Purkinje Fiber Network in Mammalian Hearts, as Revealed by Scanning Electron Microscopy

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It has been established that Purkinje fibers in mammalian hearts are different in cell size and ultrastructure among ungulates (first group), humans, monkeys and dogs (second group), and rodents (third group). In this study, the cytoarchitecture of a network of Purkinje fibers (Purkinje network) in three groups of mammals was studied by scanning electron microscopy (SEM). Purkinje networks in sheep, goats, human and dog hearts were demonstrated three-dimensionally by utilizing the NaOH digestion method.

In the first group (sheep and goats), the Purkinje network composed of Purkinje strands showed a profile resembling a fishing-net. The cells were oval in shape and met side-to-side in addition to end-to-end contact. The Purkinje network in the second group (humans and dogs) showed a delicate and complicated configuration. Purkinje cells were usually cylindrical in shape and connected end-to-end, but were polygonal or stellate in shape at the bifurcations. Purkinje cells in the third group (rats) resembled in cytoarchitecture to ventricular myocytes, but were identified by a small diameter. From SEM analyses of hearts in various mammalian species, it may be suggested that the cell size and the cytoarchitecture in Purkinje networks reflect not only conducting function but also phylogeny.

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