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The comparative study of the antioxidant activity of dairy mixtures for child nutrition is done. Fluorescein fluorescence intensity dependencies are obtained on the logarithm of the concentration of infant formula, from which IC50 values are graphically determined. A suppression of the action of free radicals and an increase in fluorescence of fluorescein up to 78-96% with a concentration of samples of 0,5 mg / ml are observed.

Keywords: antioxidant activity, dairy mixtures for child nutrition, fluorescein.

When studying the mechanisms of manifestation of antioxidant activity (AOA) of milk, the dependence of its level on the conformation and amino acid sequence of proteins and peptides was established. A comparative study of the antioxidant activity of 8 dairy mixtures for child nutrition from different manufacturers was carried out: "GA hypoallergenic 1+", "GA hypoallergenic 2+", "GA hypoallergenic 3+", "Immunis 1+", "Comfort", "Antireflux" company "Bellakt" (Belarus), "NAN Optipro HA 1+" (hypoallergenic), "NAN Optipro 1+" by Nestle (Switzerland). The mixtures "GA hypoallergenic 1+", "GA hypoallergenic 2+", "GA hypoallergenic 3+", "Comfort" and "NAN Optipro HA 1+" (hypoallergenic) contained partially hydrolyzed milk whey protein. The "Immunis 1+", "Antireflux" and "NAN Optipro 1+" mixtures contained non-hydrolyzed milk protein with a predominance of milk whey proteins.

The method for determining AOA with respect to activated oxygen species (ROS) is based on measuring the fluorescence intensity of the oxidizable compound and its decrease under the influence of ROS. In the present work for the detection of free radicals fluorescein is used, which has a high extinction coefficient and is close to 1 quantum yield of fluorescence. Free radicals were generated using the Fenton system, in which hydroxyl radicals are formed upon the interaction of a complex of iron (Fe₂) with ethylenediaminetetraacetic acid (EDTA) and hydrogen peroxide [2-4]. When fluorescein interacts with free radicals, its fluorescence is quenched, which can be restored by adding substances exhibiting antioxidant properties to the system.

For all samples, the dependences of the fluorescence intensity of fluorescein on the logarithm of the concentration of dairy mixtures were obtained. Studies were carried out in a wide range of concentrations of 0.01 - 1 mg / ml. Samples of dairy mixtures began to show AOA at a concentration of 0.01 mg / ml. With a subsequent increase in the concentration of dairy mixtures, an increase in the suppression of the action of free radicals and an increase in fluorescence of fluorescein to 78-96 % are observed at a concentration of samples of 0.5 mg / ml. The IC50 indicators are graphically determined – the concentration of dairy mixtures at which 50 % inhibition of free radicals is achieved. It is known that the antioxidant activity of milk proteins is due to the reducing properties of the amino acid radicals of tryptophan, tyrosine, methionine and histidine [1].

Maximum AOA was obtained for the "NAN Optipro 1+" dairy mixture. Suppression of free radicals is achieved up to 95 %. A sample of the "NAN Optipro HA 1+" dairy mixture inhibited the effect of free radicals by 82 %.

Hypoallergenic mixtures of "GA hypoallergenic 3+" and "GA hypoallergenic 2+" restored the fluorescence of fluorescein by 96 %. The lowest AOA of hypoallergenic mixtures was shown by the sample "GA hypoallergenic 1+". He restored the fluorescence of fluorescein by 81%, which is comparable with the sample of the "NAN Optipro HA 1+" dairy mixture.

The "Antireflux" dairy mixture restored the fluorescence of fluorescein by 93 %, which is comparable to the samples of the NAN Optipro 1+, "GA hypoallergenic 3+" and "GA hypoallergenic 2+" dairy mixtures.

Samples of dairy mixtures "Comfort" and "Immunis 1+" suppressed the effect of free radicals to 78 %, which is 1,2 times lower than the same parameters for dairy mixtures "NAN Optipro 1+", "GA hypoallergenic 3+" and "GA hypoallergenic 2+".

Dairy mixtures "NAN Optipro HA 1+", "HA hypoallergenic 1+", "GA hypoallergenic 2+", "GA hypoallergenic 1+" and "Comfort" contain partially hydrolyzed whey protein, whereas the "NAN Optipro 1+", "Antireflux" and "Immunis 1+" dairy mixtures - non-hydrolyzed whey proteins. The hydrolysis of whey proteins, as well as the degree of hydrolysis, have a positive effect on the increase in AOA of milk proteins [3, 4]. However, the dairy mixture "NAN Optipro 1+" without hydrolyzed protein shows a higher AOA than the dairy mixture "NAN Optipro HA 1+". The dairy mixture "Antireflux", also not containing hydrolyzed protein, has a higher AOA than the dairy mixtures "HA hypoallergenic 3+", "GA hypoallergenic 1+" and "Comfort".

Dairy mixtures have a fairly complex set of components. In particular, they contain a mixture of unsaturated fatty acids, carbohydrates (sugars lactose and maltodextrin), trace elements (zinc, iron, copper, selenium) and vitamins (A, E and C) that can affect antioxidant activity. Each of the dairy mixtures has differences in the content of several of the listed components, which complicates the analysis of their effect on AOA.

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