

Ozone Therapy in the Dermatology



In the dermatology "the universality" of ozone therapy is explained by physico-chemical properties of medical ozone and a wide range of its therapeutic effects: bactericidal, viricidal, fungicidal, anti-inflammatory, stimulating, immunomodulating. More often ozone therapy is used in a complex with traditional methods to speed up the healing process, but it can also be used as a monomethod. A treatment course of one nosological form includes several methods of ozone therapy.

Dermatovenereology

In the dermatology the most frequently used methods are minor ozonated autohaemotherapy in the treatment of allergodermia, acne, herpes; ozone chambers in the treatment of varicose symptocomplex (as a variant - ozone caps in the treatment of alopecia areata); intravenous infusions of ozonated saline solution in the treatment of angitis, severe forms of allergodermia, alopecia, lichen planus; subcutaneous ozone injections in the treatment of alopecia, acne disease, lipodystrophy.

One of the central mechanisms of positive action of O₃ in different diseases is correction of hypoxic conditions by increasing deformability of the erythrocytes, partial oxygen tension in arterial blood, by improving release of oxygen by oxyhemoglobin.

Immunomodulating effects of ozone therapy are related to an increase in the production of cytokines. Of particular interest is the report of H. Kief (1993) about an increase in the level of interleukin 2 and gamma-interferon through ozone therapy provided to patients with allergosis (food allergy, bronchial asthma, atopic dermatitis).

The investigation into the effect of ozone therapy on the course of HIV-infection was a starting point for studying the mechanism of immunocorrective properties of O₃. The results of the experiments "in vitro" have shown that ozone is able to inactivate extracellular HIV in the organism's liquids and suppress the growth of intracellular HIV in concentrations being safe for cells. It has been established that the antiviral effect of ozone includes destruction of virus particles, inactivation of reverse transcriptase and disability of virus to adhere its receptor to target cells. The investigations have shown that by conveying O₃ through virus-containing liquid it comes to complete inactivation of virus, chronically infected cells treated with ozone lose their ability to initiate infection in case of joint cultivation with intact sensitive cells. Thus, O₃ is a promising method of inactivation of human retroviruses in the organism's liquids and blood preparations.

The experimental investigations conducted by Italian scientists V. Bocci and L. Paulesu in 1990 established that ozone acts on monocytes and lymphocytes as an inducer of cytokines towards the production of interferon and tumor necrosis factor and apparently on many other immune functions as well. V. Bocci supposes that these cytokines in turn can activate further lymphoid cells, lead to immunostimulation without side effects. Of great importance are the data about absence of carcinogenic and teratogenic effects of moderate ozone concentrations. The use of high ozone concentrations for external applications allows achieving a viricidal effect. Through interaction of microorganisms with high ozone concentrations it comes to elimination of both bacteria and viruses resulted from oxidative destruction of their capsulated membrane. Cleavage products of DNA and RNA were found out through ozone by different authors. Disturbances of physical properties of membranes occur due to changes in the composition of their lipid fraction in case of excessive

free-radical oxidation. The mechanism of action of high ozone concentrations is of great importance for practical medicine i.e. for treatment of trophic ulcers, burn surfaces and infected wounds with ozone/oxygen gas mixtures.

Nowadays, dermatovenerology and dermatocosmetology are the fields of medicine where ozone therapy is widely used in the form of parenteral methods of introduction, treatment of damaged areas with O₂/O₃ gas mixtures and ozonized external remedies, in particular ozonized olive oil. High ozone concentrations are indicated for bactericidal and mycocidal action, low ozone concentrations - for inactivation of viruses and immunomodulating effects. The mechanisms of sanogenesis of ozone therapy in atopic dermatitis are most well-investigated. It has been shown that improvement of clinical picture is associated with normalization of immune indices, activation of some enzymatic antioxidants along with non-stimulation of lipid peroxidation, increase in the levels of histaminopexia and serotoninopexia. Nowadays, ozone therapy of atopic dermatitis is performed in the form of minor ozonated autohaemotherapy, rectal insufflations of O₂/O₃ gas mixtures, intravenous infusions of ozonated saline solution, major ozonated autohaemotherapy, applications with ozonized olive oil. Thanks to similar etiology and pathogenesis ozone therapy is effective in another allergodermia as well, in particular - eczema. The generally accepted method of laboratory control over efficiency and safety of ozone therapy is determination of lipid peroxidation products, spectrum of enzymatic antioxidants, in particular superoxidismutase and catalase of the erythrocytes and integral index - total antioxidant plasma activity.

The ability of ozone to inactivate viruses is used in the treatment of dermatosis of viral etiology, in particular herpes, the method of choice is major ozonated autohaemotherapy. J. Delgado et al. (1997) reported about efficiency of subcutaneous injections of O₂/O₃ in the treatment of pemphigus.

The use of ozone therapy in the treatment of viral diseases is especially actual in the conditions of growing spread of HIV-infection. The important aspect explaining a positive influence of ozone therapy in AIDS is the action of ozone on causative agents of opportunistic infections (herpes, mycosis, folliculitis). Besides, ozone can not only inactivate HIV, but also stimulate immunocompetent cells through normalization in the level of T-helpers and relationship Tx/Tc. The efficient antiviral effect of ozone is proved by evidence about complete disappearance of pointed condylomas in women after applications with ozone-containing drug products. Nowadays, ozonized olive oil has a hygienic certificate and is a remedy for cosmetic care. Its production requires lengthy perfusion of O₂/O₃ gas mixture with high ozone concentrations through a column of olive oil. As a result of reaction between ozone and unsaturated fatty acids it comes to formation of peroxides characterized by low reactivity. While gaseous ozone exerts an instant bactericidal effect, the effect of ozone-related oily products can last for many hours. Ozonized olive oil has well-manifested fungicidal properties and can be efficiently used in the treatment of onychomycosis caused by *Tr. rubrum* and yeast fungi.

Ozonized olive oil is also used in the treatment of trophic ulcers, microbic eczema, chronic ulcerous pyoderma, herpes. The use of ozonized olive oil in the treatment of different pyodermas is proved by in vitro investigations of its bactericidal activity.

Dermatocosmetology

The high therapeutic efficiency of ozone therapy can be considered as a basis for its successful use in dermatocosmetology. Nowadays, ozone therapy is used in the treatment of acne, cicatricial changes, alopecia, for correction of age related changes. Ozone therapy is most widely used in the form of subcutaneous injections of O₂/O₃ gas mixtures.

One of variants for external application of O₃ is balneotherapy that can be used

in both large dermatological clinics and SPA salons. Baths with ozonated mineral water are indicated for disturbances of peripheral blood circulation, varicosity, trophic ulcers, eczemas. Mineral water facilitates improvement of diffuse processes in skin so that tissues, blood bed and lymphatic system receive not only oxygen and ozone, but also mineral substances.

In the treatment of acne minor ozonated autohaemotherapy is recommended for use. Nowadays, ozone therapy is considered as a successful method of treatment for acne rash of moderate stage of severity as well as acne conglobata. The dynamics of indices of pro- and antioxidant systems through ozone therapy in acne rash is well studied. In many cosmetological clinics priority is given to cosmetic injections of O₂/O₃ gas mixtures into and around the elements of acne rash that should not exclude the systemic methods of ozone therapy.

Besides, nowadays ozone therapy is also used in cosmetological surgery. Subcutaneous ozone injections at concentrations of about 10 mg/L during the operations of liposuction and blepharoplasty provide a disinfectant, oxygenizing and healing effect. At the pre-operative stage the patients can receive rectal insufflations with O₂/O₃ gas mixture that facilitates detoxication of the patient's organism and improvement of operation results. There are some reports about the successful use of ozone therapy for correction of failures in the field of injection cosmetology and lipoplasty.

There are some reports about the efficiency of minor ozonated autohaemotherapy, intravenous infusions of ozonated physiological saline and subcutaneous ozone injections in the treatment of alopecia. In 106 patients with alopecia areata it came to normalization of the initially decreased level of oxygen in the area of alopecia proved by oxymetric method, oxygen deficit in hairs decreased according to the data of gas analysis.

In the treatment of different forms of scleroderma ozone therapy is used as a component of complex treatment in the form of minor ozonated autohaemotherapy, ozone chambers and ozone injections.

The treatment of patients with local lipodystrophy and indurative hypodermatitis by means of subcutaneous injections of O₂/O₃ gas mixture showed well-manifested efficiency of ozone therapy in comparison with traditional methods. J.L.Cidon (1977) believes that subcutaneous introduction of O₂/O₃ gas mixture is a promising method of treatment for cellulites through exposure on degenerative changed fatty tissue. A positive effect of ozone in cellulites and local lipodystrophy can be explained by its influence on the metabolism of fatty tissue and improvement of blood circulation in damaged areas. The Medozons Company manufactures modified models of medical ozone generators with a multi-injector for low-flow injections of O₂/O₃ gas mixtures at great volumes into problem areas, this method received very positive reviews.

Of great interest is correction of vascular defects by means of ozone. In the foreign literature there are some reports about intravascular introduction of O₂/O₃ gas mixture with high ozone concentrations that results in instant coagulation of vascular wall, this method can be used in the treatment of telangiectasia and "vascular stars". Our own observations have shown a good perspective for ozone therapy in complicated forms of rosacea in the form of ozone injections in the field of telangiectasia into the lumen of vessel at ozone concentration of 10 mg/L in combination with subcutaneous ozone injections at ozone concentration of 5 mg/L according to the method of mesotherapy. A positive effect of this new method is characterized by regress of telangiectasia, decrease in facial tissue swelling, regress of pustular rash. We are now developing methods of mesotherapy with ozone for treatment of different complicated forms of rosacea, including pustular, conglobated, granulomatous as well rhinophyma and phymas of different localizations. Pathogenetic links of pathogenesis of rosacea, namely vascular disturbances, disorder of derma connective tissue shell, immune shifts give us a hope for successful use of ozone therapy in the treatment of this pathology providing serious competition

to laser methods.

For today the influence of ozone therapy on the pathology of connective tissue is terra incognita. There are made first attempts of treatment of hypertrophic and keloid scars by means of ozone injections, gathered a successful clinical experience in the treatment of patients with collagenoses proved by positive dynamics of immune indices, data of lipid peroxidation and antioxidant system, improvement of metabolic indices of connective tissue (regulatory protein and fibronectin) in the treatment of patients with atopic dermatitis. Of interest is the investigation of proteolytic activity in the course of ozone therapy. The effects of ozone allowing successfully using ozone in gerontocosmetology are apparently connected with changes of collagenic fibers and certainly - with improvement of oxygen release to tissues, activation of enzymatic antioxidants (in particular catalase of the erythrocytes and superoxiddismutase) that performs an important role in the inhibition of skin aging process.

(N.K.Nikulin, O.A.Bitkina, L.I.Philippova "Ozone Therapy as a New Technology", Journal "Experimental and Clinical Dermatocosmetology", No. 1, 2005)

Before & after therapy pictures from the dermatological practice:



Patient suffered from severe form of rosacea before ozone therapy

Patient after ozone therapy



Patient suffered from acne conglobatae before ozone therapy



Patient after ozone therapy



Acne disease (before treatment)



Acne disease (after ozone therapy)



Chronic pigment purpura (before treatment)



Chronic pigment purpura (after ozone therapy)