66) The damages of aorta and coronary artery in SHRSP — synthetic estimation of smooth muscle cell and connective tissues contents by principal component analysis —

Kenji Suzuki, Haruhito Kawashimo,* Kokichi Takeuchi, Nobuyuki Abe, Mitsuyo Saito, Midori Endo, Chikao Arai, Motoharu Hasegawa,** Yoshitaka Takayama,*** Hiroyuki Ito, Kozo Okamoto****

Epidemic Institute of Arteriosclerosis,* Department of Clinical Functional Physiology, Faculty of Medicine, Toho University,** Department of Medical Engineering, Toho University,*** Department of Pathology, Kinki University****

With a view to clarifying arterial damage in hypertension, a total of five constituents comprising smooth muscle cell, elastin, collagen, glycosaminoglycans and glycoprotein of aortic and coronary mediae in SHRSP were histochemically determined and damage characteristics of both these arteries were examined by synthetic estimation based upon principal component analysis.

Subjects were aortae of 140 cases including 41 of WKY and 99 of SHRSP of less than 100 days to 500 days and coronary arteries of 133 cases including 57 of WKY and 76 of SHRSP both aged similarly. Tissue was cut off from the 5th intercostal thoracic aorta media for aorta and from the proximal part of the left coronary artery for the same, respectively, fixed in 10% formalin, embedded in paraffin, and then sliced in 4 μ with the JB4A type automicrotome. Each of these five constituents was given a special staining and determined for absorbance by microspectrophotometry. Staining method and maximum absorption wavelength for each constituent was Azocarmin-G, 545 nm for smooth muscle cell, Weigert, 590 nm for elastin, Van Gieson, 559 nm for collagen, Alcian blue, 608 nm for glycosaminoglycans and PAS, 565 nm for glycoprotein, respectively.

The results of the principal component analysis of 5 aortic constituent contents including WKY and SHRSP revealed that factor loading amount for primary principal constituents and secondary principal constituents was 0.830 and -0.180 for smooth muscle cell, -0.794 and -0.106 for elastin, -0.134 and 0.980 for collagen, -0.473 and 0.017 for glycosaminoglycans and 0.80 and 0.09 for glycoprotein, respectively, i.e. smooth muscle cell, elastin, glycosaminoglycans and glycoprotein for primary principal constituents and collagen for secondary principal constituents showed higher weights as factors explanatory of the disturbance. Contribution rate for primary principal constituents was 44.2%, cumulative contribution rate up to secondary principal constituents being as high as 64.4%. Individual scores were determined and distribution areas were examined taking primary principal constituents as X axis and secondary principal constituents as Y axis. The results revealed that WKY represented the left narrow area and SHRSP the right broad area, indicating differences in distribution area and therefore in disturbance characteristics.