Role of Peptides in Wound Care
Specialty Chemicals

- Personal Care
- Pharmaceuticals/Nutrition
- Performance Chemicals
R&D Locations

300+ researchers – 10 research centers
- Global R&D (200)
- Regional Tech. Centers (100)
Collagen hexapeptide
Collagen XVII is a trans-membrane collagen that anchors the epidermis to the ECM but can also be shed from the cell surface, acting as a signal to promote skin regeneration.

Collagen IV is involved in the anchorage of the epidermis to the dermo-epidermal junction (DEJ). It forms a network responsible for the structural stability of the DEJ.

The peptidic sequence is found both in collagen IV and XVII.
Collagen XVII can be proteolytically shed from the cell surface by specific proteinases to release soluble forms into the ECM.

Soluble forms of collagen XVII are recognized by cells as a signal that stimulates wound healing, differentiation, skin regeneration and tissue remodeling.
Like naturally-derived collagen peptides, that can bind to fibroblasts and trigger the synthesis of ECM molecules, this peptide provides the skin with strong regeneration signals, likely similar to signals occurring during ECM remodeling.
Evaluation: immunostaining of intracellular collagen I (green fluorescence)
Nuclear counterstaining with propidium iodide (red fluorescence)

Application dose: Peptide at 1.5%
Culture time: 16 hours, 24 hours, 48 hours and 72 hours
A: Peptide-treated human fibroblasts
B: Vitamin C-treated human fibroblasts

The peptide rapidly triggers an increase in collagen I expression to a much greater extent than vitamin C. It also increases collagen III and fibronectin expression (data not shown), demonstrating a complete remodeling of the ECM.
**Evaluation:** Double immunofluorescence staining of skin sections 
collagen IV in green and DAPI blue nuclear staining

**Application dose:** Peptidel at 1%

**Application time:** 16 hours

**A:** Control, untreated skin

**B:** Collaxyl-treated skin
**Evaluation:** Double immunofluorescence staining of skin sections

laminin-5 in green and DAPI blue nuclear staining

**Application dose:** Peptidel at 1%

**Application time:** 16 hours

A: Control, untreated skin

B: Collaxyl-treated skin
**Evaluation:** Double immunofluorescence staining of skin showing integrin β1 in green and DAPI blue nuclear staining.

**Application dose:** Peptidel at 1%

**Application time:** 16 hours

A: Control, untreated skin

B: Collaxyl-treated skin
Immunostaining of **filaggrin**

**Peptide:** 1%, one single application  
**Sample culture:** 72 hours

- A: Untreated skin  
- B: Skin treated with Peptide

The peptide significantly increases keratin *(data not shown)* and filaggrin expression, suggesting an improved epidermal differentiation and a more efficient barrier function.
Ex vivo human skin, experimentally wounded peptide: 1%
Sample culture: 72 hours
Treatment: One single application
A: Untreated skin
B: Skin treated with Peptide

The peptide enables a complete, rapid epidermal regeneration compared to the untreated skin. A good dermal repair is also observed.
Fibronectin hexapeptide
Fibronectin is a skin matrix glycoprotein providing a structural framework and biochemical signals that control cellular functions such as adhesion, differentiation and migration.

This peptide is a biomimetic peptide that reinforces cell adhesion on extracellular matrix (ECM) and thereby, promotes matrix remodeling and skin repairing.
Adhesion of cells to ECM molecules requires highly specific receptors: the integrins.

Integrins structurally and functionally link the ECM with the intracellular actin cyto-skeleton that gives the cell its three dimensional shape.

This peptide increases integrin synthesis, reinforcing cell adhesion and spreading.
This peptide is homologous to a 6-amino acid-sequence present in the type III unit of the fibronectin molecule. The selected Peptidic sequence demonstrates fibronectin-like properties.

**Structure**

Schematic representation of the fibronectin molecule (based on Ingham)

The selected Peptidic sequence demonstrates fibronectin-like properties.
Strong adhesion: the Velcro effect

Individual integrin receptors have a weak binding to matrix proteins, but many weak attachments collectively form a strong adhesion.

Strong adhesion = shape & activity

In healthy skin, fibroblasts have a spread appearance and an abundant actin in their cytoplasm due to strong adhesions. These strong adhesions provide a mechanical tension responsible for cell shape and activity.
Culture: HaCaT keratinocytes
Peptide: 0.75%
Application time: 24 h
Evaluation: Immunofluorescence staining of β1 integrin
The peptide helps cells spread more uniformly on collagen, which is crucial for cell growth and interaction with the ECM.
The peptide promotes ECM remodeling that results in complete dermal repair.
Epithelium:  
Reconstructed Human Gingival Epithelium  
(from SkinEthic)

Material used for the wound:  
punch 6-mm

Concentrations of the active ingredient:  
peptide at 0.5% or 1%

Application of the active ingredient:  
twice a day on the epithelium

Time of culture:  
48h of treatment
Control peptide at 0.5%
Placebo 0.5%  Peptide 0.5%
Placebo 0.5%

Peptide 0.5%
Thank You For Your Attention

ISP Research & Development