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Вплив холоду на кровообіг у людей з різним соматотипом та рівнем артеріального тиску

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Effect of Cold on Blood Circulation in People With Different Somatotypes and Blood Pressure Levels

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One of the key tasks of peripheral blood circulation in the limbs is its role in regulating body temperature, which affects peripheral blood flow resistance (Acevedo, 2017; Gapon, 2019). To assess changes in peripheral blood flow in medical practice, the method of rheovasography of the upper or lower extremities is often used together with a cold test (CT). The use of this test in combination with other diagnostic methods makes it possible to detect early signs of various diseases, including hypertension, which makes it a predictor of the functional state of the body and the detection of disorders in the early stages (Zhao, 2015). Somatotype expresses an important set of signs that allows predicting the features and reactions of the body to external influences (Carter&Heath, 2002), including exposure to cold.

We formed two groups of examinees aged 18-22 years. The first control group consisted of people whose blood pressure (BP) corresponded to the optimal level according to the WHO classification (125 people). Group II consisted of individuals whose systolic blood pressure exceeded 130 mm Hg at the time of the study, and (or) diastolic – 85 mm Hg (135 people). Somatotyping of the examinees was carried out using the Carter and Heath method [Carter&Heath, 2002]. Recording of rheovasograms (RVG) was carried out with the help of the 'Reokom' computer complex. After recording the initial RVG of the hand, it was cooled by immersing it in an ice water bath with a temperature of 3-5ºC for 1 min (Tsyganenko *et al.*, 2018), after which the RVG was recorded again at the 3rd and 7th min. A case when the rheographic index at the 3rd minute of the test decreased within 5–9% relative to the initial state, but was restored to the initial level at the 7th min, was considered as a negative cold test. Positive CT was determined if the rheographic index decreased by more than 10% relative to the initial state on the 3rd min and was delayed for recovery on the 7th min. A normal reaction was associated with a negative CT.

It was established that among people with normal blood pressure, negative CT was found in the majority of the examined, which indicated a normal reaction of blood vessels to the influence of cold in this group. In the case of those examined with elevated blood pressure, the percentage of people with negative blood pressure was significantly ($p < 0.05$) lower. Spastic processes in blood vessels were observed in individuals with elevated blood pressure and an endomorphic physique. A hypotonic reaction was characteristic of individuals with a predominance of the ectomorphic component of the somatotype with elevated blood pressure, while the development of a mixed type of arterial dystonia during CT was confirmed for mesomorphic individuals with elevated blood pressure.

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Вплив білків AIMP1/p43 та EMAP II на клітини злоякісної пухлини

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Effects of AIMP1/p43 and EMAP II Proteins on Malignant Tumor Cells

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Modern medicine requires the development of new stable and non-toxic drugs based on recombinant proteins with targeted action that inhibit pathological processes. The AIMP1 protein, also known as p43 or proEMAP II, is an important component of the mammalian multi-tRNA synthetase complex (MSC) and performs a number of cytokine functions. AIMP1/p43 is a predecessor of the endothelial monocyte-activating polypeptide EMAP II, which plays a key role in proinflammatory and antitumor processes. AIMP1/p43 is an effective agent against cancer in xenograft models in mice (Lee; 2006) with gastric cancer cells (Kim; 2006). The antitumour activity of EMAR II has been demonstrated in prostate adenocarcinoma cells (Barnett; 2000), glioma cells (Chen; 2016) and breast cancer cells (Berger; 2000).

We have studied the cytotoxic activity of recombinant AIMP1/p43 and EMAP II proteins in the MDA-231 cell culture. These proteins were produced in Escherichia coli BL21(DE3) pLysE cells and purified by metal-chelating chromatography. MDA-231 cell line was used to model breast cancer. The cells were trypsinized, washed, counted (10,000/well), transferred to a 96-well plate with complete DMEM-F-12 medium and incubated for 24 hours. Then the cells were washed with PBS buffer and DMEM-F-12 medium without fetal serum was added to the cells for 18 hours. After that cells were treated with MTT solution for 3 hours. In a living cell the MTT substance is converted into formazan crystals, which was measured using a digital spectrophotometer μQuant (Biotek, USA) at 540 nm (Mosmann; 1983).

Studies have shown that the viability of malignant cells is reduced under the influence of AIMP1/p43 and EMAP II proteins. All studied doses of proteins inhibited cell development. The greatest effect of AIMP1/p43 and EMAP II was observed at doses of 0.15 nM. At these concentrations survival of MDA-231 cells under the influence of AIMP1/p43 was 55.57% of the control, and under the influence of EMAP II – 61.29%. It should be noted that with increasing doses of cytokines a decrease in the cytotoxic effect of both proteins was observed. The last doses of AIMP1/p43 and EMAP II with a concentration of 9.5 mM are close to the control.

Thus, the recombinant cytokines AIMP1/p43 and EMAP II inhibit the development of cancer cells, especially at low doses. These protein preparations may be promising tools in the fight against cancer, which require additional research to determine their use in clinical practice.