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INFLUENCE OF TANACAN® ON LIPID PEROXIDATION OF RED CELL MEMBRANES IN CHILDREN WITH INSULIN-DEPENDENT DIABETES MELLITUS (IDDM)

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We studied the influence of Tanacan (Egb 761) on free radical processes in children with IDDM. We have discovered an increase in the level of lipid peroxidation products and in the intensity of chemiluminenescence in patients with diabetes. After two weeks of Tanacan administration we found a decrease of the concentrations of malondialdehyde and conjugated dienes, and of the intensity of chemiluminescence. However, by the end of the month of Tanacan administration we observed an increase of all the parameters of lipid peroxidation compared to the values after two-week Tanacan administration. It is apparently connected with the attenuation of the pharmacological effect.

INTRODUCTION

Drugs with antioxidant effects have been widely used in complex therapy of certain diseases. Recent studies have shown that activation of free radical processes either provokes the development of disease, e.g. it is a primary factor of pathology, or accompanies the pathological process throughout its late stages and aggravates it.

Methods of correction and control of peroxidation intensity are becoming the integral part of the complex treatment of patients with insulin dependent diabetes. Therefore drugs that show a wide spectrum of pharmacological activity (normalization of energetic balance, rheological indices, protection of cell membranes) together with antioxidant effects are of special value.

Tanacan (Egb 761) preparation can be included in this group. Tanacan is a vegetable extract isolated from *Ginko biloba*. It consist of flavonoids glycoside (24%) and terpene substances (16%) and has a significant pharmacological effect (Table 1).

The aim of the investigation was to study the influence of Tanacan (Egb 761) on free radical processes in red cell membranes of children with IDDM.

MATERIALS AND METHODS

We have studied red cells of 25 children with IDDM. Blood was taken from the antecubital vein affter overnight fasting. Erythrocytes were washed three times with physiological saline.

Malondialdehyde level was measured with thiobarbituric acid. Conjugated dienes were measured in heptane/isopropanol extracts of erythrocytes at 233 nm. Intensivity of the peroxidation processes was estimated by measurement the method of Fe^{2+}-H_2O_2-induced chemiluminescence. The inten-

Table 1. The spectrum of pharmacological activity of Tanacan (Egb 761)

	Flavonoid glycosides (24%)	Terpene substances (16%)
Haemodynamic effect	+++	+
Cell metabolism	+	+++
Antioxidant effect	+++	–
Rheological effect	+	+++

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sity of chemiluminescence (I_{max}) and intensity of impulses (S) were determined.

Tanacan (Egb 761) was administered to IDDM children at the age of 7–18 y at a dose of 1 ml per os three times a day during the meals. The indices of lipid peroxidation have been analyzed before treatment, after 2 weeks and after one month of Tanacan administration.

Statistical evaluation of differences with the help of Med-Stat program. Reliability of the differences was evaluated to using the Student "t" test.

RESULTS

We found that in the group of patients examined before antioxidant therapy, the concentration of malondialdehyde in red cell membranes increased by 63.4% ($P < 0.001$), the concentration of conjugated dienes increases by 50.8% ($P < 0.001$) (Fig. 1) and intensity of chemiluminescense of native erythrocytes by 91.2% ($P < 0.01$) and S by 205.5% compared to the control group (Fig. 2).

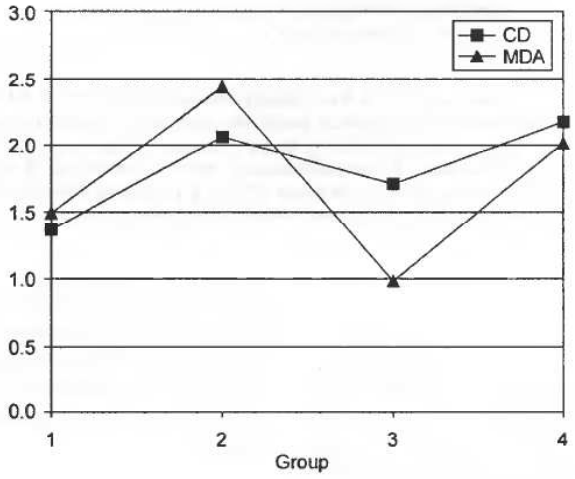

Fig. 1. Concentration of products of lipid peroxidation: conjugated dienes (in absorbance units), malondialdehyde (μmol/l) in erythrocytes of children with IDDM in the process of Tanacan (Egb 761) treatment; 1. Control group; 2. Patients before treatment; 3. Patients after two-week Tanacan administration; 4. Patients after one month Tanacan administration

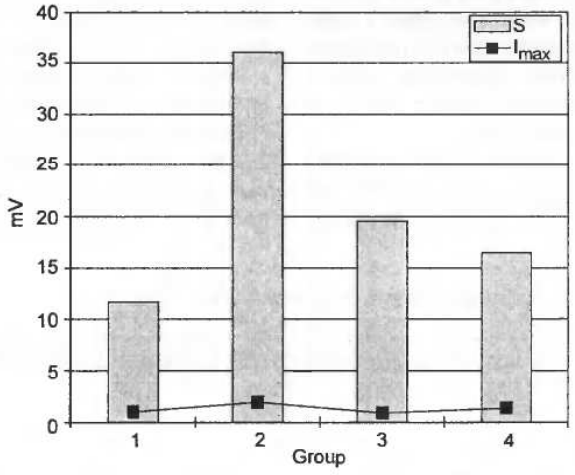

Fig. 2. Indices of chemiluminescence of erythrocytes in children with IDDM in the process of Tanacan treatment (Egb 761); 1. Control group; 2. Patients before treatment; 3. Patients after two-week Tanacan administration; 4. Patients after one month Tanacan administration

After 2 weeks of Tanacan administration the level of malondialdehyde in patients decreased by 59.2% ($P < 0.001$) and the level of conjugated dienes decreased by 34.8% ($P < 0.01$) in comparison with the values before treatment (Fig. 1). The comparative analysis of parameters of chemiluminescense of native erythrocytes in patients before treatment and after 2 weeks of antoxidant therapy revelated that I_{max} and S decreased by 52.4% ($P < 0.01$) and 47.1% ($P < 0.001$) (Fig. 2).

After a month of Tanacan administration by patients with IDDM, concentration of malondialdehyde increased by 104.5% ($P < 0.001$), concentration of conjugated dienes increased by 27.5% ($P < 0.001$) in comparison with two weeks of treatment. However, these values remained lower than it was before treatment. Comparing the parameters of chemiluminescense of native erythrocytes in patients who were examined after two-week and after one month treatment, the decrease of I_{max} by 47.5% ($P < 0.001$) was discovered in the latter case.

Thus, after one month Tanacan treatment a certain increase of all the lipid peroxidation indices was observed in comparison with the two-week course. Though these indices still remained lower than before antioxidant preparation administration, it suggests that either the organism has adapted to Tanacan (Egb 761), or some additional antioxidant defence measures are necessary. The obtained results can be of high clinical value, since they allow not only to control the conducted antioxidant therapy, but also to organize an optimum scheme of treatment of patients with IDDM considering the period of the highest pharmacological activity of the preparation.