3) Effect of Magnesium Administration on Serum Lipoprotein Metabolism in SHRSP. Hiroshi Ogawa, Tomoyo Tanaka and Sukenari Sasagawa. Department of Hygiene, Kinki University School of Medicine, Osaka-fu 589 JAPAN.

From an epidemiological study, it was indicated that there is a possible positive relationship between the dietary Ca/Mg ratio and the death rate of ischemic heart disease. Thereafter, many documents related to the protective effect of Mg on cardiovascular diseases have reported. In particular, it is well admitted that the protective effect is mainly due to the antagonist effect of Mg on Ca. Recently, Yamori et al. reported that a Mg-rich (0.8% Mg) diet decreased the incidence of stroke and prolonged the life span of SHRSP given 1% NaCl in water than in those on a regular diet (0.2% Mg). In addition, Saito et al. reported that Mg in a drinking water reduced the incidence of cerebrovascular lesions in SHRSP. However, very little is known about the effect of Mg on lipid metabolism which is closely related to atherosclerosis. In the present study, we investigated the effect of Mg administration on serum lipoprotein metabolism in SHRSP.

MATERIALS AND METHODS: Male SHRSP and the age-matched male WKY were used at the age of 21 weeks, and divided into two groups (N=6 in each group), respectively. The experimental group was given 2%(w/v) MgCl₂ in tap water and the control group was given tap water. Both groups were fed a regular diet (CE-2, Clea Japan Inc.) and maintained with free access to the diet and the drinking water. At the age of 28 weeks, post-heparin plasma samples were obtained from the jugular vein 3 min after heparin injection without fasting, and lipoprotein lipase (LPL) and hepatic triglyceride lipase (h-TGL) activities were measured by immunoprecipitation-RIA method as reported previously (JPN HEART J 31: 576, 1990). One more week later, serum samples were obtained from the jugular vein without fasting. Serum lipoprotein fractions were separated by stepwisely density-gradient ultracentrifugation. Contents of cholesterol (TC), phospholipid (PL) and triglyceride (TG) were enzymatically determined by commercially available kits. Concentrations of apolipoproteins (apo-) A-I, A-IV, B and E were measured by rocket electroimmunoassay.

RESULTS AND DISCUSSION: A significant decrease in body weight was observed on and after 23 weeks of age (2 weeks after Mg administration) in experimental group of SHRSP, but the growth rate was nearly parallel to the control group after 23 weeks of age. On the other hand, in WKY, no significant difference in body weight was noted between two groups. In addition, Mg administration decreased the drinking water consumption in SHRSP, while it showed no effect in WKY. On the contrary, Mg administration did not affect the food intakes in both strains, in other words, no significant difference between two groups was observed in both strains.

Neither LPL activity nor h-TGL activity was affected by Mg administration in both strains. This indicates that Mg may have no effect on the activities of the rate-limiting enzymes in serum lipoprotein metabolism.

Mg administration for 8 weeks caused no significant change in blood pressure and serum TC and PL concentrations in both strains. Moreover, no significant difference in cholesterol distribution among serum lipoprotein fractions was observed between two groups in both strains. However, Mg administration increased serum TG concentration of SHRSP significantly (p<0.05).

Mg administration significantly decreased serum apoA-IV concentration in WKY, which was due to the decrease in the lipoprotein-free fraction, but the mechanism still remains unclear. On the other hand, in SHRSP, Mg significantly decreased serum concentrations of apoB and apoE. The decrease in apoB was possibly due to the decreases in both VLDL and LDL fractions, and the decrease of apoE was apparently due to the decrease in the VLDL fraction including CM. In addition, Mg significantly decreased apoB/apoA-I which is assumed an atherogenic index. These results suggest that Mg could decrease the absorption of exogeneous (dietary) cholesterol in the intestine and suppress the secretion of VLDL from the liver, following to an anti-atherogenic effect.