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supplement was significantly reduced; the other amino acids had smaller effects, which were not significant. In period 5, 3.6 g L-lysine and 0.6 g L-threonine/kg were added to the basal diet, and in period 6 the same supplements of the five amino acids were given as in period 4, except that only 0.4 g L-threonine/kg was added. None of the supplements significantly affected daily urine N excretion. The procedures of periods 5 and 6 were repeated in two further periods when again there was no significant response to any of the supplements. The most probable explanation of the absence of any response to amino acid supplements in the last four periods is the declining requirements for amino acids (per kg diet) of pigs at the higher weights. It appears that, for the pig of 60–80 kg, only lysine and threonine, of the amino acids used, are capable of improving the utilization of barley protein.

Protein synthesis in the rat liver after fracture of the femur. By S. N. KHAN, W. J. TILSTONE, A. FLECK and I. BROOM, *Departments of Pathological Chemistry and of Biochemistry, University of Glasgow, and Department of Pharmaceutical Chemistry, University of Strathclyde, Glasgow*

Moderate to severe trauma is accompanied by two characteristic responses in plasma protein concentration, namely an increase in levels of acute phase reactants and a fall in albumin (Cuthbertson & Tompsett, 1935; Owen, 1967). Attempts have been made to correlate these changes in plasma concentration with changes in protein metabolism in general after trauma, and in particular to the extent to which nutritional factors are causative. Very recently Ballantyne, Tilstone & Fleck (1973) measured albumin synthesis directly in the rabbit and showed that fracture produced a 60% decrease, about half of which was due to reduced food intake. The present communication is a report of the effect of fracture of femur on protein synthesis in the rat liver, as measured by profiling and amino acid incorporation into free and bound polyribosomes. Pair-fed male Wistar rats of 150–250 g body-weight were used in all experiments.

Parallel changes both in polyribosome profiles and in amino acid incorporation (AA), measured relative to ribosomal RNA, in free and in bound polysomes were noted. Using the proportion of total polysome area represented by monomer and dimer (MD%) as an index of protein synthesis, an increase in synthesis of about 100% was found at 12 h post-fracture and of about 30% at 48 h post-fracture. At 24 h post-fracture, however, a decreased synthesis of about 20% was found. The results are summarized in Table 1. They are given as ratio of injured to pair-fed controls; at least four animals, analysed in pairs, were in each group and SE are given for groups with more than two pairs.

It is of interest that free and bound polysomes behaved similarly, since the former are thought to synthesize protein for intracellular use and the latter to synthesize protein for extracellular use (Redman, 1969). Nutrition as a causal agent can largely be discounted as a factor in the cyclic changes described above, but the

nature and magnitude of these changes is relevant to those seeking to formulate optimal nutrition for recovery in the injured.

Table 1. Protein synthesis in rat liver following fracture of femur, in terms of proportion of total polysomes as monomer and dimer (MD%), and amino acid incorporation *in vivo* measured relative to ribosomal RNA (AA), expressed as ratios of injured to pair-fed controls

(Mean values with their standard errors where given)

Time after fracture (h)	Free polysomes		Bound polysomes	
	MD%	AA	MD%	AA
3	0.71		0.61	
12	0.82 ± 0.06	1.2	0.53	1.46
15	0.96		0.53 ± 0.03	
18	1.21		0.93	
24	1.06	0.75	1.08	0.70
36	0.84	1.15	0.80	
48	0.90 ± 0.07		0.79 ± 0.09	1.20
72	1.24 ± 0.08		1.0	

REFERENCES

- Ballantyne, F. C., Tilstone, W. J. & Fleck, A. (1973). *Br. J. exp. Path.* **54**, 409.
 Cuthbertson, D. P. & Tompsett, S. L. (1935). *Br. J. exp. Path.* **16**, 471.
 Owen, J. A. (1967). *Adv. clin. Chem.* **9**, 1.
 Redman, C. M. (1969). *J. biol. Chem.* **244**, 4308.

Changes in the distribution of fat in pigs given fattening or slimming dietary regimens. By V. R. FOWLER and W. ROSS*, *Rowett Research Institute, Bucksburn, Aberdeen AB2 9SB*

Five female and five castrated male pigs of similar age and breeding were selected from a larger group of *ad lib.*-fed pigs when they weighed about 75 kg. They were fed individually on a standard (160 g crude protein (CP)/kg) diet until each weighed 81.5 kg. At this weight, one pig of each sex was slaughtered as a control. The remaining pigs were split into two balanced groups and were subjected to either a slimming regimen (S) or a fattening regimen (F). The S regimen provided 500 g/d of a diet containing 290 g CP/kg and supplied about 6 MJ/d metabolizable energy (ME), which was estimated to be about 50% of maintenance; the F regimen was 3 kg/d of a diet with 40 g CP/kg supplying 45 MJ/d ME (about 375% of maintenance). A male and a female were killed after 4 and 8 weeks on each regimen. Carcasses were dissected into major adipose depots and muscle groups, and the lipid content of each was determined using the method of Atkinson, Fowler, Garton & Lough (1972).

The results for each category, for individual pigs, are given in Table 1.

Interpretation is complicated by the large reductions in the weight of fat-free body (FFB) in the slimmed group (Table 1a). This group lost fat also, but the fat: FFB ratio (Table 1b) remained relatively constant, with the possible exception of the

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