59) Prophylactic Effects of Diets Composed of Various Proteins on the Development of Cerebrovascular Lesions in SHRSP--Changes in Lipoprotein Metabolism. Hiroshi Ogawa¹, Tomoyo Nishikawa¹, Sukenari Sasagawa¹, Tetsuo Murakami² and Yoshitomi Iizuka³. ¹Department of Hygiene, Kinki University School of Medicine, Osaka-fu 589, ²Research Institute of Food Science and ³Department of Food and Nutrition, Faculty of Agriculture, Kinki University, Osaka-fu 577.

In our previous papers, we demonstrated that the diet containing adequate amount of fish-protein(K diet) or beef-meat-protein(M diet) shows preventive effect on stroke and elongation of life-span in SHRSP, even if administered from hypertension-established stage. And, we also suggested that a possible relationship between the effect and changes in lipoprotein metabolism. In the present study, we selected three more diets composed of nutritionally different proteins originated from plant or animal, namely soybean-protein, whole egg-protein and milk casein-protein, and examined effects of the diets on lipid metabolism to compare them with that of K or M diet and to get further information about the relationship with prophylactic effects.

MATERIALS AND METHODS:

Three kinds of special diets containing soybean-protein(S diet), purified egg-protein(P diet) and milk casein-protein(Z diet) were prepared as mentioned in the preceding paper. Protein ratio in each diet was adjusted to 22% as crude protein. By using these diets, three experiments were carried out independently. In each experiment, 5 week-old male SHRSPs were used and divided into three experimental groups and one control group. Experimental groups were fed on the special diet from 5, 8 and 10 weeks of age respectively, and a control group on a regular diet(Funabashi-SP diet). Serum samples were obtained from the tail vein except 15 weeks of age, and from the jugular vein at 15 weeks of age under ether anesthesia without fasting. Isolation of serum lipoprotein fractions, measurement of cholesterol content and quantitation of apolipoproteins A-I, A-IV and E were performed as described previously. Serum HDL-cholesterol(HDL-C) was enzymatically determined by commercially available kit(Heparain-Mn²⁺ method).

RESULTS AND DISCUSSION:

Effects of three kinds of diets on serum concentrations and distributions among various lipoprotein fractions of total cholesterol(T.C.), HDL-C and apolipoproteins A-I, A-IV and E were as follows:

On S diet, no significant change in serum concentrations of T.C., HDL-C and apolipoproteins of all experimental groups was observed compared with control group during the experiment. Only at the age of 15 weeks, serum T.C. and HDL-C levels of all experimental groups slightly decreased, which was associated with a slight decrease of apo E content in HDL fraction.

On p diet, serum T.C. and HDL-C levels significantly elevated with increases of serum apo A-I and E levels after switching to P diet at the age of 5 and 8 weeks. But, finally at the age of 15 weeks, those of all experimental groups showed almost the same values as those of control group, and there was no significant difference in distributions of cholesterol and apolipoproteins among lipoprotein fractions of all experimental groups against control group.

On Z diet, serum apo E contents of both 8 and 10 week-change groups were significantly decreased against control group at the age of 15 weeks, while no significant change in serum contents of T.C., HDL-C, apo A-I and apo A-IV was observed. This decrease of serum apo E content was due to the reduction of apo E in HDL fraction, indicating that effect of Z diet on lipoprotein metabolism was relatively similar to that of M diet. In addition, although Z diet was less effective compared with K or M diet, it showed relatively high prophylactic effect among three diets used in the present study as mentioned in the preceding paper. Accordingly, the decrease of apo E content in HDL fraction, which indicates the decrease of apo E HDL in the rat, could be closely related to the prophylactic effect of the diet.