

Passport and biological age in the choice of metabolic geroprophylactic therapy

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Abstract. We compared the effectiveness of geroprophylactic means of gas and metabolic therapy (hypoxotherapy, hyperbaric oxygenation, ozone therapy, dry carbonic baths, amino acid arginine, regulatory tripeptides H–Glu–Asp–Arg–OH и H–Lys–Glu–Asp–OH, interleukin-2 in medium therapeutic dosages by their ability to reduce biological age when tested on practically healthy people or patients with mild subclinical forms of polymorbid pathology at the age of 35 - 74 years. It has been established that the effectiveness of agents and effects in terms of the degree of decrease in biological age depends on the type of geroprophylactic agent, as well as in the part of research - the passport age of patients. In this case, the biological age of the subjects after treatment decreased in the range from 12.8 to 1.3 years, depending on the means used and, in some cases, on the passport age. The greatest efficiency was achieved after the use of a combination of peptide bioregulators in the age group with a passport age of 35 - 59 years. When prescribing metabolic geroprophylaxis, it is necessary to take into account, in addition to the indications and contraindications of the means used or the correction method, the state of the body, also the calendar age and the degree of decrease in biological age.

1 Introduction

In preventive geriatrics, there is a large selection of drugs and methods to slow down the processes of age-related involution of the body. [1, 2, 3] The belonging of drugs and physiotherapeutic effects to geroprophylactic or geroprotective is very conditional. [4] Such drugs belong to the independent drug groups used in the treatment of specific nosology (immunomodulators, antihypoxants, vitamins, drugs that improve cerebral and peripheral blood circulation, normalize lipid metabolism, antihypertensive drugs, etc.) Moreover, the mechanism of the geroprophylactic action of these agents and methods will also be different, however, a certain relationship is often traced between the processes of gerontogenesis and pathogenesis of a particular nosology [5, 6, 7] Thus, the study of the relationship between the rate of aging and the risk of oncogenesis led to the appearance of a classification of the antitumor activity of geroprotectors: 1) substances that lengthen the latent period of the tumor and thereby increase the life expectancy of potential tumor

carriers (antioxidants); 2) drugs that increase the life expectancy of the body due to a decrease in the rate of its aging and the incidence of tumors (epithalamin, melatonin); 3) substances that increase survival at a young age [2].

There is a point of view that antihypoxants can be attributed to geroprotectors, since the relationship of aging and hypoxia in most cases is proved. Among the group of antihypoxants, a subgroup of antioxidants is distinguished, which combine antihypoxic activity with antioxidant and (or) antiradical action. The founder of the group of antihypoxants is oxygen itself [7, 8].

Not only pharmaceuticals can be used to prevent aging. The geroprotective effectiveness of the enterosorption method using various kinds of biologically active sorbent substances has been established [2]. The complex use of extracorporeal detoxification, oxygenation and antioxidants led to the suppression of lipid peroxidation syndrome with stabilization of cell membranes, normalization of genome functions and enzyme activity in patients of different ages [9, 10]. In elderly patients, it is often necessary to simultaneously prescribe several drugs due to the presence of polymorbidity, which further increases the risk of side effects and complications of pharmacotherapy [11, 12]. The danger of complications of drug therapy in older people is especially great: significant pharmacokinetics and pharmacodynamics peculiar to the elderly have been identified, which lead to deviations in the metabolism of drugs. The expansion of the registry of non-pharmacological methods of geroprophylaxis is now becoming increasingly important, since polypharmacy in modern medicine and geriatrics is one of the causes of the spread of iatrogenic.

The use of non-drug methods, including metabolic agents and gas therapy in geriatric practice and nonspecific geroprophylaxis, can reduce the drug load and the associated risks of complications, as well as physiologically correct gerontogenesis [9, 13, 14].

When prescribing individual geroprophylaxis, as a rule, the age group of patients is not taken into account. But the metabolism of the body, the pharmacokinetics of drugs in the body of different ages can vary. A separate problem in carrying out geroprophylactic measures is control over its effectiveness.

When evaluating the effectiveness of methods of nonspecific geroprophylaxis, objective integrated methods for tracking the state of the body, including those based on measuring changes in the patient's biological age (BV) index, are rarely used [15, 16].

Objective: to compare the effectiveness of the use of geroprophylaxis of gas therapy and the metabolic mechanism of action according to the degree of their ability to reduce BV in middle-aged and elderly people.

2 Materials and methods

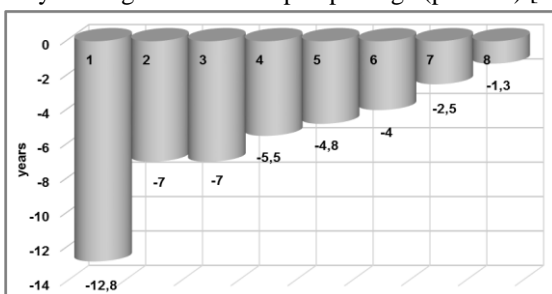
The study at the clinic of the war veterans hospital and the Institute of Medical Cell Technology (Ekaterinburg) involved 1250 subjects of both sexes: almost healthy or with subclinical forms of polymorbid pathology in the stage of persistent remission from 35 to 74 years old (35-59 - middle groups, 60 - 74 - elderly), with standardized laboratory parameters within the reference values. Exclusion criteria from the studied and control groups were the presence during the examination and (or) a history of less than 12 months before the study of acute or subacute conditions for any nosological forms, injuries, massive surgical interventions, the use of anesthesia, moderate and (or) severe stages of acute or chronic pathology, malignant tumors, severe functional failure. Representatives of the studied groups within 2 to 4 weeks received the following therapeutic effects in medium therapeutic dosages or regimens: hyperbaric oxygenation (HBO) sessions (BLKS-301M and OKA-MT-S "Barocenter", Moscow, Russia), daily for 40 minutes 1.3 - 1.8 ATA total of 10 sessions, dry carbon dioxide baths ("REABOX - SUV", "Prima-Med", Moscow,

Russia) 40 minutes a day for 8 days [17], hypoxotherapy (breathing in a hypoxic gas mixture with 10% oxygen - GHS-10 - 12 daily procedures lasting 40 minutes in a cyclically fractionated mode, alternating exposure to HBO and dry carbon dioxide baths, ozone therapy (ozonizer "Medozons", Nizhny Novgorod, Russia), 6 intravenous transfusion sessions in 20-30 minutes. ozonated for 15 minutes saline solution once every 2 days [9, 17], interleukin-2 (Roncoleukin-2, Biotech LLC, St. Petersburg, Russia) intramuscularly 0.5 mg (500,000 ME) once a day every other day for 10 days (5 injections in total), H – Glu – Asp – Arg – OH (pinealon) and H – Lys – Glu – Asp – OH (vesugen) (HBO LLC, RAS, Firma Vita, g. St. Petersburg, Russia) 1 capsule (20 mg of active ingredient) 2 times a day for 20 days, L-arginine (Vazoton, Altayvitamins CJSC, Biysk, Russia) orally for 14 days, 500 mg 2 times a day. For each of the listed effects, the studied and control groups included from 17 to 25 people. Control groups did not receive this treatment.

Before and after treatment, the subjects studied BV [18, 19, 20]. The results were processed statistically according to nonparametric and parametric criteria.

3 Results and its discussion

It was found that all the means and methods of exposure used by us had the ability to reduce BV. The degree of geroprophylactic effectiveness varied depending on the method of exposure and, in terms of research, on the calendar age of the subjects. The results of the effectiveness of reducing BV after treatment (compared with BV before treatment and taking into account the indices of the control groups) are located in the following sequence: combined use), H – Glu – Asp – Arg – OH and H – Lys – Glu – Asp – OH led to a decrease in BV in the group of elderly people by 12.8 years ($p < 0.01$), and in middle age by 3.9 years, vesugen - 7 years ($p < 0.01$), regardless of age; interleukin-2 - by 7 years ($p < 0.001$), regardless of the calendar age; dry carbon dioxide baths - by 5.5 years ($p < 0.001$), regardless of the calendar age; hypoxotherapy - by 4.8 years ($p < 0.001$) only in middle-aged people; alternating exposure to dry carbon dioxide baths and hyperbaric oxygenation by 4.6 years ($p < 0.01$) regardless of calendar age; hyperbaric oxygenation - by 4 years ($p < 0.001$) and ozone therapy – by 2.5 years ($p < 0.05$) only in middle-aged people; amino acid L-arginine - by 1.3 years regardless of the passport age ($p < 0.05$) [9, 17, 21] (fig. 1).



1. The combination of H – Glu – Asp – Arg – OH and H – Lys – Glu – Asp – OH, a decrease in BV by 12.8 years ($p < 0.01$) in the elderly group;
2. Interleukin-2, a decrease in BV by 7 years ($p < 0.001$), regardless of the calendar age;
3. H – Lys – Glu – Asp – OH, a decrease in BV by 7 years ($p < 0.01$) regardless of the calendar age;
4. Dry carbonic baths, - 5.5 years ($p < 0.001$), regardless of calendar age;
5. Hypoxitherapy, a decrease in BV by 4.8 years ($p < 0.001$) only in middle-aged people;
6. Hyperbaric oxygenation, a decrease in BV by 4 years ($p < 0.001$);
7. Ozone therapy, a decrease in BV by 2.5 years ($p < 0.05$) only in middle-aged people;
8. L-arginine, a decrease in BV by 1.3 years ($p < 0.05$), regardless of passport age.

Fig. 1. The magnitude of the decrease in bio-age (BV) of the subjects using various geroprophylactic agents

All the geroprophylactic regimens studied by us were based on the use of means and methods of metabolic therapy, a special case of which can be considered gas therapy. Our general impressions of the metabolic therapy that we used for at least 2 decades have allowed us to highlight several of their characteristics: the principle of treatment is the exposure to the body's natural metabolites, a wide range of indications, the absence or minimum of contraindications, the use of various routes of administration to the body (inhalation, oral, parenteral), has as its primary acceptor the elements of metabolism in the cell itself (enzymes, substrates, products of chemical reactions, receptors, secondary messengers), absent or minimal side effect, as a leading result, the normalization of the leading indicators of metabolism is initially present, but, as a rule, there is a need for prolonged use of metabolic effects to achieve a stable effect [5, 9, 17, 21].

In the light of these ideas, our results on a comparative characteristic of the effectiveness of geroprophylactic drugs indicate the priority use of the most effective in terms of BV if it is necessary to quickly achieve the effect, as a rule, if a patient has a sharply accelerated type of aging (according to BV or other criteria).

Therefore, it should be noted that the strategy of choosing one or another of the studied geroprophylactic schemes should in no case be determined only by the value of their ability to reduce biological age.

4 Findings

1. The different efficiencies of the used gas therapy agents and metabolic effects, which after treatment led to a decrease in biological age in the range from 12.8 to 1.3 years (years), depending on the type of correction, and in a number of studies, passport age, are shown.

2. The greatest efficiency was shown by the combined use of the peptide bioregulators H – Glu – Asp – Arg – OH and H – Lys – Glu – Asp – OH in the age group of 35–59 years, the use of L-arginine, gas hypoxic therapy, and hyperbaric oxygenation was least effective in old age.

3. When prescribing metabolic geroprophylaxis agents, calendar age, biological age, as well as indications and contraindications from the used method or means of correction and the patient's body condition should be taken into account.

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