6) Studies on Prediction of Hypertension in Spontaneously Hypertensive Rats (SHR) (1) Application of Cold-induced Adrenomedullary Hyperresponsiveness into Men. Yukio Yamori, Masayuki Mano, Masahiro Kihara, Yasuo Nara, Ryoichi Horie, Hiroyuki Kunishi and Jiro Endo. WHO Collaborating Center for Research on Primary Prevention of Cardiovascular Diseases, Shimane Medical University, Izumo 693.

Introduction

The establishment of SHR and stroke-prone SHR (SHRSP) which develop hypertension and stroke 'spontaneously', has enabled us to study experimentally prevention and prediction of hypertension and stroke. Our previous study in SHR and SHRSP compared with normotensive Wistar-Kyoto (WKY) showed urinary epinephrine (E) excretion in response to cold exposure was clearly increased not only at 12 weeks of age after the development of hypertension but also at 4 weeks in prehypertensive stage, indicating adrenomedullary hyperresponsiveness in genetic hypertensive models. Thus, sympatho-adrenomedullary hyperfunction appears to be involved in the pathogenesis of genetic hypertension and its detection in prehypertensive stage may be used for predicting the later development of hypertension. In the present study clinical applicability of such an obvious finding obtained in SHR and SHRSP was tested in healthy normotensive volunteers with and without family history of hypertension.

Materials and Methods

Twenty one healthy normotensive male volunteers aged 24-34 years were divided into age-matched two groups, one with the family history of hypertension (H) whose members had at least one parent with clinically defined essential hypertension and at least 3 out of 4 grand parents being hypertensive, and the other control group without such a family history (N). They were 8 and 13, respectively, and were placed for 2 weeks on 2500 Kcal diet containing either 6 or 25 g of NaCl per day under strictly controlled dietary conditions without smoking and alcoholic drinks. On the last day of low and high salt periods, they evacuated urine in the morning and after being in supine position quietly for 30 min, a plastic bag containing 2 kg of cold water and 2 kg of ice was placed for one min on both lower extremities between the knee and ankle (cold exposure test: CT). Urine was sampled after one hour in supine position following CT and was assayed for E and norepinephrine (NE) by high performance liquid chromatography (Goldstein et al.: CLIN CHEM ACTA 117: 113, 1981).

Results

Blood pressures (BP) at the end of low salt period were 113 ± 3.9 and 105.4 ± 2.1 mmHg in H and N, respectively, significantly higher in H than in N, and a significant rise in BP was noted only in H (116.9 ± 3.5) but not in N (106.5 ± 2.5) after 1 week of excessive salt intake. CT increased urinary E excretion for 1.5 hour significantly greater in H (13.03 ± 2.74 nmol/l) than in N (7.03 ± 0.91) on low salt diet, and during high salt period CT-stimulated urinary E and NE excretions were significantly higher in H (22.41 ± 5.97 , 29.50 ± 4.34) than in N (6.73 ± 1.18 , 17.38 ± 1.67).

Discussion and Conclusion

The present experiment confirmed our previous study that BP in H was significantly higher than in N on low salt diet and that BP rise during excessive salt intake was only observed in H. CT-stimulated urinary E excretion was clearly enhanced in H either on low or high salt diet. These observations, higher BP level on low salt diet, greater salt-induced BP rise and greater CT-stimulated urinary E excretion in normotensive men predisposed to hypertension are consistent with our previous findings in SHR or SHRSP in the prehypertensive stage, can be utilized for early detection of predisposition to hypertension in men.