

Ozonated olive oil – cosmetic or medicine

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Although we live in the era of universal access to antibiotics and chemotherapeutics, we still encounter difficulties in wound healing. Prolonged treatment with pharmaceuticals causes occurrence of systemic factors such as insufficient blood supply and, consequently, limited oxygenation or diminished amount of nutrients that affect the delay of the healing process. Wound maintenance is also the source of damage or even destruction of the granulation tissue or epidermis that is formed. For these reasons, unconventional methods and means that would support treatment are sought.

The beneficial properties of olive oil were known in ancient times. Olive oil was widely used not only as a "cosmetic", with which the body or hair were washed and rubbed, but was also used in wound dressings or in preparation of medicinal mixtures for burns, skin diseases or insect bites. Mention of such use is already found in Hippocrates, who called olive oil "liquid gold", or in the Bible. Due to its properties, the oil has also found its place in contemporary pharmacopoeial studies. Cold pressed olive oil from the pericarp was considered a medicine and was included in many pharmaceutical registers. It was used in the treatment of skin lesions and in difficult to heal wounds, frostbite and burns. In the cosmetics industry, it has become a carrier for the ingredients of natural cosmetics and an oiling and protecting substance for the skin.

This turbid, greenish liquid contains over 80% monounsaturated fatty acids. In addition, it contains phytosterols and their esters, tocopherols, wax esters, triterpene alcohols and lipophilic dyes. We also find strong antioxidants in olive oil - polyphenols. It also has antimicrobial and anti-inflammatory properties. Applied to the skin, it oils and nourishes it, thus contributing to skin regeneration, softens and reduces keratinization of the epidermis, restores the correct composition of sebum, soothes irritations.

New possibilities of using oil appeared together with the combination of olive oil with ozone, thanks to which the antioxidant properties of oil were combined with the strong antimicrobial properties of ozone, which as a strong oxidant destroys bacteria, protozoa, fungi and viruses.

Ozone properties allow it to be increasingly used in medicine in so-called ozone therapy, i.e. a group of therapeutic methods with the use of ozone applied in addition to the basic treatment of soft tissue diseases, especially infected wounds, bedsores, burns, ulcers, inflammation of the skin and chronic tissue hypoxia. These methods rely primarily on bathing in an oxygen-ozone gas mixture, applying compresses or dips from ozonized liquids. The active atomic oxygen formed during the breakdown of the ozone molecule not only destroys bacteria, fungi and viruses but above all oxygenates the tissue and accelerates cell renewal processes by improving local microcirculation, stimulating tissue granulation and tissue growth, as well as regenerating epithelial tissue. These properties mean that cosmetologists and dermatologists are willing to use methods with the use of ozone or reach for products containing this gas.

Ozone is an unstable allotropic form of oxygen, which unfortunately should be considered a disadvantage. In the form of gaseous or ozonated water, it disintegrates within a short time after production. The activity of such forms of ozone can be maintained for a period of minutes only.

To extend the stability of ozone, its ability to combine with double bonds of unsaturated fatty acids was used, resulting in the formation of ozonides, which under the influence of water contained in sweat release biologically active free oxygen. It turned out that olive oil, cold

pressed, due to the very high content of oil with high unsaturation, perfectly binds ozone, and the chemical composition of the resulting ozonides exactly matches the natural oils from which they were obtained. The use of oil as a "carrier" of ozone gives the opportunity to obtain biologically active preparations in oily form, which is easy to apply and which penetrates deep into the skin. The undoubted advantage of such products is their natural origin, which is important for many users.

The process of ozonation of olive pericarp from olive oil is carried out by passing ozone created in generators through the liquid while maintaining appropriate process parameters, including liquid viscosity, gas bubble size and speed at which it flows. Based on these parameters, the optimal time for ozonation is determined.

There are no products of this kind on the market that would have the status of medicinal products. Instead, we find a number of cosmetics or paramedical preparations whose durability, and thus their bioactive effect, according to the manufacturers' declarations, should last for a few to several months. Among the microorganisms, the most sensitive are Gram positive bacteria and anaerobic bacteria (among them we find many species responsible for skin infections), followed by Gram negative bacteria and yeast-like fungi. The results of in vitro tests, in line with methods usually adapted for the needs of such tests, confirm the antimicrobial properties of not only the ozone preparations themselves but also the oil itself. Of course, as you would expect, the activity of the ozonated product is significantly greater than that of olive oil alone. Differences in the number of surviving microbial cells are already observed after a few to several minutes of contact with ozone oil. In everyday use of ozone beneficial effects, visible short-term effects should be taken into account thanks to the way products are applied.

The combination in one product of the beneficial properties of natural substances perfectly tolerated by the human body, gave new possibilities for application in cosmetics and dermatology, both as a preventive measure and in supporting conventional methods of treating skin diseases. Antioxidants contained in products not only improve the appearance of the skin or even rejuvenate it, but through the action of active oxygen both on the surface and in the deeper layers of the skin, they increase tissue oxygenation, which means improving cell metabolism, which translates into improved local microcirculation and acceleration of regeneration of damaged tissues.

Ozonotherapy as one of the unconventional methods of treatment, used in Poland since the 80s of the last century, has an established position as a method supporting basic treatment in cases of difficult to heal wounds, i.a. such as trophic ulcers, diabetic foot ulcers, neurogenic ulcers, bedsores or burns of various origins. The development of biologically active preparations based on natural raw materials makes the beneficial properties of ozone widely available, both as cosmetics and preparations supporting the treatment of skin diseases.