

maize). It may be concluded that the difference in susceptibility to liver steatosis between the 2 strains does not result from a bad dietary efficiency in the Rhine strain, but rather from a defect in TG assembly to nascent VLDL, which is more pronounced in the Landes strain. This phenomenon occurs even when the geese overfeed spontaneously, and is not related specifically to artificial feeding.

**LPL and HL activities in golden hamster during the suckling period. Influence of the maternal diet.** R Sicart, R Sablé-Amplis, V Millet (CNRS, Université P-Sabatier, rue F- Magendie, 31400 Toulouse, France)

Hepatic lipoprotein lipase (HL) and lipoprotein lipase (LPL) are central enzymes in lipid metabolism. The development of their activities has not been studied in the hamster, a suitable model for studies of lipid metabolism. Therefore, we used hamsters (*Mesocricetus auratus*) to study the changes in the activities of HL and of LPL in inguinal adipose tissue and heart from birth to weaning (21 d). We also examined whether the enzyme activities were influenced by the composition of the maternal diet.

Newborns were obtained from mothers fed *ad libitum* either a standard diet or apples in addition to the same diet. LPL and HL activities [Nilsen-Ehle and Ekman (1977) *Artery* 3, 194–209] were expressed as mU/g fresh tissue (1 mU = 1 nmol of free fatty acid $\text{min}^{-1}$ ). In parallel, plasma insulin (IRI) was measured by radioimmunoassay and carcass lipid was evaluated gravimetrically. Values are given as means  $\pm$  SEM of at least 6 determinations.

Inguinal adipose tissue was not detectable at birth, but appeared at 1 d of age. The weight of tissue increased moderately during the early suckling period (10 d) then rose dramatically until weaning. The percentage of carcass lipid was 2% body weight at birth and reached 18% at 21d. LPL activity emerged with the development of the tissue and exhibited 2 peaks: one at 4 d ( $2\,709 \pm 435$  mU/g fresh tissue), the other at 21 d ( $1\,593 \pm 123$  mU/g fresh tissue). The lowest activity ( $406 \pm 12$ ) was noted at 10 d after birth. LPL activity in cardiac tissue was doubled from birth ( $401 \pm 10$ ) to 10 d ( $933 \pm 79$ ) then returned to the initial values at weaning (21 d). HL activity was low at birth ( $40 \pm 2$ ) and gradually rose until

weaning ( $303 \pm 28$ ). During the first suckling period, changes in LPL activity in adipose tissue were highly correlated ( $r = 0.8$ ,  $p < 0.01$ ) with plasma IRI levels ( $14.4 \pm 2.2$   $\mu\text{U/mL}$  at birth,  $40.4 \pm 3.1$  at 4 d,  $25.9 \pm 3.1$  at 10 d). All the examined parameters, except plasma IRI, were significantly lower during the first days of life in hamsters born to mothers fed the apple-enriched diet (LPL:  $-40\%$  in adipose tissue and  $-20\%$  in heart; HL:  $-20\%$ , carcass lipid:  $-30\%$ ).

In conclusion, hamsters are characterized by the absence of white adipose tissue and by relatively high level of plasma IRI at birth. Moreover, LPL and HL activities increased during early life period and are lowered when the mother is fed the apple-enriched diet.

**Reduction of turkey plasma cholesterol by dietary copper supplementation.** GM Pesti, RI Bakalli, WL Ragland (Departments of Poultry Science and Avian Medicine, University of Georgia, Athens, GA 30602-2772, USA)

It is well established that rats fed diets deficient in copper exhibit hypercholesterolemia and elevated liver copper levels [Klevy (1976) *Am J Clin Nutr* 26, 1060–1068; Petering *et al* (1987) *J Agric Food Chem* 25, 1105–1109; Murthy and Petering (1976) *J Agric Food Chem* 24, 808–811]. Liver Cu is believed to regulate cholesterol biosynthesis by reducing hepatic glutathione levels [Kim *et al* (1992) *FASEB J* 6,2467-2471]. Glutathione stimulates the enzyme 3-hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) reductase in rats,

**Table I.** (GM Pesti *et al*)

Cu (mg/kg)	Gain* (g)	FCR** (g/g)	Plasma	
			Cu (ppm)	Cholesterol (mg/dL)
0	376	1.39	22.5	107
63	384	1.30	24.0	109
125	344	1.36	30.5	87
250	375	1.32	37.7	82

\* Body weight gain, \*\* FCR = feed conversion ratio (g intake/g gained).