

carried out in the left catheter and the venous blood samples were taken in the right one. After the injection, the goats were milked out at 0.5, 1, 3, 5, 7, 9, 24, 32, 48, 56 and 72 h and blood samples were collected at 5, 10, 15, 20, 25, 30 min and at 1, 2, 3, 4, 5, 6, 7, 8, 9, 24, 32, 48, 56 and 72 h after the leucine injection.

In the deproteinized plasma, radioactivity levels quickly decreased (during the first 45 min) to a very low level. Labelled CN and WP were detected as early as half an hour after the injection. After 3 h, a labelling peak was observed in CN (126 ± 23 Bq/mg N), in WP (179 ± 32 Bq/mg N) and in the NPN fraction (117 ± 16 Bq/mg N). In the milk samples, the radioactivity of the different nitrogen fractions decreased exponentially until 72 h after ^{14}C -leucine injection (residual radioactivity level: 3.5 ± 1.3 Bq/mg N). The different apparition time of the peaks in plasma and milk proteins demonstrated the presence of intermediate storage pools for ^{14}C -leucine in the mammary gland [Bequette et al (1994) *Br J Nutr* 72, 211-220]. After 48 h, the radioactivity recovered in goat milk was 3.7×10^5 Bq/goat, or 10% of total radioactivity injected in the jugular vein.

This isotopic labelling study showed a high synthesis rate for CN and WP and indicated a feasible and adequate way to label goat milk proteins which could be used for metabolic studies in monogastric animals. This experiment completed previous experiments conducted by Mahé et al (1994) or Boirie et al (1995), who produced labelled cow milk proteins.

Postprandial splanchnic utilization of amino acids in elderly men. Y Boirie, P Gachon, E Verdier, L Morin, B Beaufrère (*Laboratoire de nutrition humaine, université Clermont-Auvergne, CRNH, Clermont-Ferrand, France*)

The major characteristic of ageing is a progressive loss of lean body mass (LBM), particularly of muscle proteins. This protein loss leads to decreased muscle strength and to unsuitable metabolic responses to stresses or trauma. It could result from changes in amino acid disposal between the muscle and splanchnic tissues during feeding, since a higher amino acid gut/liver uptake would limit amino acid availability for muscle. To test this hypothesis, postabsorptive (PA) and postprandial (PP) modifications of protein metabolism were assessed in six young men (YM: 22.6 ± 0.9 years, mean \pm SE) and six old men (OM: 68.2 ± 1.9 years) using a combination of labelled oral ($^2\text{H}_3$ -leucine) and intravenous leucine (^{13}C -leucine) to determine the splanchnic extraction of leucine and other whole body components of protein metabolism. The test meal was identical for both groups: 10 Kcal/kg, 16% protein, administered in small fractions every 15 min for 4 h. Body composition was measured by bioelectrical impedance analysis.

Leucine flux and oxidation were higher in the YM, either during the PA state (flux = 1.54 ± 0.09 vs 1.25 ± 0.07 , Ox = 0.41 ± 0.02 vs 0.30 ± 0.04 $\mu\text{mol/kg/min}$, YM vs OM, $P < 0.05$) or in the fed state (flux = 1.99 ± 0.09 vs 1.59 ± 0.15 , Ox = 1.01 ± 0.04 vs 0.68 ± 0.08 , YM vs OM, $P < 0.05$). When expressed per unit LBM, PA-, PP leucine flux and PA oxidation rates were not significantly different in the two groups, but PP oxidation remained lower in the elderly men whatever the mode of expression (0.96 ± 0.08 vs 1.18 ± 0.06 $\mu\text{mol/kg LBM/min}$, OM vs YM, $P < 0.05$). Splanchnic extraction of leucine was much higher in the elderly (50 ± 11 vs $22 \pm 2\%$, $P < 0.05$), and was inversely related to PP oxidation ($r = -0.93$, $P < 0.001$) and plasma leucine concentrations ($r = 0.71$, $P < 0.01$).

In conclusion, in both postabsorptive and fed states, leucine fluxes per unit body weight were lower in elderly men, but the

values were normalized when expressed per kg LBM. Postprandial oxidation was reduced in elderly men relating to an increase in splanchnic extraction. These results suggested that a limited amino acid disposal to muscle in the elderly is a consequence of a higher splanchnic extraction that could, in turn, lead to a lower stimulation of muscle protein synthesis during feeding.

Plasma albumin concentration is a main factor in the control of lipoprotein metabolism: a kinetic study of two cases of analbuminemia. C Maugeais, K Ougueram, P Maugeais, P Mahot, T Magot, M Krempf (*Centre de recherches en nutrition humaine, hôpital Laënnec, 44035 Nantes cedex 01, France*)

Hyperlipidaemia is commonly present in nephrotic syndrome. From previous studies, the physiopathology of these lipid disturbances could be related to a low albumin plasma level or to urinary loss of factors controlling the lipoprotein metabolism. Human analbuminemia is an inherited disease characterised by a low plasma albumin concentration and a dyslipidaemia but no proteinuria. This rare disease represents a good model for better understanding the mechanism of dyslipidaemia in nephrotic syndrome.

We studied the kinetic aspects of the apoB-containing lipoproteins metabolism of two sisters (26 and 30 years old) with analbuminemia using a constant infusion of leucine labeled with stable isotopes for 14 h.

Compared to control subjects (male, 21–25 years old), very low density lipoprotein (VLDL)-apoB production was higher (41.5 vs 24.8 mg/kg/day) as well as the production of intermediate density lipoprotein (IDL) and low density lipoprotein (LDL)-, apoB (30 vs 16 and 16 vs 10 mg/kg/day,

respectively). The fractional catabolic rate of all apoB-containing lipoproteins was decreased (0.30 vs 0.48, 0.28 vs 0.62, 0.011 vs 0.022 h⁻¹, respectively).

These abnormalities were similar to the kinetic disturbances previously reported for nephrotic syndrome. The results suggested that a low albumin plasma concentration is probably the main factor controlling the lipid abnormalities in this kidney disease.

LIPID METABOLISM

Hepatic steatosis in the goose: influence of genotype on lipid metabolism. E Fournier¹, G Guy², R Peresson¹, D Hermier¹ (¹ *Inra, 37380 Nouzilly*; ² *Inra-Artiguères, 40280 Benquet, France*)

Susceptibility to liver steatosis in the goose is at least partly under genetic control. The Landes goose (L) exhibits a typical fatty liver in response to overfeeding, whereas the Poland goose (P) is partly resistant. Plasma and liver lipids were therefore analyzed in 14-week-old male geese weighing 5.2 kg at the start of the experimental period (16 L and 13 P). Plasma lipoproteins were isolated by density gradient ultracentrifugation [Hermier et al (1988) *J Lipid Res* 29, 893-907] and their concentration and chemical composition were determined before and after 14 days of overfeeding with boiled maize. Liver composition was determined after the completion of the overfeeding period.

Before overfeeding, the plasma lipoprotein profile of the geese was typical of birds, having a low amount of very low density lipoproteins (VLDL), and a predominance of high density lipoproteins (HDL). In both breeds, VLDL were abnormally poor in triglycerides (TG ≈ 30%), but HDL concen-