2) A Study on SHRSP and WKY Hybrids. Kozo Okamoto, Kazuo Yamamoto, Nobuko Morita and Yoshio Ohta. Department of Pathology, Kinki University School of Medicine, Osaka-fu 589.

Reports on SHR and normotensive rat hybrids which indicate that offspring blood pressures are intermediate to those of the parent strains and show that it is not possible to clearly segregate them according to parental blood pressures have already been published (Tanase, et al.: JPN CIRC J 34:1197, 1970; Yen et al.: Heredity 33:309, 1974). Based upon these reports, we conducted a research project to see whether or not it would be possible to develop individual colonies which show varied blood pressure levels, ranging from those of SHRSP to those of WKY, through appropriate crossbreeding of SHRSP, WKY and their offspring.

METHOD Various crosses were made using inbred strains of SHRSP and WKY. The blood pressures, body weights and plasma renin activity (PRA) levels of their offspring were measured. Blood pressures were taken using the tail-pulse pick up method without anesthesia; PRA was determined by radioimmunoassaying the concentration of angiotensin I. Following natural death, the animals were autopsied, and pathologically examined.

RESULTS (1) SHRSP and WKY hybrid (WSP) blood pressures were intermediate to and unlike either of the parental strains. (2) Hybrids developed by crossing WSP with WSP had blood pressures nearly the same as their WSP parents. It was not possible to segregate them into SHRSP and WKY groups. (3) Backcrossing of WSP with SHRSP or with WKY also resulted in rats with blood pressures intermediate to their respective parents and it was again impossible to segregate them into SHRSP or WKY groups. (4) Crossbreeding WSP with WKY for three generations (subsequently referred to as WSP-W F_1 , F_2 and F_3) and crossbreeding WSP with SHRSP for two generations (likewise WSP-SP F_1 and F_2) resulted in rats with blood pressures intermediate to those of their respective parents. The blood pressures of the first group, however, tended to gradually lower until by generation F_3 , they were very close to WKY. The blood pressures of the latter group tended to gradually rise and approach that of SHRSP. (5) Crossbreeding WSP-W ($F_1 \times F_1$; $F_2 \times F_2$ and $F_3 \times F_3$) as well as crossbreeding WSP-SP ($F_1 \times F_1$ and $F_2 \times F_2$) resulted in rats with blood pressures nearly identical to those of their respective parents. (6) while stroke lesions were found in WSP-SP F_2 , none were seen in any of the other groups. (7) PRA levels in WSP-SP F_1 and F_2 were higher than in WKY. This was particularly true of the latter group. On the other hand, PRA was lower in WSP-W than in WKY. (8) Findings regarding body weights showed that WSP and WSP-W were heavier than either SHRSP or WKY, but that WSP-SP tended to be heavier than SHRSP and lighter than WKY.

CONCLUSION Hypertension in SHRSP does not follow simple Mendelian law. SHRSP stroke lesions disappear as a result of crossbreeding with WKY. If additional crossbreeding with WKY is conducted for several generations their blood pressures revert to close to normotensive levels. It appears that it may be relatively simple to produce strains of rats with various levels of blood pressure through different combinations of crossbreeding SHRSP and WKY.

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Blood Pressure and PRA of Crossbred Offsprings of SHRSP and WKY (Males, 15-30 Weeks of Age)