

# The use of lactobionic acid and gluconolactone in the treatment of couperose skin. A case report

## Zastosowanie kwasu laktobionowego oraz glukonolaktonowego w terapii skóry naczyńniowej. Opis przypadku

### ABSTRACT

Couperose skin is defined as the skin of face, neck and décolleté area, which is characterized by a visible tendency to develop temporary or permanent erythema, telangiectasias or other vascular lesions. The problem mainly affects women, but can also occur in men.

The article aimed to evaluate the effectiveness of lactobionic acid and gluconolactone in reducing erythema and telangiectasia in a woman with couperose skin.

The conducted therapy confirmed the effectiveness of lactobionic acid and gluconolactone in a person with erythema and telangiectasias.

**Keywords:** couperose skin, polyhydroxy acid, lactobionic acid, glukonolakton, erythema

### STRESZCZENIE

Skórą naczyńniową określa się skórę obszaru twarzy, szyi oraz dekoltu, którą charakteryzuje widoczna skłonność do powstawania czasowego, bądź utrwalonego rumienia, teleangiektazji lub innych zmian naczyńniowych. Problem głównie dotyka kobiet, lecz również może pojawić się u mężczyzn.

Celem pracy była ocena skuteczności zastosowania kwasu laktobionowego i glukonolaktonowego w redukcji rumienia oraz teleangiektazji u kobiety z cerą naczyńniową.

Przeprowadzona terapia potwierdziła skuteczność kwasu laktobionowego i glukonolaktonowego u osoby z rumieniem i teleangiektazjami.

**Słowa kluczowe:** skóra naczyńniowa, polihydroksykwasy, kwas laktobionowy, glukonolakton, rumień

### INTRODUCTION

Vascular skin is a prevalent issue that impacts a large number of people and significantly deteriorates their state of well-being. The lesions, like erythema or visible telangiectasias, appear mainly on the skin of the face, neck and décolleté. They are often accompanied by a feeling of skin tightening, burning, and stinging [1, 2]. These defects arise due to the detrimental impacts of both internal and external factors, such as ultraviolet radiation, weather conditions, stress, physical strain, substances rich in tyramine or histamine (found in fish and mouldy cheese), sulphates and nitrates, medications

like estrogens and glucocorticosteroids, certain cosmetics that contain soaps, alcohols, acetone, and fragrances [3]. Hyperreactivity of blood vessels occurs mainly in women, although the problem also affects men. In addition, couperose skin appears in people with phototype I or II according to the Fitzpatrick scale, and the changes intensify between the age of 30 and 50. Increasingly, however, the first symptoms appear as early as the age of 20 and develop with age. Polyhydroxy acids, which include lactobionic acid and gluconolactone, play an important role in the treatment of vascular skin [1, 4, 5].

Polyhydroxy acids, also known as new-generation chemical peels, are organic carboxylic acids that have two or more hydroxyl groups in the molecule. Their acidity is provided primarily by the carboxyl group. Compared to alpha-hydroxy acids, these peels exhibit a much milder exfoliating effect [4, 6].

Lactobionic acid is derived from the process of oxidising the disaccharide lactose. The molecule is composed of galactose and gluconolactone. Lactobionic acid is the name given by the International Nomenclature of Cosmetic Ingredients (INCI). It is a hygroscopic compound, so it can effectively absorb and retain water due to the eight hydroxyl groups in its structure. Typically, it is encountered as small, white crystals that easily dissolve in water. In cosmetology offices, it is applied in concentrations of up to 50%, and exhibits a pKa value of 3.8 [6-8].

Gluconolactic acid is a colourless, crystalline substance that has a sweet taste and exhibits typical properties of alpha-hydroxy acids. It has a pKa value of 3.8 and displays high solubility in water. It is produced through the oxidation of glucose or the fermentation of corn kernels. Gluconolactic acid is naturally present in wine, honey, and fruit juices [7]. The optimal concentration range for cosmetics is 5-15%. [9].

## AIM OF THE WORK

The study aimed to evaluate the effectiveness of lactobionic acid and gluconolactone in reducing erythema and telangiectasia in a woman with vascular skin.

## CASE DESCRIPTION

A 22-year-old woman visited the cosmetological office with symptoms of vascular skin, manifested by erythema on the cheeks, single telangiectasias and excessive skin sensitivity. A comprehensive cosmetological history was obtained, including health status, lifestyle and home care. A palpation (i.e., elasticity test) and visual diagnosis (involving observation of the treated skin) were also performed.

Based on her medical history, the client started experiencing vascular issues at the age of 17, during her high school years, and these problems progressively worsened over time. The lesions might have been attributed to the escalating chronic stress associated with the preparations for high school graduation and subsequent entry into college. Initially, the erythematous areas were paroxysmal before stressful situations, manifesting as redness of the face and décolleté, while over time they gradually became more fixed, giving a more or less severe picture. The woman did not suffer any chronic disease, but had lactose intolerance and an allergy to pollen and house dust mites. The proband's diet differed significantly from accepted norms and dietary recommendations. In addition, she admitted to consume a large amount of sweets, salty snacks, moldy cheese and spicy foods, which also contributed to the severity of erythematous lesions. The rooms she occupied were frequently heavily air-

conditioned, which lead to dry skin and excessive sensitivity, as well as the formation of telangiectasias. The regular blood tests did not raise any concerns, as the results remained within the accepted range. Furthermore, she had a genetic predisposition to circulatory issues in her lower limbs, specifically venectasias or varicose veins, as well as vascular skin conditions like rosacea.

The client's daily skin care routine consisted of cleansing the facial skin with a gel cleanser in the morning and a micellar lotion in the evening, using cotton pads or a makeup remover glove. According to the interview, it was revealed that the micellar fluid was no longer removed by any product or water, which could lead to residue, further irritating the skin and promoting erythema. The client's daily use of hot water to remove her makeup had an adverse impact on the condition of her blood vessels, leading to their dilation. Furthermore, the method of drying the facial skin was incorrect as she aggressively rubbed her face with a towel, resulting in irritation. In addition, she used the same towel for other parts of her body, such as her hands, and changed it only once a week, likely resulting in microbial proliferation. The client did not use a toner after removing her makeup, thus failing to restore the skin's physiological pH, which could disrupt the skin's normal hydrolipid mantle and increase susceptibility to negative external influences. Mechanical peeling was used once a week, despite the fact that this kind of scrub was not recommended for hyper-reactive vascular skin. It was another irritant which disrupted the hydrolipid mantle and dilated blood vessels. The client used a cream on a daily basis containing alcohol and fragrances substances, which also negatively affected the condition of the skin, irritating and drying it out. Another important aspect was the client's lack of regular use of photoprotection. During the colder months, she refrained from using it entirely, whereas in spring and summer this protection was applied very irregularly. Due to above, the skin was exposed to the harmful effects of UV radiation, which was the main factor inducing the formation of erythema and contributing significantly to the deterioration of the skin condition. In addition, the composition of the chosen sunscreen contained only chemical filters that were known to cause irritation.

## METHODOLOGY OF A SERIES OF TREATMENTS

The therapy was performed on a 22-year-old woman with symptoms of couperose skin, manifested by erythema on the cheeks, isolated telangiectasias and excessive skin sensitivity.

To begin the treatment preparation, the initial assignment involved filling out a client card and conducting an interview. This interview was used to identify and eliminate any contraindications that would prevent the in-office procedure from taking place.

The therapy was carried out with a 20% preparation containing lactobionic acid and gluconolactone acid, pH 2.0, in a series of six treatments at 10 day a intervals. Each

treatment was performed according to the manufacturer's recommended protocol.

The treatment scheme:

1. Two-step makeup removal.
2. Disinfection of the treatment area.
3. Protecting the area around the eyebrows, eyes, wings of the nose, lips and unusual pigmented nevi with cosmetic petroleum jelly.
4. Acid preparation application (Table 1).
5. Washing off the acid preparation.
6. Toning.
7. Application of moisturizer and SPF50 cream.

**Table 1** Acid application time

Treatment number	1	2	3	4	5	6
Acid application time (in minutes)	5	8	11	14	15	15

Source: Own elaboration based on manufacturer's recommendations

After the first treatment, the client was advised to change her current cosmetics to gentle products with moisturizing, regenerating, strengthening and sealing blood vessels. It was suggested that regular, year-round photoprotection with physical, non-irritating, filters, was important. She was also recommended to avoid using skin care products that contain strong detergents, alcohols, or fragrances. Additionally, it was proposed to the client to switch from using home mechanical scrubs to enzymatic products once a week. She was also advised to stop using makeup remover gloves and cotton pads, replacing them with gentle products spread with her hands, and to dry the skin with disposable paper towels. Moreover, the water to wash the face was recommended be lukewarm, not hot, as it caused intense vasodilation of blood vessels.

## ANALYSIS OF RESULTS

The persistent erythema on the client's cheeks was significantly visible on the skin before the treatment. Throughout the

treatment, the severity of the condition gradually diminished with each session, resulting in a subtle, but discernible, improvement in the appearance of the skin. Basing on the woman's observations, the occurrence of transient erythema on the skin did not stop completely. It was still visible under exacerbating factors such as ultraviolet radiation, high temperature, air conditioning, red wine, physical exertion or stress. However, this erythema was less severe and tended to subside more quickly after the therapy with lactobionic acid and gluconolactone.

The mildly dilated individual blood vessels located on the proband's cheeks became invisible. In addition, vascularization of the skin became less noticeable after the series of treatments, which also contributed to a more favorable appearance of the skin. From both the client's observations and the cosmetologist's assessment of the skin, better skin hydration was also noticed. Facial skin tone had been improved significantly, and areas prone to dryness, such as around the wings of the nose, lips and eyebrows, no longer showed such tendencies.

In addition, it was noticed that the closed blackheads on facial skin and the discoloration on cheeks and chin had been reduced. As a result, the skin was visibly brighter and smoother, and the skin tone became more uniform.

The effects of the treatments are juxtaposed in the form of photos taken before the therapy, as well as after a series of exfoliation treatments (Fig. 1-3).

## CONCLUSIONS

1. Lactobionic and gluconolactone acid treatments were beneficial in deleting vascular lesions in the facial skin.
2. The therapy carried out significantly reduced the dilated blood vessels.
3. The series of exfoliation treatments performed improved the condition of the skin.



**Fig. 1** Comparison of the treatment site before and after therapy - front part of the face Source: Own archive



Fig. 2 Comparison of the treatment site before and after therapy - left profile Source: Own archive



Fig. 3 Comparison of the treatment site before and after therapy - right profile Source: Own archive

## SUMMARY

Vascular skin is characterised by its fragility, thinness, and frequent coexistence with sensitive skin. It exhibits a superficial development of blood vessels, leading to its intense response to external stimuli. Polyhydroxy acids are highly recommended for their therapeutic use, as they possess hydrating and rejuvenating properties on the skin, enhancing its complexion and fortifying blood vessels.

In the conducted combination therapy with lactobionic acid and gluconolactone acid lasting 60 days, there was a reduction in both fixed and temporary erythema, and dilated blood vessels on the cheeks were eliminated. In addition, there was an increase in hydration, improvement in facial skin tone, as well as a reduction in hyperpigmentation and closed blackheads.

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