Honored Students' Abstracts

Abstracts for four of the 1979 AOCS Honored Students were inadvertently omitted from the San Francisco meeting abstracts published in the February JAOCS. To provide recognition for these graduate scholars, the abstracts are published below.

The Effect of Dietary Proteins on Lipoprotein Metabolism and Atheroslcerosis in Rabbits. **Susanne K. Czarnecki** and **David Kritchevsky**, The Wistar Institute of Anatomy and Biology, 36th Street at Spruce, Philadelphia, Pennsylvania 19104.

Soy protein is less atherogenic than casein for rabbits fed a cholesterol-free, semipurified diet. Based on the possibility that the difference between these proteins may be due to their arginine/lysine ratios (0.49 in casein; 1.13 in soy), we compared the effect of diets in which the protein component (25%) was casein (C), soy protein (S), casein plus arginine (CA) and soy plus lysine (SL). The remainder of the diet was 40% sucrose, 15% cellulose, 14% hydrogenated coconut oil, 5% salt mix and 1% vitamin mix in all cases. After eight months of feeding, serum cholesterol levels (mg/dl) were: C:174, S-59, CA:129 and SL:106. Serum triglyceride levels (mg/dl) were: C-133, S-95, CA-186, and SL:101, but the liver cholesterol levels were similar in all four groups (17-20 mg/g). Average atheromata (arch + thoracic/2) were: C:1.86, S:0.67, CA:1.90 and SL:1.33. In a second experiment lasting ten months, serum cholesterol and triglyceride levels (mg/dl) were: C:283,81; S:234,53; CA:343,59; and SL:242,70. The average atheromata were: C:0.94, S:0.41, CA:1.11 and SL:0.62. The data show that the atherogenicity of semipurified diets can be affected by the addition of specific amino acids. The addition of lysine to soy increased atherogenicity by 50-100%. The results of the addition of arginine to casein were equivocal. When total rabbit serum lipoproteins were isolated by ultracentrifugation and fractionated by agarose column chromatography, the levels of all the lipoprotein classes were higher in rabbits fed the casein ± arginine diets than in rabbits fed the soy diets. The addition of arginine to casein depressed VLDL (50%) and IDL (25%) levels and increased LDL (59%) and HDL (51%) levels. The addition of lysine to soy protein had the reverse effect; VLDL and IDL levels were increased by 50% and 84%, respectively, and LDL and HDL levels were decreased by 20% and 35%. Total lipid analysis of the lipoprotein classes revealed no major changes among the various dietary groups. The most striking features of the lipid composition were low triglyceride levels in VLDL and IDL and an increase in cholesteryl ester in the lower density classes. When total apoprotein content was analyzed on 10% SDS-polyacrylamide gels, no major changes were detected in any lipoprotein class. However, apoE levels were increased in the lower density fractions isolated from all the dietary groups. These data show that rabbit serum lipoproteins undergo changes in concentration and class distribution depending on the addition of specific amino acids to a semipurified diet containing either casein or soy protein. These changes in lipoprotein profiles may be an important indicator of the effect of animal vs. vegetable protein on atherosclerosis.

Effects of Thyroid Status on the Metabolism of Free Fatty Acids by the Perfused Rat Liver. **W. Keyes** and **M. Heimberg**, Dept. of Pharmacology, University of Missouri, Columbia, MO 65212.

Hypothyroidism is known to be a possible cause of secondary hypercholesterolemia. Our understanding of triglyceride metabolism in thyroid disease, however, is incomplete. Since thyroid disease is often accompanied by change in food consumption, and the hepatic output of triglyceride is exquisitely sensitive to caloric intake, it was important to develop animal models of hypothyroidism and hyperthyroidism in which this factor was controlled. We have found that in rats injected subcutaneously, daily for 7 days with propylthiouracil (10 mg/kg body weight/day) to produce hypothyroidism, or with triiodothyronine (100 μg/kg body weight/day) to produce hyperthyroidism, there is no difference in food consumption from control animals injected in a similar manner with vehicle. Livers from these animals were perfused in vitro with a recirculating system containing washed bovine erythrocytes suspended in Krebs-Henseleit bicarbonate buffer pH 7.4, 3 g/dl purified bovine serum albumin (BSA) and 100 mg/dl glucose. The initial hematocrit was 30%, and the perfusate was continuously gassed with 95% O_2-5% CO_2. After a 20 minute equilibration period, a complex of BSA and [1-^{14}C]-oleic acid (FFA) was infused at a rate of 166 μmol FFA/hour. There was no difference in the uptake of FFA by livers from hypo- or hyperthyroid rats; however, the output of very low density lipoprotein-triglyceride (VLDL-TG) was increased 30% in livers from hypothyroid rats, and decreased 73% in livers from hyperthyroid rats. Ketone body production and the production of CO_2 were increased 91% and 32%, respectively, in livers from hyperthyroid animals. This data may explain in part the changes in VLDL-TG often observed in thyroid disease.

Effect of Hepatoma Growth Period on Host Animal Plasma and Liver Lipid Concentrations. **Martha Matocha** and **Randall Wood**, Texas A & M University, College Station, TX.

A group of 44 male Buffalo strain rats (250 g) were transplanted in the hind limbs with hepatoma 7288CTC and placed on a chow diet. Four animals were sacrificed at three-day intervals, and liver and plasma specimens of individual animals were collected. Total liver and plasma lipids were separated into neutral lipid and phospholipid, and the lipid class concentrations of each fraction were determined for each time period. The fatty acid composition of the major lipid classes was also analyzed. Each of the plasma neutral lipid classes exhibited a distinct change in concentration as tumor growth progressed. Triglyceride concentrations decreased slowly from day zero to the period between the 12th and 15th days, at which time there was a rapid increase which peaked between the 24th and 27th days and then decreased sharply. Plasma cholsterol levels increased slightly until the 18th day, at which time there was a large increase that remained high for the duration of the experiment. Free fatty acids concentrations started to rise on the 9th day, peaked near the 15th day, and then decreased. The percentage of plasma phosphatidyl choline began a gradual rise at the 6th day and continued to increase until it peaked at the 27th day. Lyso-phosphatidylcholine and sphingomyelin percentages show a corresponding decrease. Host liver phospholipid classes exhibited only minor percentage change as tumor growth progressed. The