Neurocosmetics

The skin is equipped with an effective communication and control system, and neurocosmetics, an emerging segment that explores topical treatments affecting this system, has only scratched the surface of advancing technological possibility.

Having treated every other aspect of the skin, cosmetic formulators have recently discovered the cutaneous nervous system. The new category that has emerged as a result, neurocosmetics, can literally affect how the brain responds to topical treatment. The subject inaugurated the 2007 program of the New York Society of Cosmetic Chemists (NYSCC) and is certain to appear on many technical programs in the coming months.

Neurocosmetics targets nerve clusters sensitive to heat, cold, pain, itch and pressure. These receptors send signals through fibers in the skin to the spinal cord, which are then transmitted up to the cerebral cortex of the brain.

Physical coolants—ethanol is a common example—act through evaporation, and are a simple example of materials that create a nervous response. Lower-boiling compounds such as ether or acetone give a more general stinging sensation. Menthol acts on thermoreceptors to provide the cool sensation via cold receptors, and can also create a hot or stinging pain sensation. Similarly, capsaicin can produce a hot sensation. Figure 1 shows the structure of L-menthol and capsaicin.

Figure 1

<table>
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<tr>
<th>L-menthol</th>
<th>capsaicin</th>
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<td><img src="image.png" alt="Menthol and Capsaicin" /></td>
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The structure of L-menthol and capsaicin.

NGF, like almost anything biochemical in nature, decreases with age. Acetylcholine, dopamine, adrenaline and serotonin are examples of neuroactive chemicals. Synthetically produced biomimetic peptides replicate a small, active amino acid sequence of neuropeptides and make them available in the dermis. Since dipeptides can be attacked by enzymes in the skin, decarboxylated dipeptides have been used to avoid enzyme destruction while maintaining biological activity similar to natural neuropeptides. The GT version has been commercialized under the INCI name “glutamylamidoethyl indole” by Essynol S.A.M. This product is available in the United States through Biosil.

The N.V. Perricone M.D. brand utilizes Oligopeptide-17 (CLF-835 Neuropeptide). It is a 35 amino acid sequence claimed for CTFA listing to be a skin protectant. Lancôme Hydra Zen uses Acticalm, a combination of botanical and vegetal extracts. No reaction mechanisms are readily available in either of these products.

Soliance, available in the U.S. through Tri-K markets Ocaline—a blend of seawater and pumpkin seed extract. Their Web site (www.groupeoliance.com) and literature proposes a mechanism of action. The pumpkin seed extract inhibits the action of neurotransmitter Substance P (as in “pain”). Under stress, Substance P is released from the nerve fibers of the skin, causing secretion of histamine from the mast cells, and leading to the typical signs of inflammation. If the activity of Substance P is inhibited, the skin becomes more resistant to attack. A simple view of this process is shown in Figure 2.

Testing dermal nerve responses with electrodes is the subject of a 2002 patent application by Cognis, based on research performed in France, where the patent was filed for. This study is a good place to begin an examination of the underlying science of neurocosmetics:

“The skin is equipped with a particularly effective communication and control system of which the function is to protect the organism from the environment. This
Skin becomes more resistant to attack when activity of Substance P is inhibited.

Neural inflammation

Stimulus

Epidermis

Dermis

Substance P

Mast cell

Histamines

Nerve fiber

Microcirculation

quest to understand and treat aging skin, but the possibilities for new and better products seem endless.

Acknowledgments and References

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