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Склад сироватки пуповинної крові після низькотемпературного зберігання за –40°C

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Cord Blood Serum Composition After Low-Temperature Storage at –40°C

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Cord blood serum (CBS) is actively used in experimental and preclinical studies, to treat a number of pathologies, in the field of cell technologies and tissue engineering. An important issue is the storage of CBS in order to maximize the preservation of its composition and biological properties. Foremost, it is solved by using the methods that ensure long-term preservation of the biomaterial, such as freezing down to liquid nitrogen temperature or lyophilization. However, assuming that currently in Ukraine, blood components and products are most widely used at blood transfusion stations and medical institutions, where freezing equipment that maintains temperatures from –30 to –40°C is mainly used, it is important to study the effect of these temperature conditions on preservation of blood components. Therefore, the aim of our work was to study the effect of low-temperature storage at –40°C on the human cord blood serum composition.

Human cord blood was obtained from the umbilical vein of the postpartum placenta, with the informed consent of the women. Blood samples were kept for 15 min at room temperature. After retraction of the blood clot, samples were centrifuged at 3,000 rpm for 10 minutes. The separated supernatant, *i. e.* CBS was poured into 1.0 ml cryovials, frozen at a rate of 1°C/min to –40°C, and then stored at this temperature for 1 month. After low-temperature storage, the content of protein fractions in CBS, as well as the levels of hormones (prolactin, human chorionic gonadotropin (hCG), alpha-fetoprotein (AFP), cortisol, and somatotropic hormone (STH)) were studied using the immunoenzymatic analysis.

The content of total protein, protein fractions (albumin, alpha-1, 2-globulins, beta- and gamma-globulins) and the levels of prolactin, hCG, AFP, cortisol and STH in human CBS were determined before and after storage at –40°C. It was found that after 1 month of storage at a temperature of –40°C, the content of total protein, protein fractions, and levels of hCG, AFP, cortisol, and THG in CBS remained at the level of native serum, and the content of prolactin decreased insignificantly.

Thus, the obtained results showed that low-temperature storage of cord blood serum at a temperature of –40°C for one month led to an insignificant decrease in the content of prolactin, and did not affect the content of total protein, protein fractions, levels of human chorionic gonadotropin, alpha-fetoprotein, cortisol and somatotropic hormone.

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Transcriptomic Analysis of Genes Expressed After Carotid Endarterectomy: Searching for New Pathways for Cerebral Ischemic Tolerance

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Ischemic stroke is a serious disease and the second leading cause of death in the European Union. Carotid stenosis accounts for 15% of all ischemic strokes. A potentially beneficial therapeutic method to induce tissue tolerance to ischemia has so far been studied mainly in animal models (Furman, 2023). The aim of this study is to investigate changes in the expression of cerebral ischemia genes in human patients during carotid endarterectomy (CEA), and these changes are thought to be a potential activator of ischemic tolerance. Patients undergoing CEA were divided into Symptomatic and Asymptomatic groups according to the occurrence of symptomatic atherosclerosis and stroke before CEA itself. The third specific group was the Oxymetric group with a drop in oxymetry during CEA below 20%. The last group was the negative control group containing healthy individuals who had not undergone stroke or CEA. Peripheral whole blood of the control group and patients after CEA was collected and blood cells were separated and stored at –80ºC until the actual microarray analysis. The results of the microarray analysis show us the presence of 791 genes with a significant fold change in expression rate > ±2 compared to the negative control in the Sym group, and the number of genes specific exclusively to this group was 523. For the Asymptomatic group, there are 688 genes, of which 422 are specific exclusively for this group. In the Oxymetric group, we found the occurrence of 637 genes, of which 359 are specific exclusively for this group. When compared to the negative control, hundreds of genes out of more than 20,000 genes tested came out as specific genes expressed exclusively in our test cohorts. When overlapping between the groups, only dozens of genes with the potential to participate in the pathways of induction of ischemic tolerance were already present.

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Furman, M. *et al.* (2023) 'Quantitative analysis of selected genetic markers of induced brain stroke ischemic tolerance detected in human blood', Brain Research, 1821, p. 148590. doi:10.1016/j.brainres.2023.148590.