

SCIENCE & INDUSTRY

kosmetikos*

Arachidonic what?

Cosmetics can help prevent skin irritation or aid in the repair process.

By Steve Herman

*In the licorice fields at Pontefract
My love and I did meet
And many a burdened licorice bush
Was blooming round our feet...¹*

The Arachidonic Inflammatory Cascade. Who can deny the lyricism associated with skin irritation! The lovers in Betjeman's poem might be reaping the benefits of glycyrrhizin during their romantic rapture—but more about that later.

Everyone knows irritation is bad, and it is desirable for cosmetics to contain anti-irritants, but exactly what is irritation, and how do anti-irritants work? The information available on raw materials frequently includes claims and clinical data, but doesn't always offer detailed mechanisms explicating the relevant biochemical pathways.



Inflammation is the body's response to invasion, challenge, or damage (Figure 1).

The observable consequences of irritation were first categorized by Cornelius Celsus in the first century AD as redness, swelling, heat, and pain. (He actually said rubor, tumor, calore, and dolore.) In 1858, Virchow added loss of function (function laesa). Irritants are substances that produce irritation. Primary irritation occurs on first contact; secondary irritation requires repeated exposure.

Steve Herman is Director R&D of AFF International. He has 28 years experience in the industry, primarily in fragrance application. He serves as an Adjunct Professor in the FDU Masters in Cosmetic Science program, and has been active in numerous capacities with the SCC. He may be reached by phone, (973) 244-5880, or by e-mail at GCISteve@aol.com.

*Greek kosmEtikos, skilled in adornment or decorating.

All these changes occur at the vascular level. The cause of redness and increased temperature, which occurs during the inflammatory response, is vasodilation and increased blood flow. Changes occur in the permeability of blood vessels resulting in an increase of fluid in the interstitial spaces,

FIGURE 1 Some Exogenous Factors in Cell Damage

FACTOR	EXAMPLE
Mechanical	Trauma
Physical	High Temperature
Chemical	Caustic Agents
Nutritive	Vitamin Deficiency
Biological	Viruses
UV Light	Sun Exposure

observed as edema.

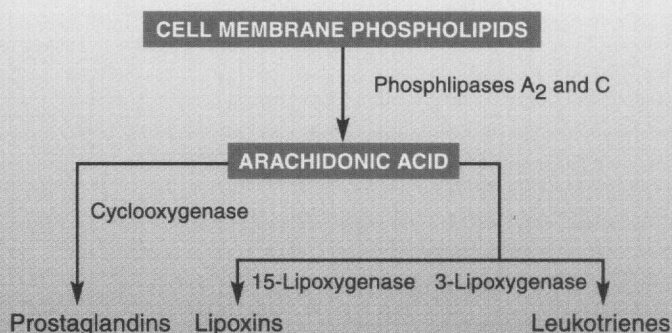
The body has a complex mechanism for responding to irritation. Extreme cutaneous stress may result in cell death. In less severe cases, damaged areas must be isolated, and then either repaired or removed. Part of the response, the Arachidonic Acid Cascade, is shown in a highly simplified outline in Figure 2.

Many strange looking substances appear in a detailed account, such as PGH₂, 15-HPETE, and LTD₁. Acronyms run wild: In immunology, we find TNF (Tumor Necrosis Factor), IL-1 (Interleukin-1), and ELAM-1 (Endothelial-Leukocyte Adhesion Molecule).

Skin irritation, with all the pathways, intermediates, and reactions involved, cannot be given even the most cursory summary in a few pages. Suffice it for now to observe that a dazzling array of chemical agents are involved. The Arachidonic Cascade has been cited to provide a glimpse at the extraordinary science underlying the inflammatory response.

Cosmetics have the capacity to create, prevent, or help cure chemical irritation. All reputable formulators take every reasonable step to minimize or eliminate irritating effects. Some products are by their nature irritating, such as low pH AHA creams and hair relaxers.

FIGURE 2 Arachidonic Inflammatory Cascade



Prevention or repair is the goal of treatment products. An example of a protective measure is the deposition of an occlusive film. A simple coating of petrolatum can be an effective barrier against environmental assault. Dimethicone is another common protectant. The free radicals present in air are an omnipresent source of irritation, an effect exaggerated by pollution or cigarette smoke. Free radical scavengers, such as Tocopherol or Super Oxide Dismutase², can be effective in reducing this source of damage.

Inhibiting an early step can have a profound effect on the cumulative reaction since irritation pathways like the Arachidonic Acid Cascades *are* cascades. SOD can do it on the surface; other actives work in the skin. Licorice is a natural product extensively used in cosmetics for its anti-inflammatory effects. According to folklore, licorice uses

(continued on p. 48)

LA-PACKAGING
Stock Containers • Container Decorating • Custom Molding

LA-CONS' hinged lid containers feature air tight one piece hinged lids and are molded of FDA approved material. LA-CONS is a leading Supplier in Health & Beauty, Food, Pharmaceuticals, Toys, Chemical and Industrial Markets. LA-CONS comes in 26 sizes ranging from 1/8 oz to 8 oz and is available in 25 stock colors and custom colors. LA-CONS offers precision in-house decorating with multi-color hot stamping and pad printing. LA-CONS will also make your custom size or part.

For free Samples Call or Write to:
LA PACKAGING
24895 E. La Palma Ave. • Yorba Linda, CA 92887
(714) 694-0202 • Fax (714) 694-0400

CIRCLE #124 ON READER INQUIRY CARD

all under one roof!

a complete line of:

- Emulsifiers
- Parabens
- Undercynates
- Detergents
- Quaternary Compounds
- Cosmetic Chemicals
- White Oils and Petroliums
- Humectants
- Pharmaceuticals Chemicals
- Waxes
- Essence & Flavors

Over 2,400 Chemicals in Stock!
In any quantity... small or large!
Write for FREE Catalog

RUGER CHEMICAL CO. INC.
83 Cordier St., Irvington, NJ 07111
Phone: 973-926-0331 • 800-274-7843 • Fax: 973-926-4921
Website: rugerchemical.com
email: ruger.amend@worldnet.att.net

CIRCLE #136 ON READER INQUIRY CARD

kosmetikos*

(continued from p. 46)

included alleviating asthma, bronchitis, coughs, and fevers.

Several active components have been isolated from licorice extract, the most prominent being glycyrrhizin. Saponin, asparagine, and glabridin (a skin-whitening agent) are also present.

Claims that can be made³ for a representative licorice active, 18fl glycyrrhetic acid include inhibition of phospholipase A₂, hyaluronidase, and histamine, potentiation of glucocorticoid action. Chemicals ending in “-ase” are enzymes, so blocking them would radically diminish the reaction rates of an inflammatory cascade.

Histamines are released by mast cells as an inflammation mediator, and glucocorticoid is a steroid hormone. The point is clear: This is a complex subject.

Anyone interested in studying the inflammation process in greater depth can hardly

fail to be awed by the complex, ingenious, and remarkably effective ways living forms have concocted to combat damage. For the rest, be assured that the lovers in the licorice fields at Pontefract had their feet planted in a biochemical wonderland beyond their wildest imaginings. ■

Thanks to Larry Smith of International Sourcing and Stephanie Clay of Stevens & Associates for providing essential reference material, and John Carson of CPD for valuable discussions.

References

An invaluable Website on inflammation:

www.nic.savba.sk/logos/books/scientific/node1.html

1. Betjeman, John, *The Licorice Fields at Pontefract in A Few Late Chrysanthemums*, 1954. The complete text is at www.jbetjeman.freeserve.co.uk/licorice.htm
2. Kosmetikos, *There's SOD in your SMECI, GCI (formerly DCI)*, Dec. 1998.
3. Palacio, Susana, *New cosmetic active ingredient for acne-prone skin treatment: zinc glycyrrhethinate*, ISI poster presentation, 1998 SCC Annual Scientific Meeting.



Touch the cheeks and
Whisker's fine hair
The skin has joined here
to make the woman
whisper of another day
produce for the time
to make



It is soft as dew



Hands and feet as soft as velvet



It is soft as steel



Legs and arms and thighs as soft as kisses



To Order:
Call your Ashland
Representative or call
1-614-790-6590

For Information:
Daichi Fine Chemicals
1-800-352-5726

CIRCLE #114 ON READER INQUIRY CARD