Magnetic Resonance and Coronarographic Study of Rat Heart During Artificial Hypobiosis

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The research aim was to study the functional activity of rat myocardium and coronarographic examination of great blood vessels of the rat heart during artificial hypobiosis.

The experiments were carried out in accordance with the statements of the European Convention for the Protection of Vertebrate Animals used for Experimental and other Scientific Purposes (Strasbourg, 1986). In experiments, white outbred male rats weighing 180–200 g were used, maintained under standard vivarium conditions. The animals were divided into two groups (n = 7 in each): the 1st control group was intact animals (control); the 2nd experimental one made the animals with the state of artificial hypobiosis (experimental group). The state of artificial hypobiosis was initiated by the Bakhmetev-Giaja-Andjus method under the effect of hypercapnia, hypoxia and hypothermia factors (they were placed in a hermetically sealed chamber of 3 dm³ at 4°C and kept for 3 hrs) [S.D. Melnychuk, 2007]. Functional activity of rat heart was imaged with a magnetic resonance tomography Achieva 1.5 T (Philips Medical Systems Nederland B.V., The Netherlands). Coronarographic study of rats were performed with a CT scan of Brilliance CT 64-section configurations (Philips Medical Systems, Inc., USA) using ULTRAVIST 370 contrast agent (Bayer, Germany). The rats of control group were immobilized by ether anesthesia. Rectal temperature was measured with Gamma Thermo Soft thermometer (UK). The data were statistically processed using Student’s t-criterion, p ≤ 0.05.

The results of magnetic resonance study showed a significant reduction of myocardium heart rate in rats at artificial hypobiosis from (380 ± 2) to (70 ± 2) beats per min (in six times if compared with the control); reduction of blood volume in cardiac chambers. The coronarographic study of rat heart great vessels during artificial hypobiosis showed a significant decrease (by 14 ± 3 s) of the velocity of vascular bed of rat blood, as compared with the control.

Thus, functional activity of myocardium and velocity of vascular bed of rat blood are decreased during artificial hypobiosis suggest a low physiological activity of organism under hypobiotic factor.