Effect of AIMp1/p43 protein on heart function in hypertension

Aminoacyl-tRNA synthetase-interacting multifunctional protein 1 (AIMP1, also known as p43), is one of the main components of the multi-aminoacyl-tRNA synthetase complex. AIMP1/p43 has an anticancer effect and plays important role in immune response, angiogenesis, wound healing, and glucose homeostasis. Hypertension is accompanied with diastolic dysfunction, decreased the pumping and myocardial contractile functions. We have recently shown that the AIMp1/p43 derivative endothelial monocyte-activating polypeptide-II (EMAP-II) improves diastolic function in hypertension, decreased oxidative and nitrosative stress and increased the synthesis of NO.

The aim of work was to investigate the effect of AIMp1/p43 on the heart function in spontaneously hypertensive rats (SHR).

The research was conducted on six-month Wistar and SHR male rats. The functional cardiohemodynamic indicators registered via Pressure-Volume System. The recombinant p43 (0.85 µg/kg) was administered intraperitoneally.

We found that AIMp1/p43 administration improves parameters of heart pumping function in SHR. It was shown that after p43 in SHR stroke volume increased by 11.5%, cardiac output increased by 22% (p<0.05), ejection fraction increased by 18.8% (p<0.05). It was shown that after AIMp1/p43 administration end-systolic and end-diastolic pressure of SHR didn’t change. Also, AIMp1/p43 administration improves myocardial contractile functions. In SHR after AIMp1/p43 administration index of contractility (dP/dtmax) increased by 53.5% (p<0.01). The end-diastolic myocardial stiffness reduced in 3.2 times (p<0.01) in SHR after p43, arterial stiffness didn’t change.

Thus, AIMp1/p43 has a positive effect on parameters of cardiohemodynamics in hypertensive animals. It increased of heart pumping and myocardial contractile functions and decreased end-diastolic myocardial stiffness.