CHARACTER OF CHANGE IN THE THERMAL CONDUCTIVITY COEFFICIENT OF RABBIT LYMPH IN DIFFERENT PARTS OF THE LYMPHATIC SYSTEM

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The thermal conductivity coefficient of lymph in various parts of the lymphatic system was measured with microthermistors. Starvation was found to affect the thermal conductivity coefficient of lymph of the intestinal trunk and the temperature of the lymph in the thoracic duct affected its thermal conductivity coefficient.

KEY WORDS: lymph; thermal conductivity; temperature; starvation.

The thermal conductivity coefficient of solutions of high polymers, consisting of particles of different components, varies essentially on the composition and concentration of the components of the solution [2].

The dependence of the thermal conductivity coefficient of rabbit lymph taken from various parts of the lymphatic system on the temperature of the lymphatic fluid and on the dietary conditions was investigated.

EXPERIMENTAL METHOD

Experiments were carried out on 71 adult rabbits of both sexes. The animals were anesthetized with pentobarbital, ether, and alcohol.

Laparotomy was performed through a midline incision from the xiphoid cartilage to the public region (along the linea alba). The lumbar lymphatic trunk, lying alongside the abdominal aorta, was exposed. Lymph was collected from the lumbar lymphatic trunk by means of an insulin syringe at the level of vertebrae L2-3 and also from the intestinal trunk. Thoracotomy was then performed and lymph taken from the thoracic duct at the level of vertebrae T4-5. The thermal conductivity coefficient of lymph taken from these vessels, in a volume of 0.3 ml, was determined.

The lymph was introduced into a 0.3-ml fluoroplasm cell and a type MT-64 microthermistor was lowered into the lymph in the cell to a strictly definite depth. The resistance of the thermistor was measured with a type MO-62 bridge twice. The first measurement (R_0) was made with the thermometer working in a dissipated power of 0.2 mW, the second measurement (R_t) immediately after the first, when the thermistor was working with a heat source with a dissipated power of 5 mW. The thermal conductivity coefficient of the lymph was calculated by the equation deduced and justified by Kamenskaya et al. [1].

EXPERIMENTAL RESULTS

Analysis of the results showed that if the temperature remained constant (20.8°C) and other conditions were equal, the thermal conductivity coefficient of lymph obtained from different parts of the lymphatic system was unchanged in value: thoracic duct 0.485 ± 0.003 W/m · deg, intestinal trunk 0.486 ± 0.003

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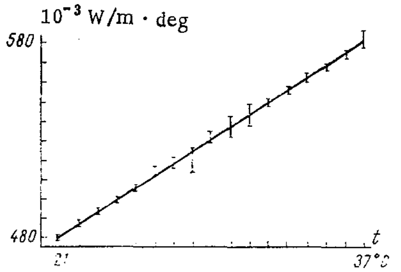

Fig. 1. Thermal conductivity coefficient of lymph from the thoracic duct as a function of its temperature.

W/m · deg, and abdominal trunk 0.488 ± 0.004 W/m · deg (probability of significance P = 99.9%). A decrease of 14.5% in the thermal conductivity coefficient was found for lymph of the intestinal trunk after prolonged starvation of the animal, down to a value of 0.415 ± 0.012 W/m · deg (P = 99.9%). Characteristically the thermal conductivity coefficient for lymph taken from any of these parts of the lymphatic system varied substantially depending on the external environmental temperature. The thermal conductivity coefficient of lymph of the thoracic duct is shown in Fig. 1 as a function of its temperature 25 min after collection. This function may be affected by structural changes in the lymph taking place in experiments conducted under these conditions.

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