21) Fluorescein Microscopic Studies of Retinal Arterioles in SHRSP

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Introduction: Permeability of retinal vessels in stroke-prone spontaneously hypertensive rats (SHRSP) was histologically studied using fluorescence microscopy. According to our previous studies, hypertensive vascular changes were observed in the retinal arterioles near the optic disc in SHRSP. This paper describes the results of studies on the permeability of the blood-retinal barrier and blood-optic nerve barrier to infusion of fluorescein dye in Wistar Kyoto rats(WKY) and stroke-prone spontaneously hypertensive rats.

Material and Methods: Six to nine-month-old WKY were used as controls and SHRSP of the same age were used in the present study. The blood pressure was measured by the tail pulse pick up method without anesthesia. Fluorescein sodium(0.04cc) was injected intravenously and was allowed to circulate one minute before enucleation. Under intra-peritoneal nembutal anesthesia, the eyes were enucleated and rapidly frozen in isopentane and dry ice. The frozen eyes were dried under vacuum at -35°C and embedded in paraffin. Sections were cut at the thickness of 12µm, placed on glass slides and examined with the fluorescence microscope (exciter filter UG-1; barrier filter, 435 nm) with special reference to the distribution, color and intensity of fluorescence in the tissue.

Results and Discussion: Examination of tissue sections from the eyes of WKY rats which were given fluorescein intravenously showed the characteristic pattern of brilliant green fluorescence within the lumen of the retinal and choroidal vessels and throughout the choroidal stroma. Fluorescein was not detectable in the pigment epithelium, neural retina and optic nerve of WKY rats, although fluorescein was observed within the retinal blood vessel. In SHRSP, fluorescein dye penetrated the blood retinal barrier and fluorescein staining was found around the retinal vessels near the optic disc. When the cerebral tissue of WKY rats were examined by the same methods, fluorescein was not detectable except for the lumen of the cerebral vessels. But in the cerebral tissue of SHRSP, blood flow was blocked by increased intra cranial pressure and fluorescein was detectable neither in the lumen nor the stroma of the cerebral tissues.

Conclusion: It was suggested that fluorescein dyes leaked out of the vessels near the optic in SHRSP due to a remarkable change in the permeability of the vessels of the retina and the optic nerve.