier layer of the skin, the stratum corneum.

Keratinocytes start to produce keratin, cytokines, growth factors, **interleukins**.

Keratinocytes are highly specialized. They play an essential role in protection, as they form a tight barrier that prevents foreign substances from entering the body, while minimizing the loss of moisture, heat, and other constituents.

### Anatomy of the Epidermis



# KERATINOCYTES

## INTERACTIONS

**Keratinocytes and Fibroblasts:** The cross-talk between keratinocytes and fibroblasts is essential for maintaining the skin homeostasis and for ensuring a balanced wound-healing process ([Wojtowitz, 2014](#)). **These two cell types communicate through signalling mechanisms.**

**Keratinocytes and other cells:** Keratinocytes have immunomodulatory functions that interact with other cells.

**Keratinocytes and Melanocytes:** The interaction of keratinocytes and melanocytes is also crucial for the **homeostasis of the epidermis**. Melanocytes produce melanin, which absorbs UV waves and prevents damage to the keratinocytes. Keratinocytes, stimulate melanocyte functions such as proliferation, differentiation, and melanogenesis ([Hirobe, 2014](#)).

## WOUND HEALING AND INFLAMMATION

**Keratinocytes in Wound Healing:** Keratinocytes are responsible for **restoring the epidermis following injuries** ([Pastar et al., 2014](#)). This process, called re-epithelialization, is necessary for a successful **wound closure**. When the skin is injured, keratinocytes become activated and migrate to the wound, where they start proliferating to fill the defect. During wound-healing, interactions between keratinocytes, fibroblasts and immune cells are critical for a successful healing process.

**Keratinocytes in Inflammation:** When the epidermal barrier is breached or when pathogens enter the skin, an inflammatory response is triggered. Keratinocytes actively participate in this process, as they express cytokines that transmit positive or negative signals to immune cells. ([Albanesi et al., 2010](#)),([Albanesi et al., 2018](#)).



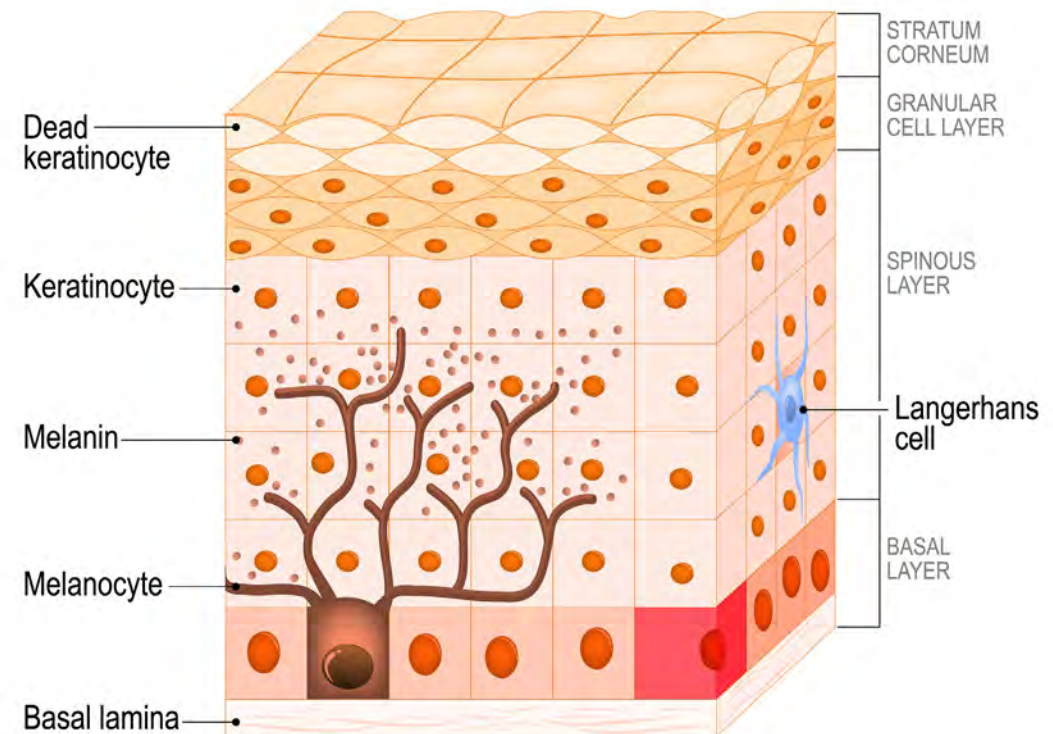
## LANGERHANS CELLS (THE SENTINEL)

Langerhans cells (LCs) reside in the epidermis as a dense network of **immune system sentinels**. These cells determine the appropriate adaptive immune response.

When they sense a danger signal, for example when the physical integrity of skin has been compromised as a result of a trauma, they **instruct the immune system to mount efficient effector responses**.

LCS are adaptive, they can interpret the signals and adapt to the correct response in the Epidermis. Main functions are fight and control the protection of the skin from bacterial agents.

LCS are SENTINELS that activate immune responses.



# COLLAGEN

Collagen is a hard, insoluble, and fibrous **protein** that makes up one-third of the protein in the human body.

In most collagens, the molecules are packed together to form long, thin fibrils.

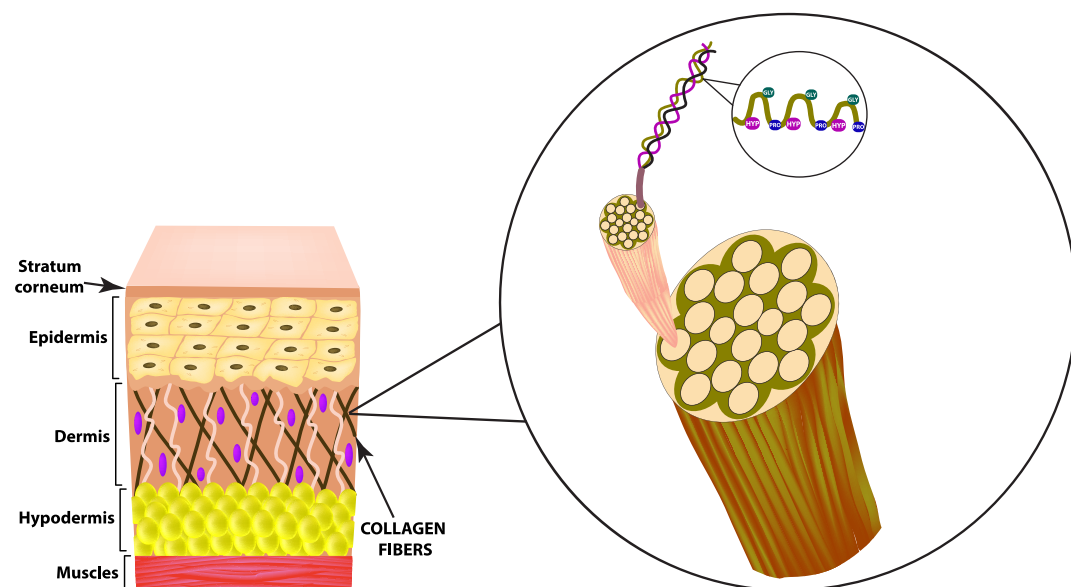
**These act as supporting structures and anchor cells** to each other. They give the skin strength and elasticity.

The collagens in the human body are strong and flexible.

## Fast facts on collagen

Here are some key points about collagen.

- Collagen occurs throughout the body, but especially in the skin, bones, and connective tissues.
- Collagen production declines with age and exposure to factors such as smoking and UV light.
- Collagen can be used in collagen dressings, to attract new skin cells to wound sites.
- **Cosmetic lotions that claim to increase collagen levels are unlikely to do so, as collagen molecules are too large to be absorbed through the skin.**

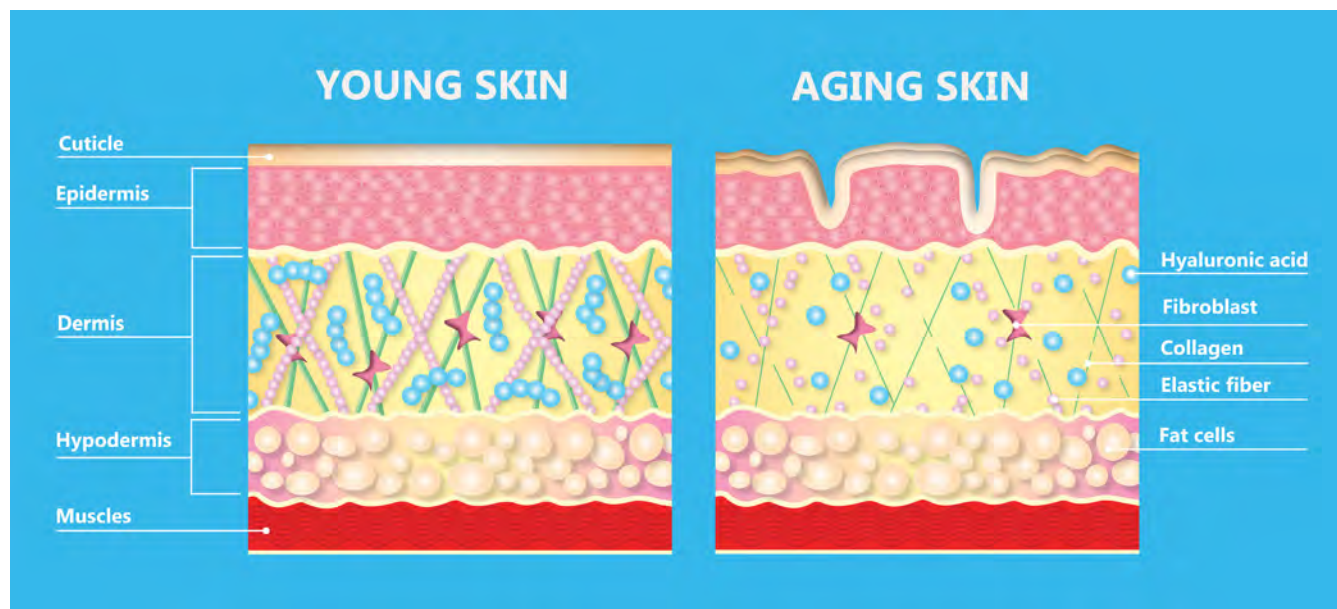


# COLLAGEN

## What does collagen do?

Collagen is secreted by various cells, but mainly by connective tissue cells.

It is found in the **extracellular matrix**. This is an intricate network of macromolecules that determines the physical properties of body tissues.



With age, the body **produces less** collagen. The structural integrity of the skin declines.

Women experience a dramatic reduction in collagen synthesis after **menopause**.

By the age of 60 years old considerable **decline** in collagen production is normal.



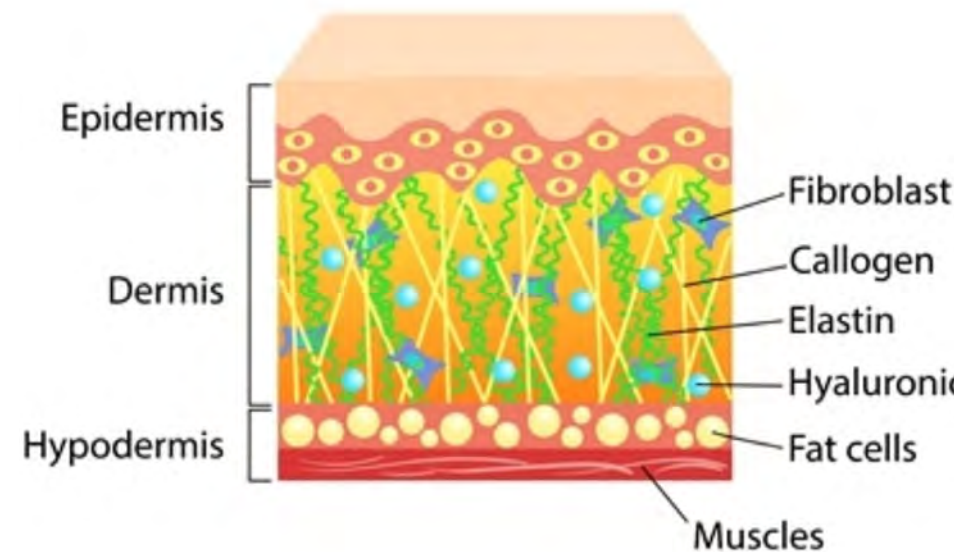
## ELASTIN

Elastin is an extracellular matrix protein that lends elasticity and resilience to tissues such as the arteries, lungs, tendons, skin, and ligaments.

Elastin is about 1.000 times more flexible than Collagen.

Main function is to **resume body tissue shape after stretch or contract**.

Elastin helps skin to return to its original position.



## HYALURONIC ACID

Hyaluronic acid (HA) is a sugar found naturally in our skin that holds water and helps keep it hydrated and plump.

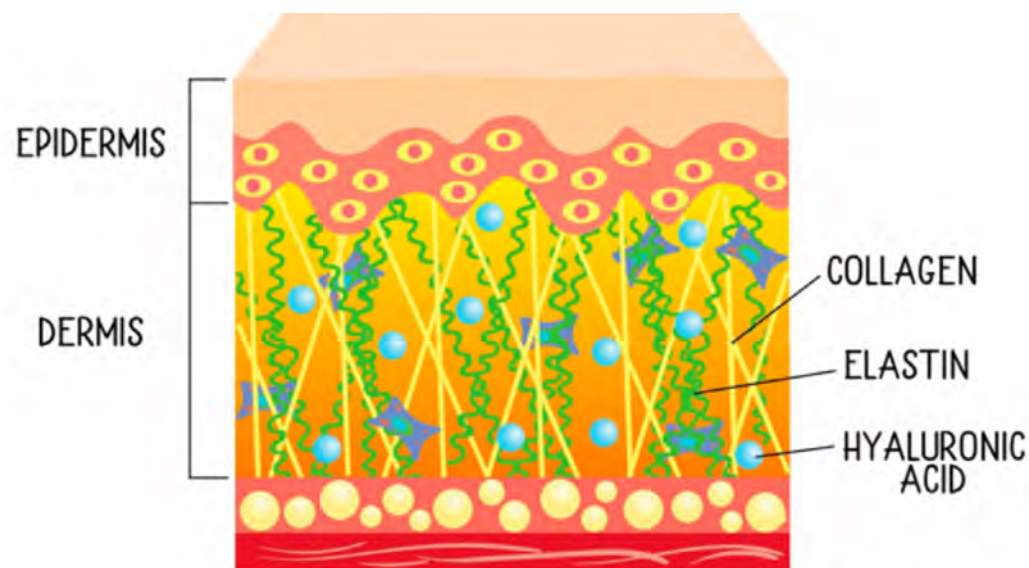
The HA within our bodies holds a thousand times its weight in water to not only **retain all that moisture in our skin** and joints, but also **prevent all that moisture from evaporating into the air**.

Just like collagen and elastin, the amount of naturally-occurring hyaluronic acid in our bodies decreases as we get older.

But picking the right hyaluronic acid product is tricky. The molecule is often times too large to effectively deliver hydration deep into skin layers.

(Quote) “where the molecule is micronized or [if] the HA is in a vehicle that penetrates the skin in order to be effective where it needs to be.”

(Quote) “Otherwise you are just putting it on top of the skin without it being helpful.”



# FIBROBLAST

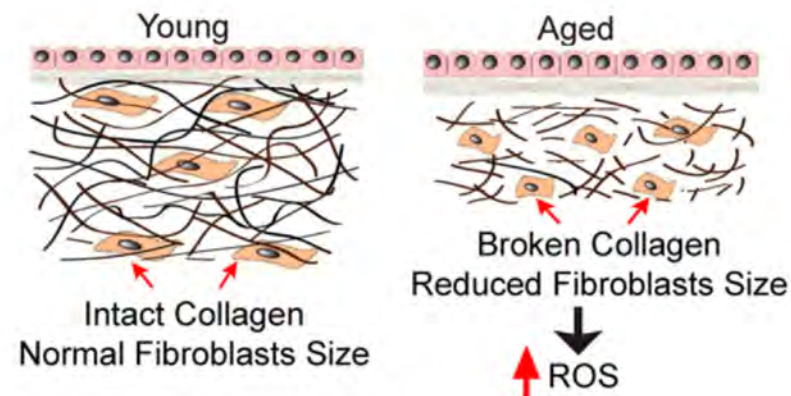
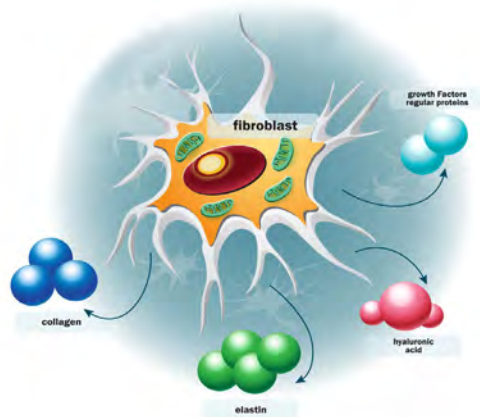
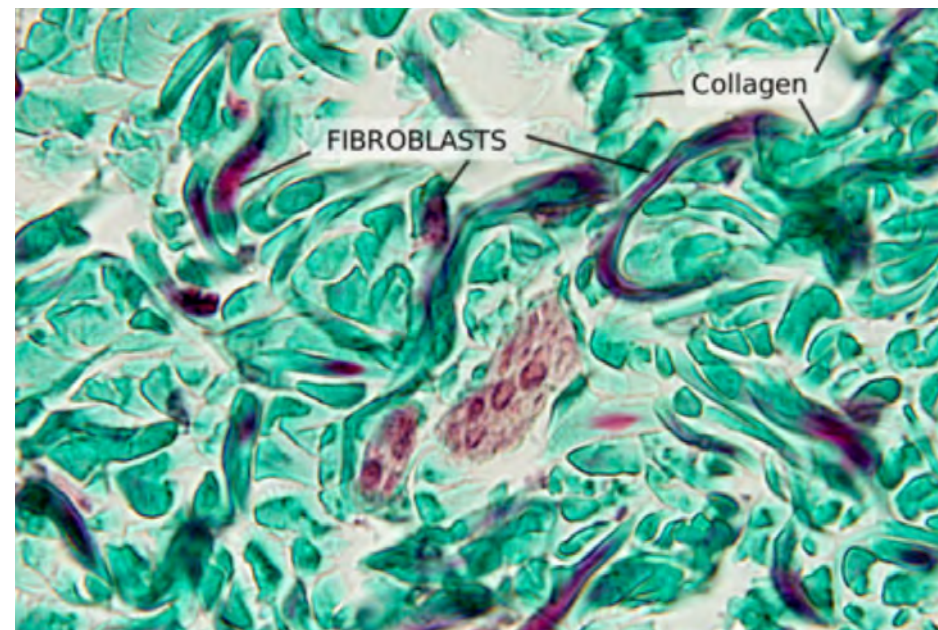
Fibroblasts are the main cell type of the dermis (also found elsewhere in the body).

Produce the dermal matrix composed of collagen, elastin, hyaluronic acid. Fibroblast functions are also modulated by keratinocytes.

Dermal fibroblasts are responsible for synthesizing and organizing the dermis with three layers of:

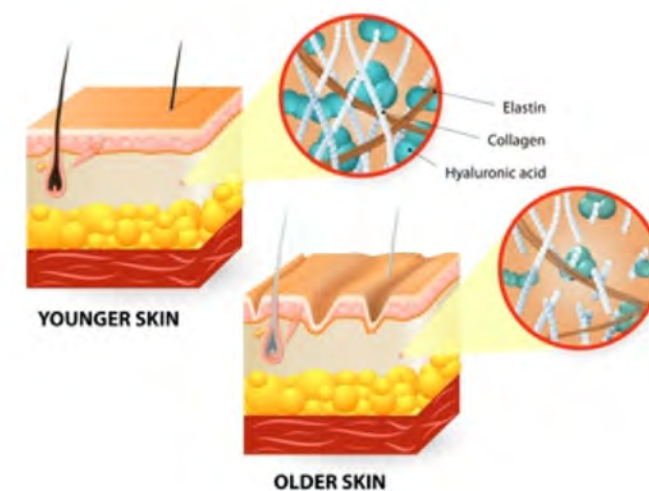
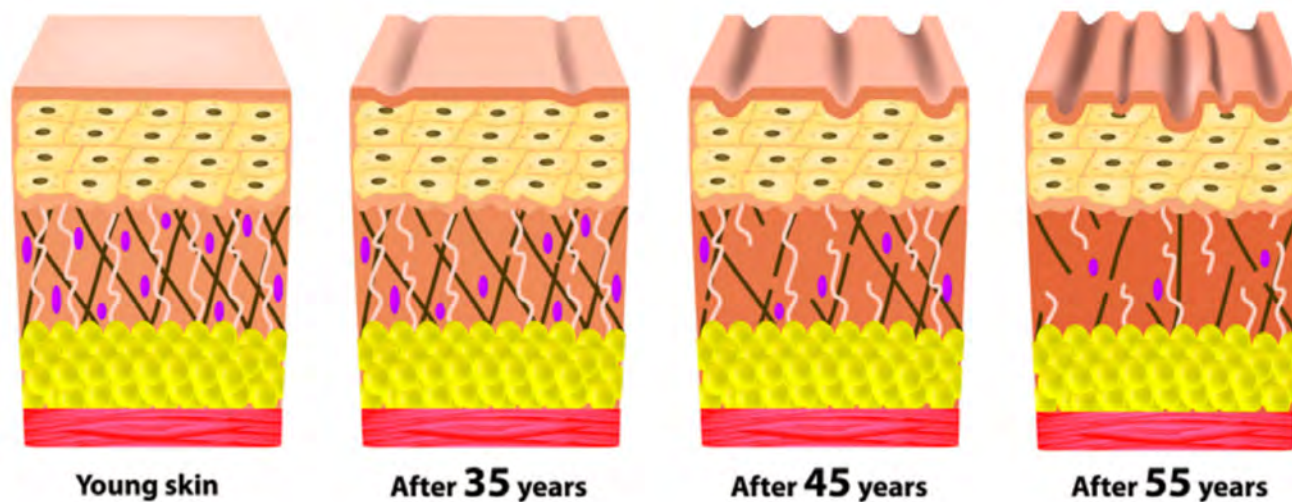
- (i) epidermis containing keratinocytes, melanocytes, and Langerhans cells
- (ii) dermis that is populated with fibroblasts
- (iii) subcutaneous tissue

Collagen and elastin provide strength/firmness and elasticity, respectively, to skin. Hyaluronic acid is important for skin's humidity.





## WRINKLE FORMATION



## INTERLEUKIN 1 ALPHA (IL1A)

### ABSTRACT:

Inflammation occurs after disruption of tissue homeostasis by cell stress, injury or infection and ultimately involves the recruitment and retention of cells, which **arrive at the affected sites to resolve damage and initiate repair.**

Interleukin 1 $\alpha$  (IL-1 $\alpha$ ) is a potent inflammatory cytokines(\*\*) that activate the inflammatory process, and their deregulated signalling causes devastating diseases manifested by severe acute or chronic inflammation.

### (\*\*) Cytokines

Cytokines are a large group of proteins. Cytokines are a category of **signalling molecules that mediate and regulate immunity and inflammation.**



IL-1 $\alpha$  is constitutively produced by epithelial cells.

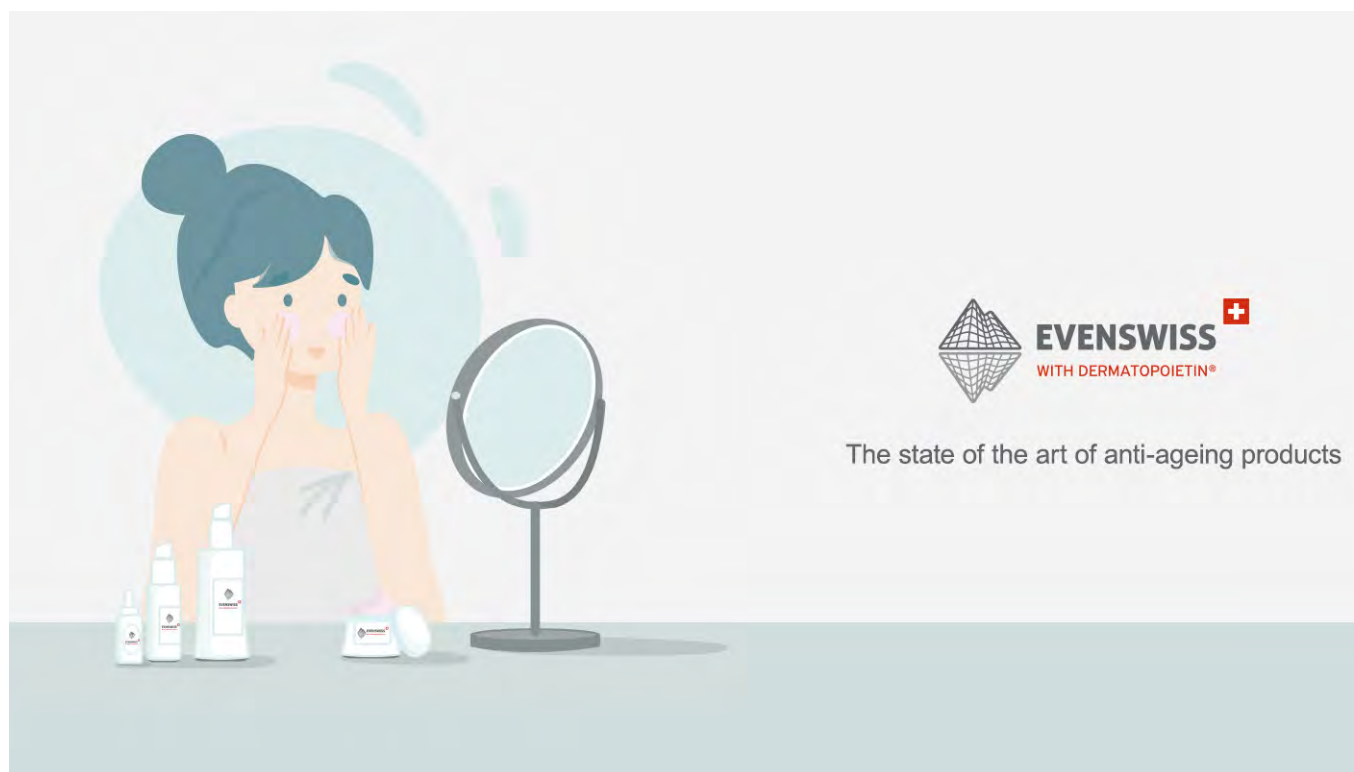
It is found in substantial amounts in normal human epidermis and is distributed in a 1:1 ratio between living epidermal cells and stratum corneum.

In particular, IL-1 $\alpha$ :

- **stimulates keratinocytes for induced IL-1 $\alpha$  secretion**
- induces pro-collagen synthesis
- **causes proliferation of fibroblasts**, introduces collagenase secretion



## WHAT IS DERMATOPOIETIN<sup>®</sup> (DP)?



The state of the art of anti-ageing products



WATCH THE VIDEO

## WHAT IS DERMATOPOIETIN® (DP)?

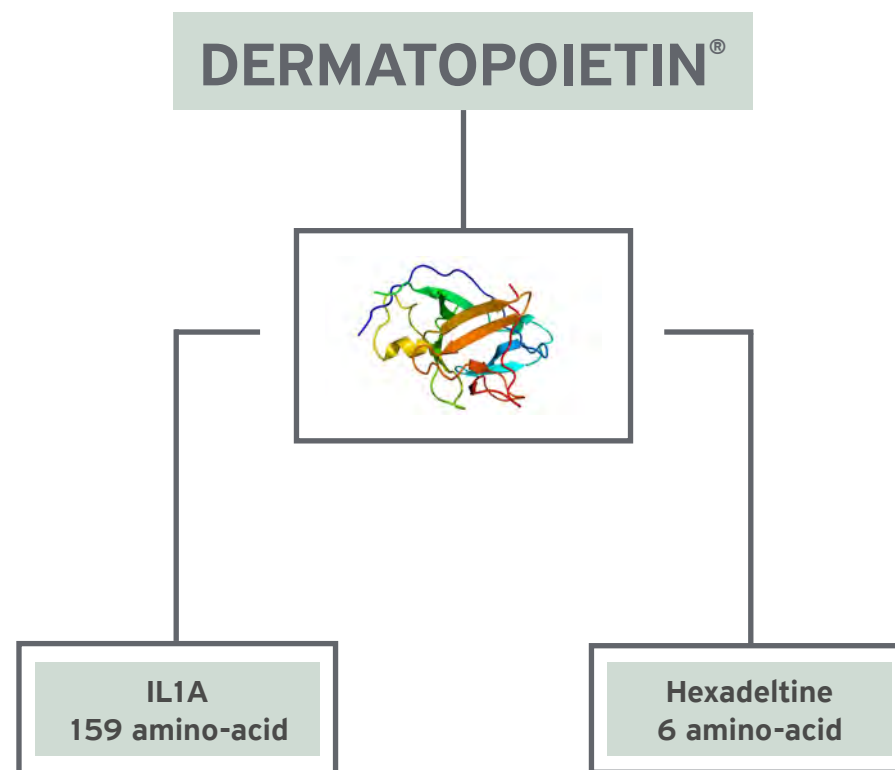
DP is the main active ingredient of the EVENSWISS® products.  
It is protected by a patent and it is the interaction of two main polypeptides:

### 1 – Interleukin-1 Alpha

- Interleukin 1 Alpha (IL1A): protein stripes of 159 amino-acids, non-penetrable
- It is produced and released by Keratinocytes in the Epidermis
- Biological Name: Interleukin-1 Alpha
- Registered Trademark and Patented: Dermatopoietin®
- INCI Name: sh-polypeptide-17

### 2- Hexadeltine

- Stripe of 6 proteins
- Hexadeltine do not penetrate into the living cells of the epidermis, it is restricted to stay on the SC



## TIPS: PEPTIDES / AMINO-ACIDS / PROTEINS

### PEPTIDES

**Peptides** are strings of **amino-acids** which are the buildings blocks that **make up proteins** in our body, including **collagen, elastin and hyaluronic acid**.

This proteins provide to the skin firmness and elasticity.

### AMINO-ACIDS

**Amino-Acids** are the composition of the peptides. They are **nitrogen, carbon, hydrogen and oxygen**.

When you eat a Protein the body brakes down into amino-acids.

### PROTEINS

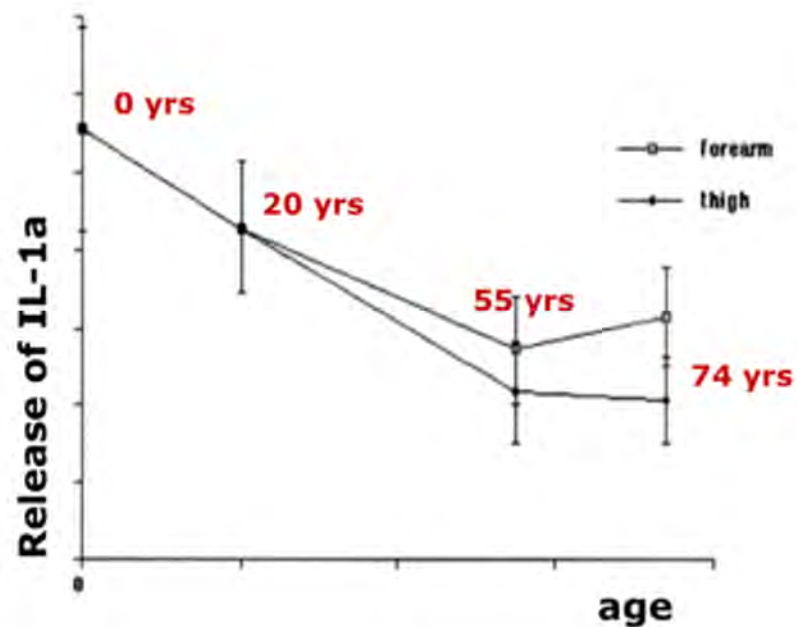
**Proteins** are the building structure of the body tissues: **bones, tendons, muscles, hair, nailsmand skin**.

The most important into the body is the Collagen protein, present at 6% into the entire human body.

Proteins are the structure of each cell.

## THE PRODUCTION OF INTERLEUKIN-1 ALPHA IN SKIN DECLINES AS WE AGE

The reduction of interleukin-1 alpha (skin renewal factor) contributes to the process of skin aging. Dermatopietin® can partly compensate this deficit and reactivate skin renewal by stimulating endogenous production of collagen, elastin and hyaluronic acid.

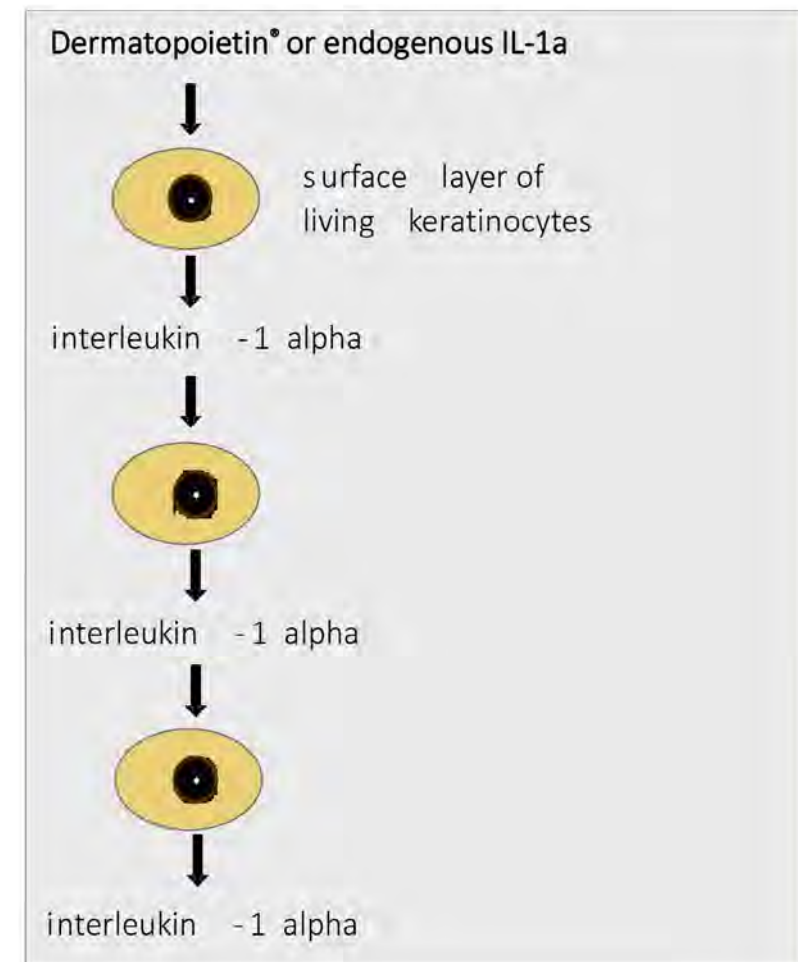


## DERMATOPOIETIN AND ITS ENDOGENOUS PRODUCTION OF IL1A

Dermatopietin® = interleukin-1 alpha (IL-1a) is a well-known polypeptide abundant in human skin.

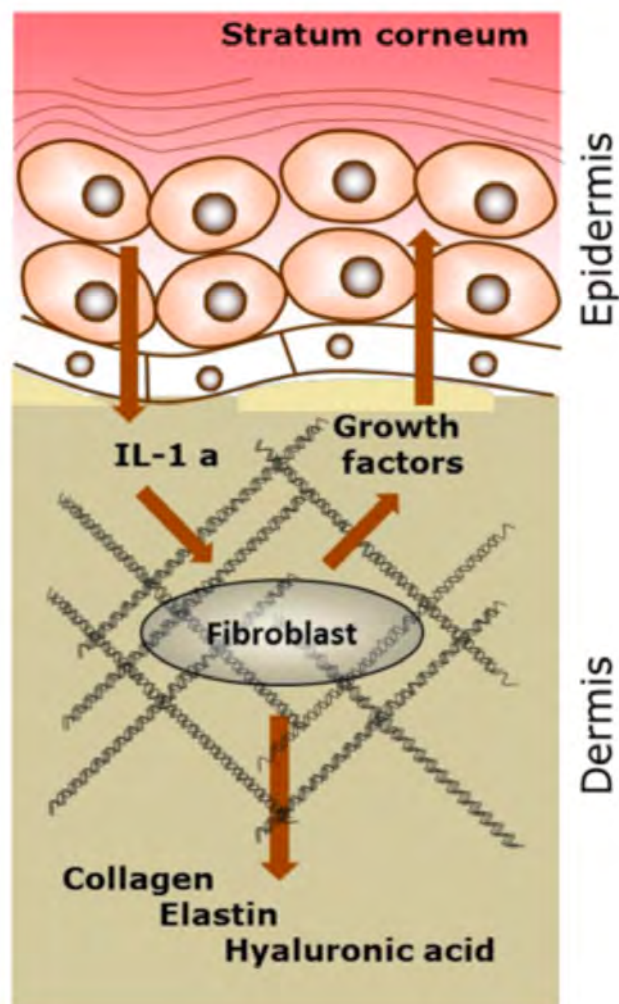
**Its main physiological activity in skin is to promote skin renewal.**

It stimulates keratinocytes in the epidermis to produce more IL-1a, thereby generating a “chain reaction” of IL-1a penetrating the epidermis (see scheme at right). Upon arriving in the dermis, it activates the fibroblasts to produce collagen, elastin and hyaluronic acid.





## DERMATOPOIETIN PROMOTES THE RENEWAL OF EPIDERMIS AND DERMIS

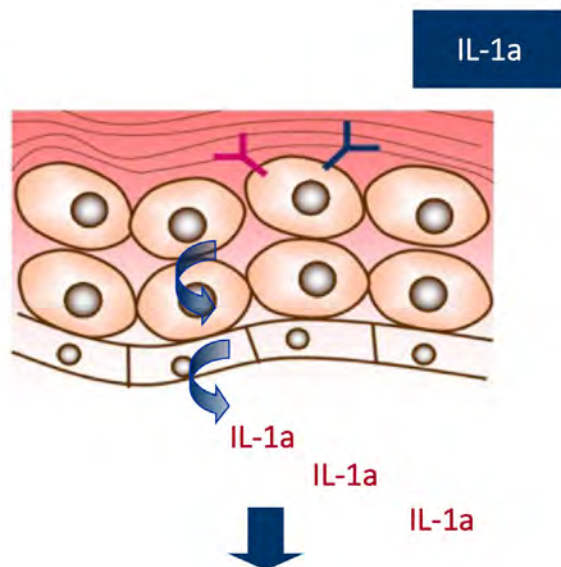


Dermatopoietin® triggers on the surface of skin a signaling cascade that penetrates the entire epidermis.

In the dermis interleukin-1 alpha activates the fibroblast to produce collagen, elastin, hyaluronic acid and several growth factors. These effects lead to the renewal of the entire skin structure, epidermis and dermis.

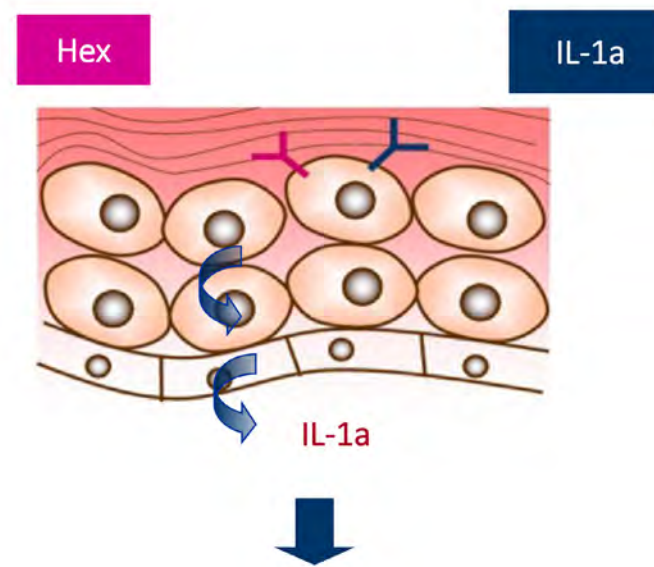
## HEXADELTIME FINE-TUNES THE EFFECT OF DERMATOPOIETIN®

### DERMATOPOIETIN ALONE



Large release of IL-1a

### DERMATOPOIETIN PLUS HEXADELTINE



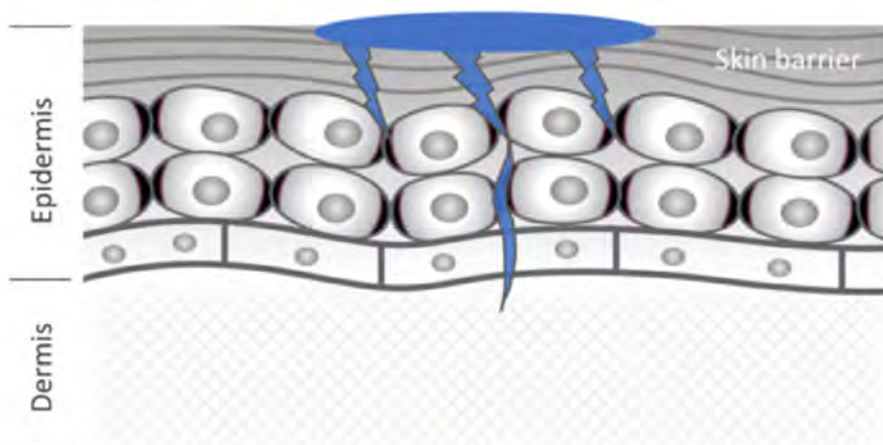
Controlled release of IL-1a: stimulation of collagen deposition without adverse effects.

Action profile Hexadeltine

- Control of excess release of IL-1a by keratinocytes
- Inhibition of inflammation
- Promotion of wound healing
- Stimulation blood circulation

## CONVENTIONAL VS DERMATOPOIETIN

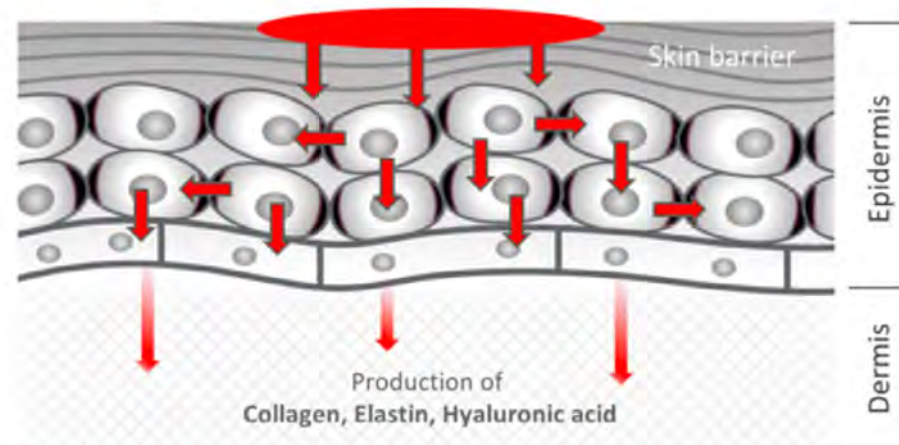
### Conventional anti-ageing products: Penetration of skin barrier



#### Conventional anti-ageing products

- to reach their site of action in the dermis they need to penetrate the epidermis (= skin barrier) by passive diffusion which is almost impossible.
- are often administered in combination with penetration enhancers that allow also harmful agents (pollution, viruses, bacteria) to penetrate the skin.
- do usually not achieve effective results in deep skin layers for rejuvenation effects.

### Dermatopietin®: Natural signalling mechanism **THE REVOLUTION**



#### Dermatopietin®

- is a **natural and harmless polypeptide** in human skin, responsible for the regulation of **skin regeneration**.
  - starts a "chain reaction" from the Epidermis which **propagates deep into the dermis**.
  - activates the production of **collagen, elastin and hyaluronic acid** in a **natural way**.
- ➡ Signalling reaction. The cascade is initiated by Dermatopietin® on the surface and stimulating adjacent cells in the deep skin layers.

## INTELLECTUAL PROPERTY OF UNITED TECHNOLOGIES UT AG

### Registered trademarks

- Dermatopoietin®
- Dermapoietin®
- Hexadeltine®
- EVENSWISS®
- Signalling Cosmetics®
- Skin Rejuvenation Decoded®

### Patents (20 international and local patents)

The use of interleukin-1 alpha and Hexadeltine represents a platform technology with applications in antiaging skin care, hair care, oral care and wound healing. It is protected by several international patents in Europe, Russia (incl. Eurasia), Ukraine, USA, China, Japan, Korea, Brazil, India and Mexico.





## Dermatological and Clinical Studies with Dermatoipoietin®

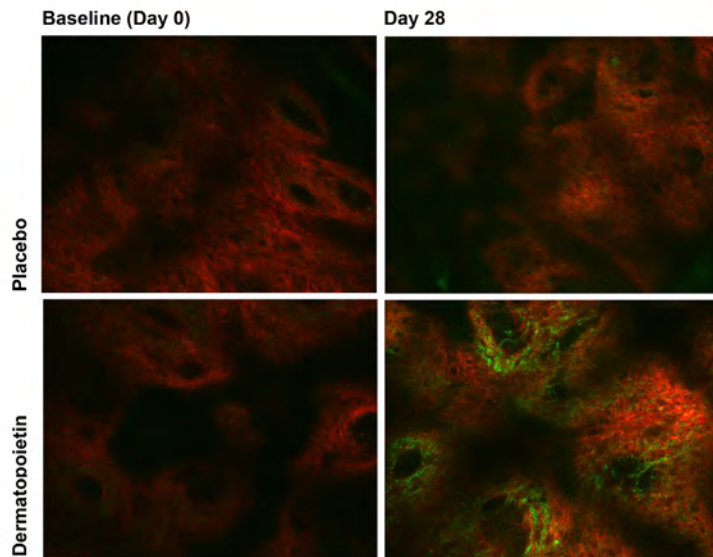
Check more studies

<https://evenswiss.ch/en/our-laboratory>



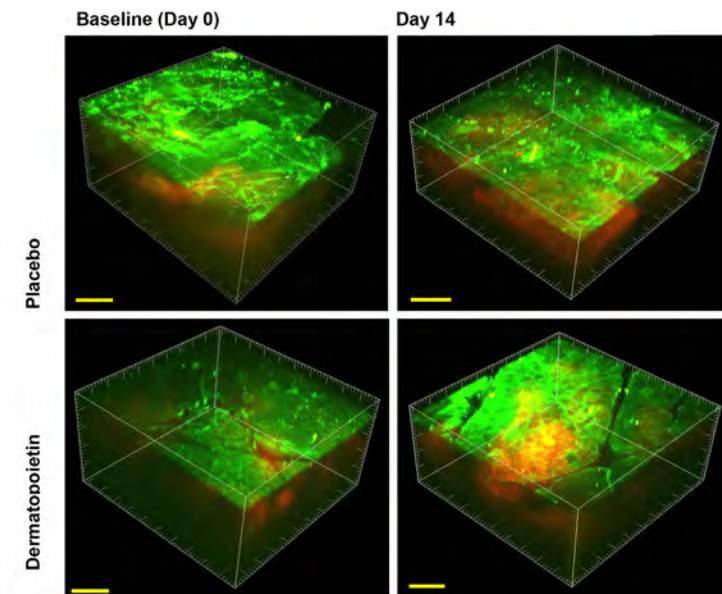
## FLUORESCENCE SPECTROSCOPY STUDY

A 4-week treatment of aging skin with Dermatopoietin strongly increases the collagen, elastin and hyaluronic acid content of the dermis.



### Experiment 1

Two-photon microscopic pictures from the dermis at 80 µm skin depth. Comparison of Dermatopoietin versus Placebo and Baseline versus 4-week treatment. Pictures were obtained from the same skin spot. Clearly visible is the increase of collagen (red) and elastin (green). Dermatopoietin concentration: 150 µg/L.

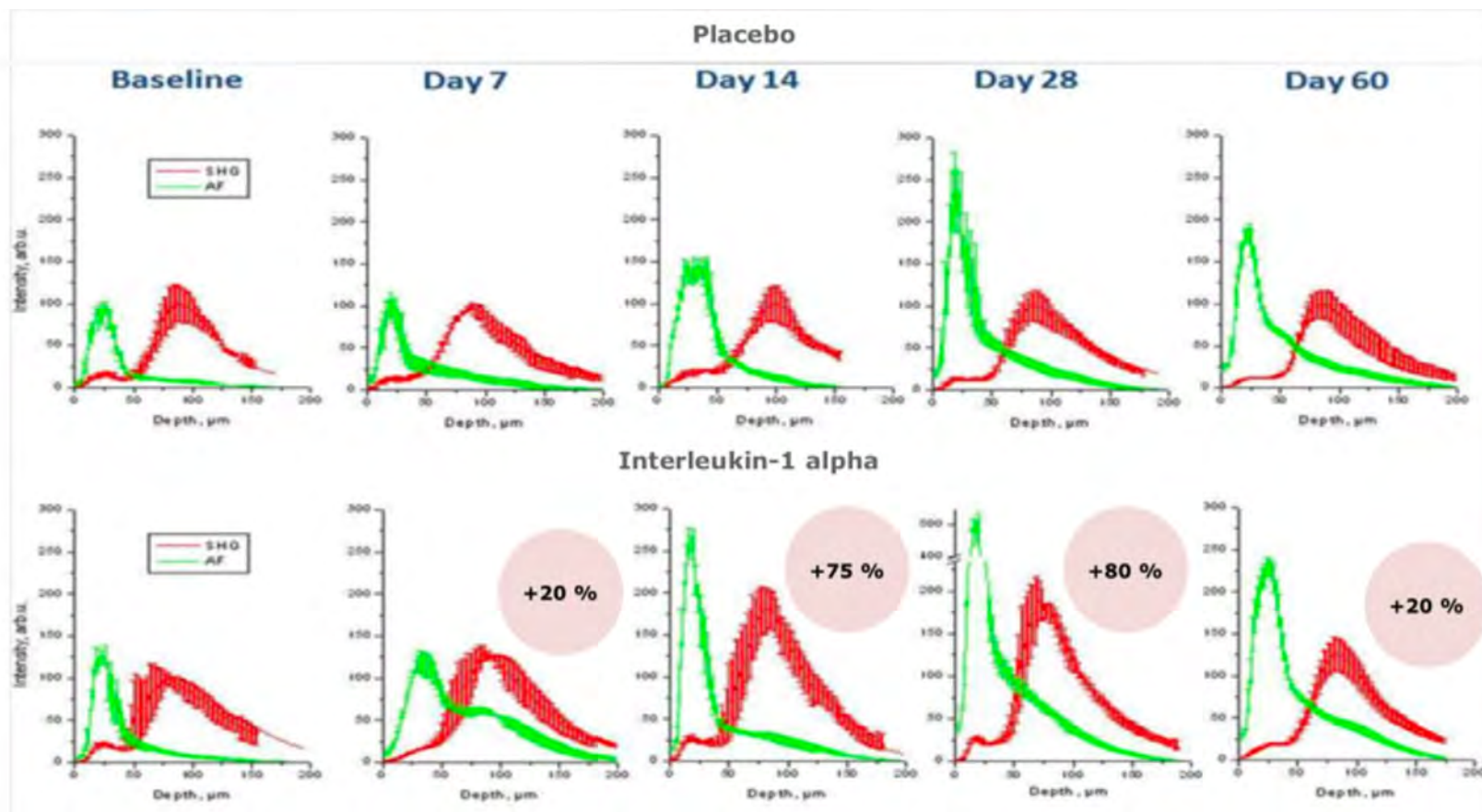


### Experiment 2

Three-dimensional 2-photon microscopic composite pictures showing the green autofluorescence in the epidermis and dermis as well as collagen (red, second harmonic generation) in the dermis. Clearly visible is the increase of collagen after two weeks in the skin of the forearm treated with Dermatopoietin at a concentration of 30 µg/L.

## TIME COURSE OF COLLAGEN BUILD UP

Treatment from day 0 - day 28 / No treatment from day 29 - day 60



**Collagen almost double within 3-4 weeks of topical administration of IL- 1a**

Legend:

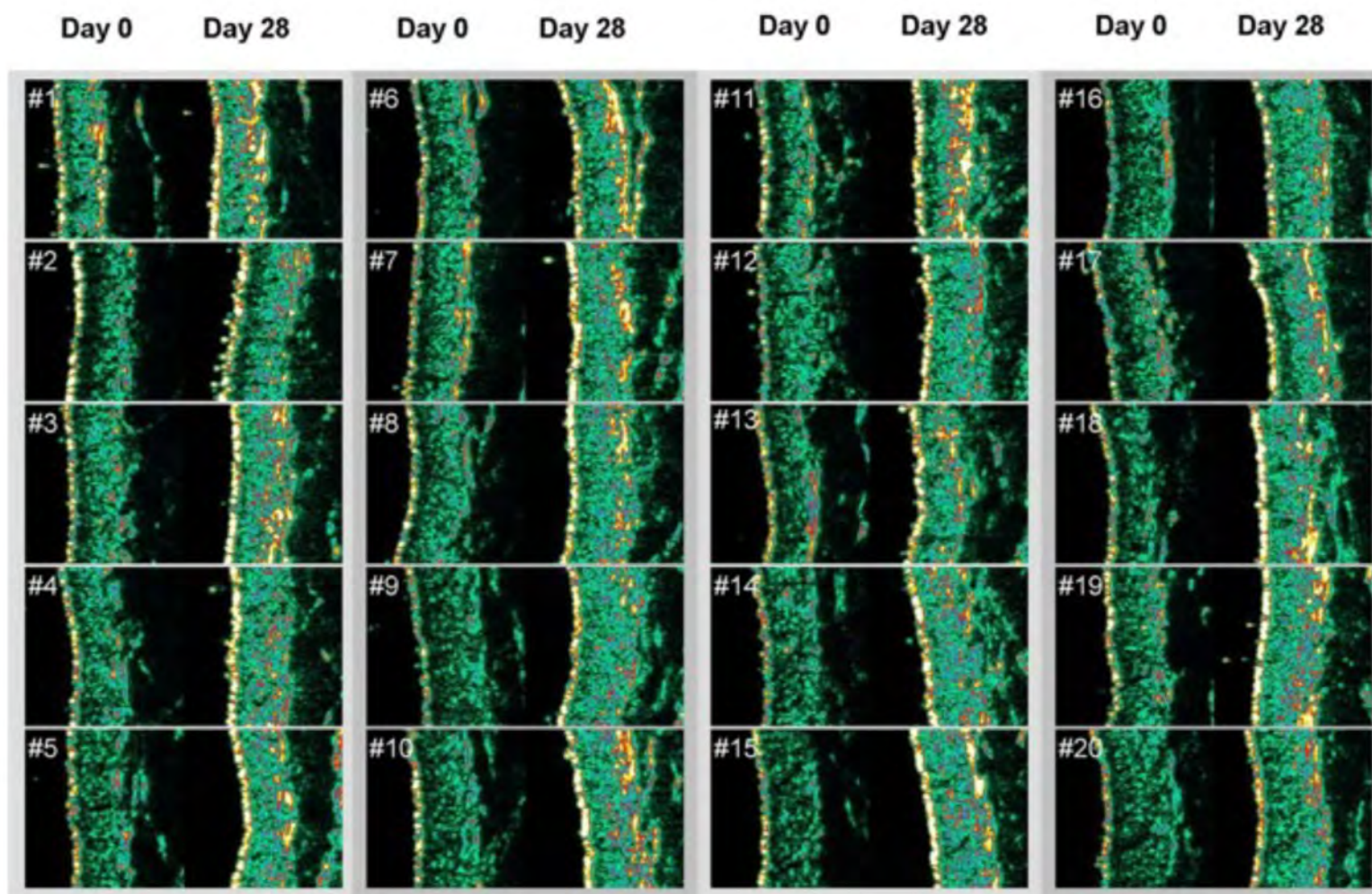
Epidermis: 0-60 μm; dermis: 60-200 μm

Green curves: NADH, NADPH, FADH<sub>2</sub>; in addition: keratin (epidermis), elastin (dermis)

Red curves: collagen (dermis)

## ANTI-AGING SKIN STUDY

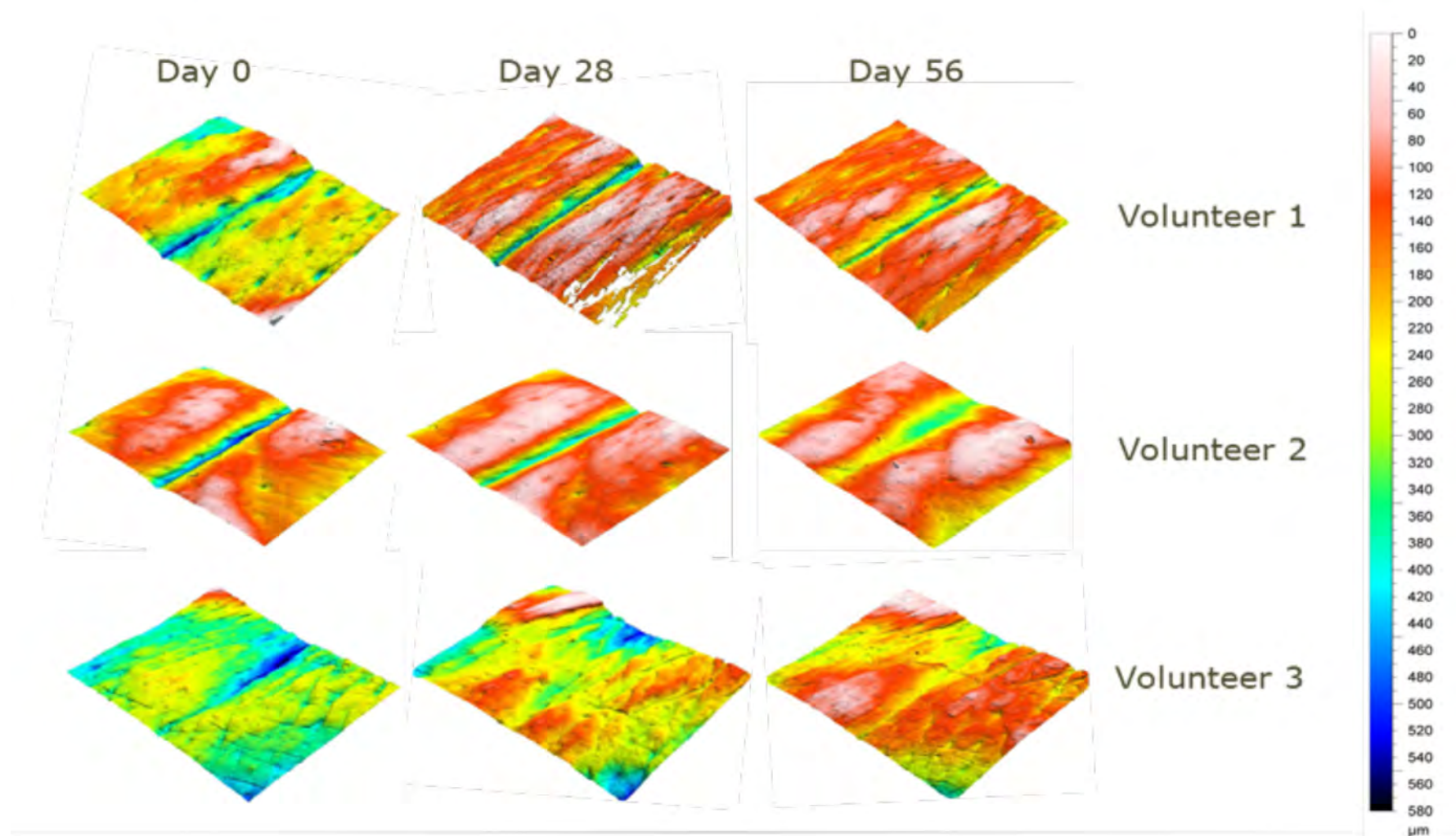
20 volunteers with strong signs of skin aging. Ultrasonography shows clear improvement of skin structure in all volunteers.





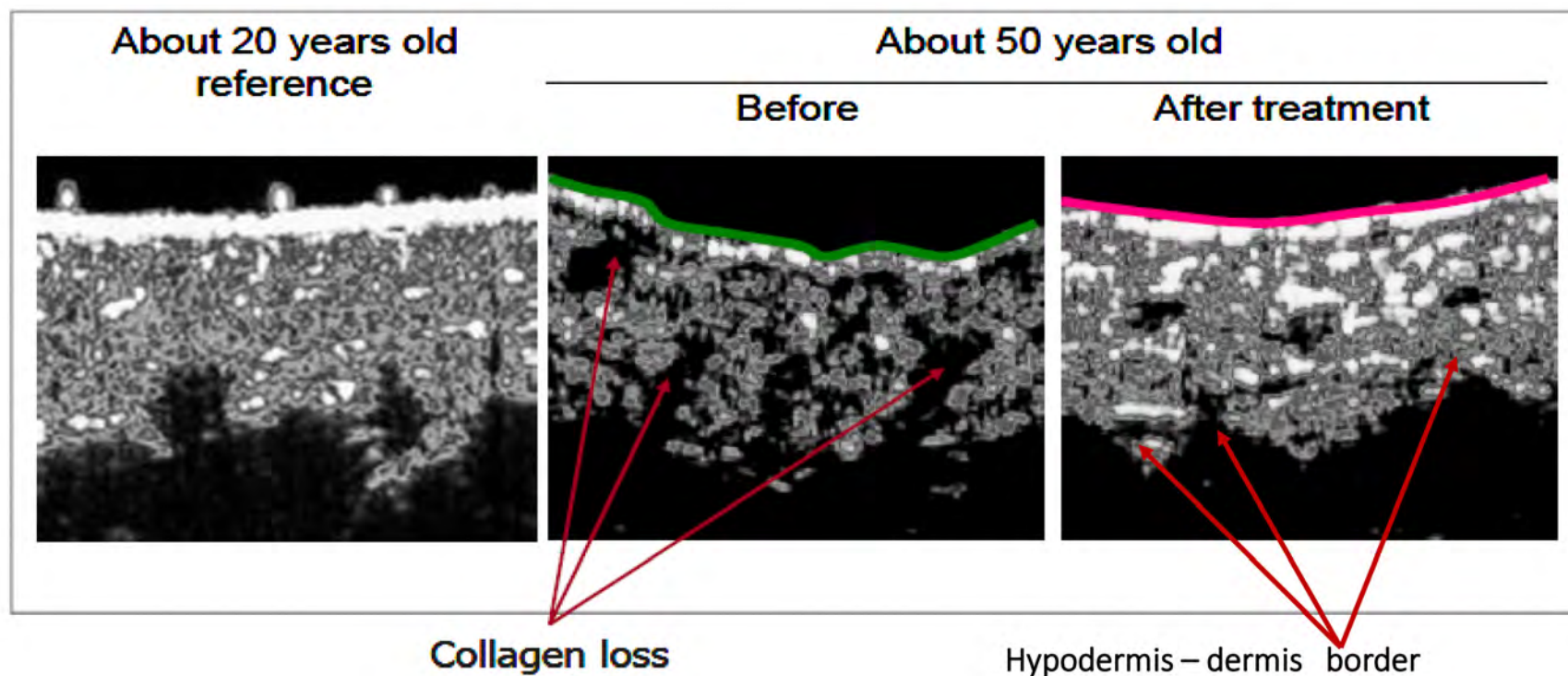
## ANTI-AGING SKIN STUDY

Wrinkle profilometry (3 typical cases out of 12)



## ANTI-CELLULITE STUDY

Ultrasonography shows clear improvement of skin structure after a 4-week bid treatment with Dermatopoietin.



Bright pixels: high echogenic material – keratin and collagen  
Dark pixels: low echogenic material – proteoglycans, fat, water





**EVENSWISS**   
WITH DERMATOPOIETIN®

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THE SWISS INNOVATION BRAND



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