

11th International NPY-PYY-PP Meeting

in collaboration with
1st International Symposium of the
CRC 1052 „Obesity Mechanisms“

August 22-26, 2015
Leipzig, Gemany

Book of Abstracts

Development of neuropeptide Y-mediated heart innervation

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In the heart, the most prominent source of neuropeptide Y (NPY) is postganglionic sympathetic axons. In some species, e.g. the rat, NPY is also expressed by neurons of the intrinsic cardiac ganglia. However, there are only few works concerning the development of NPY-containing fibers and NPY receptors in the heart during the development.

In the current study, immunohistochemistry and western blotting was used to label NPY, Y1 and Y5 receptors to NPY in the heart tissue and intramural cardiac ganglia from rats of different ages (newborn, 10-day-old, 20-day-old, 30-day-old, 60-day-old, 1-year-old and 2-year-old).

The obtained data suggest age-dependent changes of the NPY-mediated heart innervation. The density of NPY-positive fibers was the least in newborn animals and increased in first 20 days of life. In the atria of newborn and 10-day-old rats, NPY-positive fibers were more abundant in comparison with the ventricles. Y1 and Y5 receptors were found in the heart of newborn and more adult rats. Receptors were observed in the coronary arteries, arterioles and cardiomyocytes. Density of Y1 receptors increased in the first 20 days of life. In contrast, the highest level of expression of Y5 receptors was found in newborn puppies in comparison with more adult rats. All intramural ganglionic neurons were also Y1- and Y5-positive in all studied animals. Thus, the increasing of density of NPY-containing nerve fibers accompanies changes in relation of different subtypes of NPY receptors in the heart during development.

Acknowledgements

This research was supported by Russian Fund for Basic Research grant (N 13-04-00059).