Histologic Distribution of the Autonomic Nerve Fibers Around the Ostia of the Pulmonary Veins in Humans

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Introduction: The detail of macroscopic distribution of the ganglionated plexi (GP) has been demonstrated and it has been a good reference for the procedure of GP ablation procedure; however, the microscopic information of the peripheral autonomic nerve fiber in human heart around the orifices of the pulmonary veins (PVs) is not well described.

Methods: We examined 16 autopsied adult human hearts without structural abnormalities (mean age: 70.0 y.o., 6 women, mean heart weight: 409.2g). Four PV stalks including the junctions of the LA were totally excised for histologic sections obtaining longitudinal aspect along the blood flow. Sections were stained with azan-Mallory, and nerve fibers were immunohistochemically defined by a marker of peripheral nerve (S-100). We assessed the histological correlations between the muscular sleeve and autonomic nerve fibers at the PV orifices.

Results: The thick peripheral nerve fibers distributed more abundantly in the sections of the anterior wall of all orifices, in comparison of the posterior wall. Furthermore in the anterior wall of the left PV orifices, the muscular thickness was thicker than that of the posterior wall (superior PV; 2.12 vs 1.56 mm, and inferior PV; 1.91 vs 1.13 mm). The nerve fibers including GP located deeply in the epicardial adipose tissue that mainly adhered on the anterior wall of each PV. Each epicardial adipose tissue harbored some additional myocardial fibers including Marshall bundle in the left PV,

coronary sinus musculature or interatrial bundle in the right PV.

Conclusion: The autonomic nerve distributes mainly on anterior wall of each PV orifice adjacent to complex myocardial structure.