23) Genetic Analysis of Severe Hypertension in Stroke-prone SHR (SHRSP) — Preliminary Report. Yukio Yamori, Katsumi Ikeda, Akira Ooshima, Ryoichi Horie, Yasuo Nara, and Michiya Ohtaka. Japan Stroke Prevention Center, Department of Pathology, Shimane Medical University, Izumo 693.

SHRSP, which was obtained by successive brother and sister inbreeding from among SHR, develop severe hypertension in comparison with SHRSR. Although SHRSP are unique genetic models for stroke researches, essential genetic differences between SHRSP and SHRSR remain unsolved. However, as far as specific characteristics in SHRSP other than severe hypertension were concerned the qualitative difference in the cerebrovascular permeability between them was experimentally noted by YAMORI et al. (Jap. Circul. J., 39:611, 1975), and further this difference was quantitatively analyzed using YAMORI'S PREPARATION-II (HORIE, R and YAMORI, Y: Jap. Heart J., 19(4), 1978), and the results suggested that such characteristics might be essential genetic differences.

On the other hand, genetic studies on hypertension in SHR showed that one major gene and other several genes with relatively minor effect were involved (Tanase et al.: In "Prophylactic Approach to Hypertensive Diseases", Raven Press, New York, 1979 (in press)). SHRSP develop severe hypertension more quickly in younger age than SHRSR (Yamori et al.: Jap. Circul. J., 38:1095, 1974). In the present study, the heredity of severe hypertension in SHRSP, which was of course the greatest risk factor of stroke, was analyzed by the method of statistical genetics.

Basic data for analyses were obtained from blood pressures in the F_1 generation obtained by cross breeding between (SP-1 and SR-2), in the F_2 generation ($F_1 \times F_1$), and in the generations obtained by back cross breeding between F_1 and SP-1 or SP-2. Blood pressure in these rats at the age of 50 to 100 days after birth were repeatedly checked by the tail-pulse-pickup method.

Using these data, the following genetic parameters were calculated. The degree of genetic determination and the heritability at the age of 51 to 90 days after birth were 0.65-0.46 and 0.40-0.23, respectively. The minimum number of loci involving in the development of severe hypertension at the ages of 51 to 90 days, was 0.2-1.9. All these results of genetic parameters are summarized in Table.

Age (days)	50-60	60-70	70-80	80-90
Degree of Genetic Determination	0.648	0.49	0.542	0.456
Heritability	0.337	0.401	0.233	0.200
Minimum Number of Loci	0.2	0.9	1.9	1.7

The degree of genetic determination suggested that severe hypertension, halfly determined by genetic and environmental factors, respectively, would be preventable by changing environmental factors especially at the initial stage of hypertension. And the relatively small number of loci involved in the heredity of severe hypertension seemed to develop their effects mostly at the age of 90 days. Since the number of major genes involved is relatively small, the genetic pathogenesis of severe hypertension in SHRSP, controlled by these major genes, could be clarified, and the establishment of method for the prevention of stroke from the genetical point of view, may be promising.

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