

Neuroanatomy of the rabbit heart and immunohistochemical demonstration of nNOS positive nerve fibers in the rabbit ventricle

In the UK, my research concentrates on autonomic control of the heart using the rabbit and one of my most important findings is that the vagus nerve protects the heart against ventricular fibrillation via a nitric oxide dependent mechanism. However, whilst I use a rabbit model, little is known about the neuroanatomy in this species. It is therefore important to understand the topography of the epicardial nerve plexus in the rabbit and investigate the nitrergic innervation in the ventricle and this why I am collaborating with Professor Dainius Pauza. I visited his laboratory in April 2013 to carry out research utilizing two preparations 1) the whole mount atria preparation which enables a clear identification of the entire supraventricular epicardial nerve plexus, and 2) thin cryostat sections of ventricular tissue which allows you to perform detailed immunohistochemical labeling and identification of neuronal structures deep within the myocardium. We used antibodies raised against the neurotransmitters tyrosine hydroxylase (TH), choline acetyltransferase (ChAT) and more importantly the neuronal isoform of nitric oxide synthase (nNOS) to characterize the phenotype of neuronal structures within the heart. Neuronal structures were revealed using high end state-of-the art fluorescent microscopy and confocal imaging. From my time in Kaunas, we have established that nNOS is present in the intrinsic plexuses in the atria and that nNOS positive nerve fibers are present in the ventricle of the rabbit. These important anatomical discoveries support and confirm the functional effects that I study in the UK.