45) Physical Characteristic of Aorta in Stroke-Resistant Spontaneously Hypertensive Rats. Chiyo Shiota, Hiroshi Ogawa, Kiyomi Asai, Shinichi Fukushima, and Sukenari Sasagawa. Department of Hygiene, Kinki University School of Medicine, Osaka-fu 589.

It is well known that the changes in physical characteristics of arterial wall are associated with the establishment of hypertension. We previously showed that the aortic walls of stroke-prone SHR (SHRSP) were thicker but more brittle than those of normotensive rats of Kyo:Wistar (KW), but it was not cleared whether these differences are involved a genetic phenomenon related to the etiology of hypertension or simply represent the response of the aortic wall to elevated blood pressure or a combination of the two (Sasagawa *et al.* Jap. Heart J. 20 S1:1-270, 1978). Yamori and Sasagawa suggested that the aortic wall of SHRSR was histometrically much the same to those of SHRSP, but was physically rather similar to those of KW (Jap. Heart J. 16:296, 1975). In the present study, a further investigations in SHRSR were undertaken to clarify whether such differences relate to a low incidence of stroke in SHRSR or not.

MATERIALS AND METHODS:

Forty-nine male and 63 female SHRSR of various ages from 1 month to 9 months were used. The extirpated thoracic aortas were examined with previously reported method of tension-test to obtain the load-elongation curves. The thickness of the aortic wall was measured by an electric micrometer.

RESULTS:

1) The aortic wall of SHRSR thickened rapidly with age. The thickness at the age of 1 month was $103 \pm 3.9 \mu\text{m}$ in male and was $103 \pm 3.3 \mu\text{m}$ in female, and that was $168 \pm 8.8 \mu\text{m}$ in male and was $152 \pm 6.2 \mu\text{m}$ in female at the age of 9 months.

2) "Extension modulus" of the aortic wall, calculated as percentage of the maximum length to the original length, increased with age and reached to a plateau (100-110%) at the age of 3 months in male SHRSR and at the age of 4 months in female SHRSR.

3) The values of "apparent stress" calculated from dividing the maximum load to cause the ductile failure by the cross sectional area, which indicate reciprocals of the brittleness of the aortic wall, showed a rapid increase to the age of 3-4 months and reached to a plateau (about 550 g/mm^2). Then, those tended to decrease at 7-8 months.

DISCUSSION:

The thickness of aortic wall of SHRSR was the same as SHRSP from the age of 1 month to 9 months, however, the plateau level of "extension modulus" was similar to KW, in contrast with the lower level in SHRSP. In general, the values of "apparent stress" in SHRSR were larger than those in SHRSP but smaller than those in KW. In SHRSR the alteration of the values of "apparent stress" with age, however, resemble to that in SHRSP, that is, the values began to decrease at the age of 7-8 months, while those further increase in KW.

The blood pressure of SHRSR were between SHRSP and KW, but some physical characteristics of the aortic wall were not. This fact maybe suggests that the changes of the physical characteristics of the aortic wall do not simply represent the response of high blood pressure in SHRSR and SHRSP. SHRSR and SHRSP were respectively established from SHR by selection. If the physical characteristics of the aortic wall relate to a low incidence of stroke in SHRSR, the "extension modulus", which is obviously different from the aortic wall of SHRSP, will be mentioned first of all.