53) Effect of Salt Loading on Fatty Acid Composition in Various Organs of Stroke-Prone SHR (SHRSP). Shinichi Mochizuki, Yasuo Nara, Katsumi Ikeda, Masahiro Kihara, Masayuki Mano, Ryoichi Horie and Yukio Yamori. Department of Pathology, Shimane Medical University, Izumo 693.

Introduction

SHRSP genetically develop severe hypertension and die of stroke. Recently, membrane abnormalities in various cells have been focused as a genetic phenotype of hypertension. The main constitution of cell membrane are protein and phospholipid. It has not been cleared which constitution, protein or phospholipid, is mainly involved in membrane abnormalities in SHR. A part of membrane characteristics is dependent on fatty acid composition of phospholipids, that is saturated and unsaturated fatty acid. To determine whether fatty acid composition was changed in SHRSP or not, the composition was compared in various organs of SHRSP and Wistar Kyoto rats (WKY). Also, the effect of salt on the fatty acid composition in these organs were examined in order to observe a secondary dietary effect, if any, on membrane composition.

Methods

Male SHRSP and WKY (5-6 animals in each) at the age of 4 months were fasted for 24 hours and were killed by the removing whole blood from abdominal aorta under anesthesia. In salt loading experiment, animals at the age of 3 months were given 1% NaCl solution instead of tap water for 1 month.

After removing various organs; hearts, thoracic aortas, mesenteric arteries and kidneys, total lipid was extracted from the organs by a method of Blight and Dyer (CAN J BIOCHEM PHYSIOL 37: 911, 1959). Phospholipid fraction was separated with a silica column, and fatty acids of the phospholipids were methylated with a methylating reagent. The methylated fatty acids were analyzed by a gas chromatography (Shimadzu GC-9A) with SS-10 capillary column (0.24 mm in diameter, 50 m in length, Shinwa Kako K.K.). This column was highly polar column and could completely separate arachidonic acid from ercanoic acid.

Results

Fatty acid composition was greatly varied among the organs in both strains. In mesenteric arteries, arachidonic acid (AA) composition was significantly higher in SHRSP than that WKY, however eicosapentaenoic acid (EPA) composition was significantly lower in SHRSP. On the other hand, AA composition was significantly lower in renal cortex of SHRSP than that of WKY. AA and EPA composition in hearts and thoracic aortas showed no significant difference between two strains. As EPA composition of mesenteric arteries and AA composition of renal cortex in WKY were decreased by salt loading, significant differences between WKY and SHRSP in these organs disappeared. However, AA composition of mesenteric arteries was not affected after salt loading.

Discussion

These results suggest that the formations of AA in the renal cortex and EPA in the mesenteric arteries might be genetically changed in SHRSP. These changes in fatty acid composition was induced by salt loading in WKY.

This mechanism is not clarified at present. Changes of fatty acid composition in the mesenteric arteries in SHRSP might affect membrane characteristics which may result in altered membrane sensitivity against various factors in hypertension, such as increased reactivity to norepinephrine.

Conclusion

Fatty acid compositions of phospholipid in various organs in SHRSP were compared with those in WKY; higher AA and lower EPA in mesenteric arteries and lower AA in renal cortex were noted in SHRSP. Although AA in mesenteric arteries was not affected, salt loading lowered EPA and AA in mesenteric arteries and renal cortex in WKY, respectively, down to the levels of SHRSP.