

# IS THERE ANY RISK OF ALLERGIC REACTION IN CRENO-COSMETOLOGY?

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## Synopsis

High content of salts, which prevents the growth of pathogen microorganisms, is the main hallmark of mineral waters. This feature gives mineral waters and muds useful, long-duration self-preservative properties which allow for their utilization in both cosmetology and dermatology (as vehicles of pharmacological agents). As concerns cosmetology, broad possibilities of application of mineral waters have long been recognized, which are based on the eudermic properties of salts, the radioactive power of solutions and the bio-activating charge of suspended colloidal substances.

It is well known that the overall incidence of untoward effects from cosmetics is low and a thorough literature review did not detect any report of irritant/allergic reactions to mineral water-derived cosmetics. Considering the ever-increasing use of 'creno-cosmetics', these circumstances might be explained as follows:

- 1) so far, the problem has not aroused medical concern; or
- 2) cases have been overlooked or misdiagnosed; or
- 3) creno-cosmetics have no irritant/sensitizing potential.

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## Riassunto

Dopo la sempre più ampia e promettente applicazione delle acque minerali e dei loro derivati in campo medico, peraltro da molti secoli già conosciuta e sfruttata, tali prodotti hanno più recentemente trovato impiego anche in campo cosmetologico.

L'applicazione sulla cute di qualsiasi sostanza reca sempre in sé un più o meno rilevante rischio di produrre reazioni allergiche, o più genericamente indesiderate. Per quanto più specificamente attiene i cosiddetti creno-cosmetici, nessuna informazione in argomento pare finora essere stata consegnata alla letteratura. Tale circostanza potrebbe dipendere o dallo scarso interesse finora suscitato dal problema, o dal mancato riconoscimento dei casi, oppure da una intrinsecamente bassa capacità dei creno-cosmetici di indurre irritazione e/o sensibilizzazione. Gli Autori propendono per quest'ultima ipotesi e ne discutono le possibili basi farmacologiche.

**Parole chiave:** Creno-cosmetologia, acque minerali, fanghi, rischio allergologico.

The possibility of employing mineral waters for medical purposes has very ancient traditions in the Old World. Crenotherapy, as a whole, is based on the more or less demonstrated "bio-activity" of mineral waters and has been added to other therapeutic tools in a variety of skin disorders (see table I). In some instances, quite well codified regimens have been conceived (to cite an example, the so-called "Tomesa therapy" for psoriasis, which consists of the association of ultraviolet light with baths containing salts from the Dead Sea). In others, the crenotherapeutic approach is rather more empiric, but may represent a proposable alternative in the management of a large number of disease (1).

Also in cosmetology broad possibilities of application of mineral waters have long been recognized which are based on the eudermic properties of salts, the radioactive power of solutions and the bio-activating charge of suspended colloidal substances. Moreover, the benefit properties of mineral waters have found additional fields of application in a variety of cosmetological methodologies, including:

- **Baths in carbonic waters**, from which benefits derive from the stimulating effect of nascent carbon dioxide. This method is widely used in beauty farms, in which an artificial carbon dioxide supply is often provided to com-

mon water;

- **Plankton-cosmesis**, which employs a rich organic matrix, named 'plankton', consisting of unicellular algae that are collected from the water overhanging mature thermal muds;

- **Peloido-cosmesis**, in which the prolonged contact of virgin muds with thermal waters gives raise to development of a micro and macroflora producing bioactive substances that stimulate cutaneous metabolism;

- **Fucoido-cosmesis**, which employs organic substances (including carotenoids, phospholipids, aminolipids and polysaccharides) produced by algae developing in mature muds (1).

After these preliminary outlines, we will now begin to deal with the allergological aspects of creno-cosmetology or, more comprehensively, with overall untoward effects of creno-cosmetics.

As a matter of fact, a thorough literature review did not enable us to find any data regarding this issue. In our opinion, this may be due to the fact that:

1) so far, the problem has not aroused medical concern; or

2) cases have been overlooked or misdiagnosed; or

3) creno-cosmetics have no irritant/sensitizing potential.

**Table 1**

SKIN DISORDERS IN WHICH A CRENO-THERAPEUTIC APPROACH CAN BE PROPOSED

Psoriasis

Contact dermatitis

Atopic dermatitis

Pompholyx

Pruritus

Seborrheic dermatitis

Acne

Rosacea

Peripheral vasculopathic diseases

Dystrophic dermatoses

Ichthyosis

Cutis laxa

Lymphoedema

Acrocyanosis

Vaginitis

Lichen ruber planus

Actually, considering the results of our enquiry, the third hypothesis is more likely to be the true. However, before presenting any possible argument in favour of this point of view, some premises would be necessary.

No allergological survey can be performed if information is lacking on the ingredients of a cosmetical product. On the basis of their mineral content (in terms of both absolute and relative concentration of ions) thermal waters are classified as sulfurous, iodic, bromic, chloric, carbonic, and radioactive.

One of the most represented active ingredients of mineral waters is sulfur, a nonmetallic element weighing nearly 36,000. Sulphuric waters contain variable amounts of H<sub>2</sub>S, ranging from 1 to more than 100 milligrams per litre. It is well known that sulfur preparations (in precipitated, sublimed and colloidal forms) are widely used in medicine due to germicidal actions and keratolytic properties, and that they have a well established, dose-dependent irritant potential; by contrast, they are only very rarely responsible for allergy (2). Thus, the risk related to the use of sulfur-containing creno-cosmetical products is likely to be practically negligible. Moreover, while in medical preparations sulfur content is considerable (2% or more), in crenocosmetology much lower concentrations of this element are supposed to be supplied and this may well provide further explanation of the absence of documented allergic as well as irritative reactions. Actually, when employed for cosmetological purposes, sulfur does retain its full effect despite of its dilution. In fact, it can be assumed that the small size of sulfur particles in water solutions increases the area available for sulfur-cutaneous interaction and sulfur efficacy as well. Moreover, it may be supposed that high dilution of salts in water results in an increase of corneum hydration state and, consequently, in a paradoxical enhancement of bio-availability and biological effect of soluted molecules.

However, we believe that, apart from high dilution and low allergenicity per sé, further reasons

for safety and tolerability of sulfur may lie also on antioxidant and immunosuppressive properties. In fact, *in vitro* studies have demonstrated that sulfur is able to inhibit T-lymphocyte proliferation and to down-regulate both production and release of lymphokines. Moreover, sulfur-containing thermal waters have been shown to inhibit antigen-presenting-cells activity (3). Finally, as concerns antioxidant properties of sulfur, some circumstance should be briefly discussed: mineral waters contain free H<sub>2</sub>S, a highly instable molecule which reacts with oxygen giving origin to more stable reduced products. In this way, H<sub>2</sub>S-containing mineral waters may be considered a good antioxidant agent and antioxidants have been demonstrated to be effective downregulators of irritant and allergic contact reactions (4, 5, 6). On the basis of all these premises (namely, antioxidant charge and immunomodulating effects) allergy to sulfur might be restrained or masked (in the same way as cyclosporin or corticosteroids do).

As for the other components of mineral waters, including bromine, iodine, calcium, potassium, sodium, chlorine, magnesium and so forth, no sensitizing potential has been acknowledged so far to any of them.

Considering all these circumstances, it would seem that there is no allergological risk upon contact with active ingredients of creno-cosmetics. On the other hand, a possible risk of allergy should be sought in bases employed for incorporation of mineral components. In this view, as shown in previous surveys (7), perfumed compounds and preservatives are likely to play a major role. However, it's well known that the overall incidence of untoward effects from cosmetics is very low, and no special risk of allergy seems to be borne by crenocosmetics.

Moreover, the following detail should be incidentally considered: one of the main hallmarks of mineral waters and muds is high content of salts. Such condition is likely to decrease or abolish the need of addition of flavouring and

preservative agents as it could directly prevent the growth of pathogen microorganism, giving useful self-preservative properties to creno-cosmetics.

Certainly, all these points of view remain highly speculative and, in order to assess a safety profile of creno-cosmetological formulations, more information should be provided by the manufacturers on the ingredients of products that have been put on the market.

In conclusion, safety of creno-cosmetics will be confirmed only when they will be used on a larger scale and wide pre- and post- market skin testings will have carried out among consumers.

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