MOLECULAR INTERACTIONS OF FAT-SOLUBLE VITAMINS (RETINOL AND ALPHA-TOCOPHEROL) WITH THE PARAMETERS OF THE FUNCTIONAL CONDITION OF THE ERYTHROCYTIC MEMBRANES IN EVENKIA CHILDREN

T.A. Kolodyazhnaya, O.I. Zaitseva, V.T. Manchuk, G.N. Kazakova
SRI of the medical problems of the North SD RAMS, Krasnoyarsk city
Director – member-correspondent of RAMS V.T. Manchuk
Krasnoyarsk State Medical University named after prof. V.F. Voino-Yasenetsky
Rector and Professor Ivan P. Artyukhov

Resume. In healthy children of the indigenous (18) and newcomers Evenkia from 1 to 3 years studied the structural and functional properties of erythrocyte membranes with defined lipid profile, levels of fat-soluble vitamins (retinol and alpha-tocopherol). Established physical and chemical properties of erythrocyte membranes: performance mobility of molecules in the surface and in the hydrocarbon regions, the level of structured water and the degree optical lability. The method of pair correlation relationships found that fat-soluble vitamins (retinol and alpha-tocopherol) are often ambiguous functional properties with respect to the molecular structure of erythrocyte membranes in children of different ethnicity.

Key words: Evenkia, children, erythrocytic membranes, liposoluble vitamins.

Introduction. Adverse environmental conditions of the North Asian promote considerable growth of various deviations in the health status of children of non-indigenous population to 3 years [5], which may affect the structural and functional properties of their membranes, primary adaptive changes [1]. In these extreme conditions of high role of lipid metabolism, energy supply to the body of the child is particularly important fat-soluble vitamins (retinol and tocopherol) [7]. They are an integral part of the antioxidant system of non-enzymatic nature. From them depends largely on the structural integrity of biomembranes and their functional activity. [2,10]. As the structural components of biomembranes, retinol, and tocopherols functionally complement each other and are closely connected. And she is so strong that vitamin A in the absence of tocopherol oxidized and quickly destroyed. It is known that

retinol in biological membranes is associated with localized surface phospholipids and protein-lipid complex. Accordingly, they influence their metabolism [10].

Tocopherols are localized in the hydrophobic regions of phospholipids, supporting the necessary density of their packing, limiting the access of oxygen to the acyl chains. It should be emphasized that the above mentioned functions tocopherol is able to perform only in the biologically active state. This condition is ensured by the presence of ascorbic acid in the system, which supports its steady-state level, preventing the formation of toxic tokoferilhinona. [10].

Real metabolic manifestations of fat-soluble vitamins (tocopherol and retinol) in the structure of biomembranes is impossible to determine without taking into account the state of their structure and function. The study of lipid structure of erythrocyte membranes and their biophysical properties, including the determination of levels of intramembrane-soluble vitamins (alpha-tocopherol and retinol) and membrane-structured water, will reveal their antioxidant or prooxidant properties. The absence of such studies have identified the relevance of the study of the problem. Universal model for studying the state of cell membranes is the erythrocyte [6].

Objective: to study the molecular interaction of retinol and alpha-tocopherol with the parameters of lipid metabolism and physical-chemical state of erythrocyte membranes in children from 1 year to 3 years of different ethnic origin living in the Evenkia.

Materials and methods. Were examined by healthy children of the indigenous (18) and newcomers (18 people) aged 1 to 3 years old, living in the village of Tura Evenkia). Were examined 36 healthy children. The study was conducted based on the kindergarten of the village.

In the erythrocyte membranes were determined: lipid profile by thin layer chromatography [9], the level of fat-soluble vitamins, alpha-tocopherol and retinol-fluorimetric method [11], physical-chemical properties by measuring the fluorescence spectra of interaction of biomembranes with probes [3]. These measurements were made on the spectrofluorimeter MPF-4 firm, Hitachi (Japan) in a quartz ultromikrokyuvete 0,1 X 0,1 cm with a slit width of excitation and emission 8 nm.

Investigated the following parameters of physical and chemical state of erythrocyte membranes: the degree of fluorescence associated with the superficial layer of the membranes of negatively charged probe ANS (1-anilinonaftalin-8 - sulfonate) [3], characterizing the total charge of the surface layer of erythrocyte membranes; indicators reflecting microviscous properties of erythrocyte membranes deep (fluidity of the hydrophobic layer of erythrocyte membranes in relation excimers / pyrene monomers) and surface (motility area of protein-lipid interactions by reciprocal anisotropy of the probe 1-anilino-naphthalene sulfonate-8) layers of erythrocyte membranes. Along with that assessed the degree of optical lability [12] and the

asymmetry of fluidity of erythrocyte membranes. Using the fluorescent probe 4-demitilaminohalkona (DMC) found the degree of hydration of the erythrocyte membrane [3] according to the reciprocal of the fluorescence of the probe.

Mathematical processing of the results was performed using a standard package of statistical programs STATISTICS ver.6.0 [8]. To ensure the unity of the methodology used nonparametric methods. The significance of differences between groups when comparing two independent sample set using the nonparametric Mann-Whitney test (M-B). Results of the study of quantitative parameters in the comparison groups are presented in the form of Me-Media, 25% - 75% - percentile. The changes considered statistically significant at a significance level of P <0,05. The analysis of dependence symptoms was performed by calculating and assessing the significance of the nonparametric Spearman's Rank Correlation.

Results and discussion. The research results presented in table number 1, showed that the content of alpha-tocopherol, the children of this age group, significant ethnic differences were found, while the concentration of retinol in children Evenkia was lower compared with those newcomers to 26,5% (n = 0,0088). However, indicators of lipid and phospholipids in the structure of erythrocyte membranes were not marked ethnic differences, except for a slight increase of free fatty acids (FFA) in the group of Evenkia children (P = 0,0818) and statistically significant increase (12,3%) degree of order in the hydrophobic area of the phospholipid molecules (reduced flow index) of the erythrocyte membranes (p = 0,0465). This has contributed to changes in the molecular relationship of surface and inner layers of erythrocyte membranes in children Evenkia. They found an increase in the exponent of the asymmetry of flow of surface and deep layers of erythrocyte membranes by 22, 7% (p=0,0209) compared with children of newcomers. Such a state of plasma membranes of red blood cells show a more pronounced conformational processes in the surface lipid layer of the white-plasmolemma erythrocytes in relation to the hydrophobic layer of phospholipids. Data transformation, in our opinion, are connected with vitamin A, which promotes the formation of positive charges on the protein-lipid surface of red blood cell membranes. This is evidenced by a moderate positive correlation relationship between retinol and an exponent of binding a negatively charged probe ANS (r = 0,506, p = 0,0455). This probe, negatively charged has the ability to bind to positively charged molecules only in the surface region of biomembranes and reflects the quantitative content of positively charged molecules.

Along with this have retinol in erythrocyte membranes of children Evenkia found antioxidant function. This is evidenced by a moderate direct correlation between the above mentioned vitamin with general quantity of phospholipids (r = 0,496 p = 0,0598). The fact that

retinol exhibit antioxidant properties with respect to phospholipids, proves not only the biological activity of metabolites of retinol, and alpha-tocopherol, which contributes to their conservation, while in the biologically active (reduced) [10]. Direct correlation between vitamin E with an exponent of fluidity of hydrocarbon layer of phospholipids (r = 0,552, p = 0,0267).

In children, the alien population Evenkia correlations of fat-soluble vitamins with indicators of functional properties of erythrocyte membranes showed a completely different metabolic manifestations of these vitamins. They have virtually no links pointing to the antioxidant function of the studied vitamins. However, sufficiently established a strong positive correlation levels of membrane alpha-tocopherol with the index of the optical lability (p = 0, 712, p = 0.0020). The indicator shows the ratio of degrees of polarization and depolarization background biomembranes [12]. Correlation between in this case may reflect the influence of vitamin "E" to shift the balance of capacities and, therefore, to work acetylcholine receptors, which are simultaneously and ion channels that regulate membrane permeability to sodium and potassium ions [2]. In this context, traced a direct correlation between the optical index of lability to the level of membrane-structured water (the reciprocal of the fluorescence of DMAC) (p = 0, 508; p = 0,0314). It is known that the transport of ions are dissolved in water status [2].

Conclusion. Using for food by the children from an early age of animal products contain high levels of fat-soluble vitamins, retinol, and tocopherols, has developed adaptive devices, particularly in relation retinol. It is known that this vitamin in its liposoluble form, being of highly compound, with even mild imbalance in the antioxidant system can become prooxidants [10]. Therefore, we obtained a significant reduction in the level of retinol in the structure of erythrocyte membranes is regarded as an adaptive activation of cellular metabolism that entails increased consumption of the vitamin in children Evenkia.

Identified antioxidant properties of vitamin "A" and "E" in the structure of erythrocyte membranes show that these vitamins and their metabolites in children Evenkia are biologically active. It is sufficient to maintain the antioxidant system in red blood cells.

In children, the alien population increased level of retinol in the structure of plasmolemma erythrocytes does not ensure its sufficient biological activity. In the alpha-tocopherol in the absence of express antioxidant characteristics in relation to membrane phospholipids and retinol found a link, proving its preserving function with respect to integral proteins, providing potassium sodium exchange. Lack of warning signs, reflecting the antioxidant function of fat-soluble vitamins in children alien population, shows no balance not only the above mentioned vitamins (retinol and tocopherol), but also protein, fat and other related components to ensure the metabolic conversion of these vitamins, so they get new

hydrophilic properties [4]. In our opinion, this can be achieved only at the use of natural, adapted to the conditions of the North with food or dietary supplement is as close to the food (fish oil northern species of fish, seaweed, etc.).

Thus, the study of the relationship of fat-soluble vitamins (retinol and alpha-tocopherol), erythrocyte membranes and their lipid structure and physical-chemical characteristics increase information availability and the physiological significance of these vitamins, child's body. The effectiveness of the processes of functioning plasmolemma erythrocytes caused not so much of these vitamins in the structure of membranes, as their quality characteristics, it means, biological activity, as determined by complex relationships that form the physiological level of optimal organization of the maintenance of prooxidant-antioxidant balance of the organism of the child.

Table 1.

The indexes of the content of retinol, alpha-tocopherol and biochemical and physical-chemical parameters in healthy children of the population of Evenkia (Me 25%-75%)

Analyzed indexes	Ethnical belonging		The degree of the reliability of the differences
	Evenks n = 18	Russian n=18	
Retinol, mcmole/l	0,4300 (0,4000-0,5400)	0,5849 (0,4900-0,6900)	p =0,0087
Apha- tocopherol, mcmole/l	7,1300 (5,8400-9,8000)	8,4250 (5,7550-10,010)	_____
Available fatty acids (AFA), mcmole/l	0,832 (0,493-1,115)	0,582 (0,427-0,897)	p = 0,0818
Fluidity of the deep layer of the membranes, rel. unit	0,371 (0,318-0,390)	0,423 (0,359-0,488)	p= 0,0465

Mobility of the superficial layer (1/anisotr), rel.unit	2,375 (2,130-2,488)	2,220 (2,045-2,421)	_____
The degree of the skewness of the fluidity, rel.unit	6,444 (5,943-7,030)	4, 980 (4,115-6,338)	p=0,0209
Fluorescence, rel.unit	30,850 (29000-33,850)	32,000 (30,600-34,300)	_____
The level of the structured water (498) rel.unit	0,020 (0,018-0,023)	0,0214 (0,019-0,024)	_____
Optical liability (p/dp), rel.unit	7,190 (6,545-7,475)	7,060 (6,460-7,410)	_____

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Pregnancy and prenatal outcomes of juvenile mothers of Yakutsk

Grigorieva N.A., Savvina N.V.
North-East federal university named after M.K. Ammosov

Introduction

The period from 10 to 20 years old (in some countries to 24 years old) was recommended by international experts to be considered as “teenage” in Geneva in 1987. Teenage pregnancy is said to occur when a women aged between eleven and nineteen period. Pregnancy at teenage period was and continues to be the problem of public health care [1].

There is now the common opinion in literature about prevalence complication pregnancy and its outcome in young age. The majority of scientists think that young mothers have more complication than old ones [1, 3, 4, 5, 6, 7]. But some authors notice that there are no statistical significant differences to perinatal complications between young mothers and old ones [8, 9, 10].

During last years in our country the growth of somatic and gynecological morbidity of teenage girls is being marked. Deceases, that took place in child and teenage do not pass without consequences and afterwards complicate pregnancy and childbirth, exert bad influence on the