

Physiological cleansing for problematic skin

ABSTRACT

Skin, being the interface between us and the outside world, is often exposed to a great number of different stress factors which can lead to structural and biological damages, that usually manifest themselves with different degree.

From sunburns to allergies, from sensitive to atopic skin, the key word of toiletries is nowadays not only clean but care.

The work will propose some ideas for the physiological cleansing of skin and hair affected by some of the most common disorders.

During the work the following parameters were thought to be fundamental (2):

- physiological and re-equilibrating acidity
- buffered pH
- low surfactants level
- use of multifunctional surfactants
- low content of traditional preservatives
- control of pathogenic micro-organisms growth
- antioxidants effects
- moisturizing and softening ability
- deposition of "soothing" substances.

INTRODUCTION

In the '70 the skin aggression level of the few available surfactants, together with the social discovery of frequent body washing as element of comfort and pleasure, gave rise to increasing skin problems. A group of English dermatologists clearly suggested a less frequent and abundant use of soap, bath foam and shampoo, in order to fight the growing number of mycosis and irritant dermatitis reports. The issue was not so easy as water itself can for example induce skin changes (1) but the concept of cutaneous respect in cleansing was born, together with the reduction of all possible irritations.

Also the so called "healthy skin" suffers various stresses that disrupt its normal functions and reveal themselves as evident phenomena (e.g. redness, itching, stinging, swelling).

In presence of skin disorders the cleansing must be really physiological and, even if it is not its task to solve the pathology, it must be able to avoid further irritation, to maintain skin well moisturized and pliable and to prepare it for further medical treatments.

AIM OF THE STUDY

Aim of the study was to formulate some physiological cleansers for four of the most common skin disorders: impure skin, psoriasis, sunburn and sensitive skin.

IMPURE SKIN

The words "impure skin" mean often a greasy, seborrhoeic and acne-prone skin.

Sebum, which is secreted by sebaceous glands present in the follicles, softens and lubricates the skin. It is mainly under hormonal control but also genetics and environment can influence its production. When this last is excessive we have greasy or seborrhoeic skin. In seborrhoeic dermatitis sebum has also a different composition (a higher content of saturated lipids, solid at room temperature) and seems to have a permissive effect on the growth of *Pityrosporum ovale* (3).

If to sebum overproduction we add keratinisation

Formulation 1 – Face Cleanser for Seborrhoeic skin

INCI Name	% by wt.
Aqua and excipients	to 100
Allantoin	0.1
Citric Acid	1.1
Chondrus Crispus	0.8
Zinc Coceth Sulfate	27.0
Disodium Capryloyl Glutamate	5.0
Potassium Undecylenoyl Hydrolyzed Wheat Protein	8.0
Disodium Cocoamphodiacetate	11.0

Characteristics:
Appearance at 20°C = clear solution
pH = 4.7 - 5.3
Viscosity (with the perfume used) at 25 °C = 2500 cps (spindle 3, rpm 5)
Manufacture: Stir the above mentioned components in the indicated sequence to homogeneity

Table 1.

disorders, bacterial proliferation and inflammatory response within pilosebaceous units, then we have acne phenomenon.

The cleansing strategy in these cases is to use only mild surfactants in small quantity. The rinsing water should be barely warm (never hot) and with a low content of salts.

As calcium salts (coming from tap water) have a light irritating effect, it would be better to make the last rinsing with demi water.

Formulations should also perform a good control of bacterial proliferation.

A face cleanser for seborrhoeic skin was manufactured.

As main surfactant Zinc Coceth Sulfate was used: it deposits a layer of zinc basic salts onto the skin, decreasing so irritation, and helps healing.

Potassium Undecylenoyl Hydrolyzed Wheat Protein is substantive, texturizing and able to control fungi growth; Disodium Capryloyl Glutamate helps moisturization, has sebum control properties and is effective against bacteria involved in acne.

The amphoteric surfactant Disodium Cocoamphodiacetate decreases further irritation. Allantoin help in dissolving skin scales (Table 1).

PSORIASIS

Psoriasis is characterized by an accelerated rate of epidermal cell replication, a decrease in tonofilaments and keratohyalin granules, a dilated and tortuous capillary loops, a disordered, loosely and irregularly stacked stratum corneum (4). The barrier effect of stratum corneum is reduced. Psoriasis causes patches of thick, red skin with silvery scales that can itch or feel sore.

They are often found on the elbows, knees, scalp, lower back face, palms, legs and soles of feet.

Psoriasis is quite widespread (about 2 percent of both sex population) and begins in the immune system.

A correct cleansing must avoid to enhance irritation, swelling and protein denaturation.

The formulations must have acidic pH, moisturizing ability and avoid to give alteration on barrier lipids. They must be also easily rinseable because residue of surfactants could damage stratum corneum.

Formulation 2 has a low surfactants content. Surfactants are mild and multifunctional. Disodium Laureth Sulfosuccinate improves rinseability of formulation; Zinc Coceth Sulfate guarantees an anti-irritating and soothing action; Potassium Cocoyl PCA and Disodium Capryloyl Glutamate are able to provide good moisturization while betaine, arginine and panthenol guarantee the correct water coordination. Disodium Capryloyl Glutamate also control microbial proliferation (Table 2).

SUNBURN SKIN

Even if sun is the source of energy for all life on our planet, it is not always so friendly with our skin.

Between 8 and 24 hours after skin irradiation, a

Formulation 2 – Shower Gel for Psoriasis	
INCI Name	% by wt.
Aqua and excipients	to 100
Tetrasodium EDTA	0.2
Panthenol	0.5
Betaine	1.0
Citric Acid	1.1
Arginine	1.6
Potassium Chloride	0.5
Zinc Coceth Sulfate	32.0
Disodium Laureth Sulfosuccinate	18.0
Potassium Cocoyl PCA	3.0
Disodium Capryloyl Glutamate	5.0
PEG-120 Methyl Glucose Dioleate	1.5
PEG-90 Glyceryl Isostearate (and) Laureth-2	2.0
Characteristics:	
Appearance at 20°C = clear fluid	
pH = 5.0 - 5.5	
Viscosity (with the perfume used) at 25 °C = 5200 cps (spindle 3, rpm 5)	
Manufacture: Stir the above mentioned components in the indicated sequence to homogeneity	

Table 2.

damaged cell which is called "sunburn cell" appears in the epidermis (5). This shrunken cell with condensed nucleus and eosinophilic cytoplasm is typical of damages caused by irradiation.

From a macroscopic point of view skin is red, painful, sensitive, pimply and with an increased blood flowing.

In order to clean sunburn skin, foam is not necessary but it is important to use polar oils that can be easily emulsified in order to remove salts (this happens mainly at the seaside) and every oxidized molecule from the skin. UV rays oxide squalene present in sebum arising peroxidized squalene that give free radicals and irritation. Iron oxide from make-up catalyze this reaction.

Formulation 3 is an oil cleanser for sunburn skin. It has a soothing and refreshing action and can be easily rinsed-off; its acidity helps to reduce capillary flowing.

Zinc deposition from Zinc Coceth Sulfate helps to restore physiological conditions and has a long lasting effect (Table 3).

Formulation 3 – Oil Cleanser for Sunburn Skin	
INCI Name	% by wt.
Aqua and excipients	to 100
Citric Acid	1.0
Arginine	1.5
Zinc Coceth Sulfate	15.0
Disodium Laureth Sulfosuccinate	10.0
Polysorbate-20	18.0
Sorbeth-40 Hexaoleate	3.0
PEG-6 Caprylic/Capric Glycerides	20.0
Characteristics:	
Appearance at 20°C = clear fluid	
pH sol. 10% = 4.5 - 5.0	
Viscosity (with the perfume used) at 25 °C = 400 cps (spindle 3, rpm 5)	
Manufacture: Stir the above mentioned components in the indicated sequence to homogeneity	

Table 3.

SENSITIVE SKIN

Mills and Berger divided sensitive skin into four categories (6):

- individuals with frank dermatological disease
- individuals with minimal or atypical dermatological disease
- individuals with previous skin trauma
- none of the above (clinically normal)

Formulation 4 – Bath Oil for Sensitive Skin	
INCI Name	% by wt.
PEG-7 Glyceryl Cocoate	15.0
Zinc Coceth Sulfate	25.0
Disodium Capryloyl Glutamate	2.0
Hydrogenated Polydecene	37.85
Isostearyl Lactate	10.0
Sorbeth-40 Exaoleate	10.0
Tocopheryl Acetate	0.05
Bisabolol	0.05
Beta Carotene, Zea Mays	0.05
Characteristics: Appearance at 20°C = clear fluid pH sol. 10% = 4.5 - 5.0 Viscosity (with the perfume used) at 25 °C = 5800 cps (spindle 3, rpm 5) Manufacture: Stir the above mentioned components in the indicated sequence to homogeneity heating at 40 °C. Cool down under stirring	

Table 4.

So, as it is possible to see, there is a group of people that claim to have sensitive skin but no objective evidences of it can be found. Sensitive skin is mainly a self-defined, perceived problem. People mainly use this term to express their intolerance to some skin products or environmental factors. Sensitive skin is commonly dry and delicate: temperature changes, wind, sun, cosmetics, alcohol

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(applied on skin) can leave the skin red and blotchy with visible surface veins.

It is important to formulate skin cleansers that don't influence the barrier function, with a soothing and lubricant action, able to decrease surface electrostatic charge and that can be easily rinsed-off (Table 4).

CONCLUSIONS

Cleansing of problematic skin is a very complex issue. It involves cleaning, protection and treatment. It should use multifunctional surfactants able to moisturize, sooth, protect, heal and maintain the right balance.

Skin needs care, mainly if it has disorders: the goal of today hygiene is to look after it with mild and active ingredients and with scientific and sophisticated formulations.

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