

THE EFFECT OF PROTEIN INTAKE ON AMINO ACID
DEGRADATION BY ISOLATED CAT-LIVER CELLS

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The protein requirement of the adult cat expressed on an energy basis is 19% compared with 4% for man, dog and rat. The NPU for typical proteins fed to cats is 30-50%. It has been argued that the cat liver is unable to regulate rates of amino acid catabolism with changes in amino acid supply, resulting in high obligatory nitrogen losses when low-protein diets are fed (Rogers et al. 1977). We have determined the rates of degradation of a number of amino acids by isolated parenchymal hepatocytes from cats fed high- and low-protein diets.

Cats (1-3 kg body weight) were fed 17.5% or 70% isolated soy-protein diets (Rogers et al. 1977) for a minimum period of 6 weeks. Animals were fasted for 16 h prior to intravenous anaesthesia with 'Saffan' and preparation of hepatocytes by the method described for guinea pigs by Elliott and Pogson (1977). The cells (approximately 8 mg dry weight) were incubated for 60 min at 37°C in 2 ml of Krebs-Henseleit buffer containing 2% defatted bovine serum albumin (Smith and Pogson 1980). Tryptophan 2,3-dioxygenase (TDO) flux was determined by the method of Smith and Pogson (1980), tyrosine aminotransferase (TAT) flux by the method of Marston and Pogson (1977), and threonine degradation by trapping the $^{14}\text{CO}_2$ produced from the degradation of $[\text{U-}^{14}\text{C}]$ threonine. Each amino acid was assayed at two low concentrations, the lower of which was within the physiological range, and at a high concentration which was near the K_m of the enzyme or at the maximum solubility of the respective amino acid. It was assumed that approximately 35% of the tryptophan was bound to the albumin (Smith and Pogson 1980). The results are shown below. Each flux or degradation rate is expressed as the mean of three cats (\pm SE) and a significant ($P < 0.05$) dietary effect at each concentration is indicated by different superscripts. Rates are expressed as nmol/mg dw/h.

Tryptophan 2,3-dioxygenase			Tyrosine aminotransferase			Threonine degradation		
mM	LP	HP	mM	LP	HP	mM	LP	HP
0.15	0.50 ^a (0.16)	1.74 ^b (0.45)	0.02	0.23 ^a (0.03)	0.69 ^b (0.02)	0.5	0.21 ^a (0.01)	0.34 ^b (0.01)
0.30	1.41 ^c (0.29)	2.35 ^d (0.11)	0.04	0.61 ^c (0.15)	1.25 ^d (0.05)	1.0	0.33 ^c (0.04)	0.52 ^d (0.03)
1.50	3.29 ^e (0.54)	4.79 ^f (0.10)	0.10	1.26 ^e (0.23)	3.77 ^f (0.22)	10.0	2.34 ^e (0.6)	3.35 ^f (0.43)

LP = 17.5% soy-protein diet; HP = 70% soy-protein diet.

The results show that the high-protein diet induced TDO and TAT flux rates and increased the degradation rate of threonine.

- ELLIOTT, K.R.F. and POGSON, C.I. (1977). *Molec. cell. Biochem.* **16**: 23.
 MARSTON, F.A.O. and POGSON, C.I. (1977). *FEBS Lett.* **83**: 277.
 SMITH, S.A. and POGSON, C.I. (1980). *Biochem. J.* **186**: 977.
 ROGERS, Q.R., MORRIS, J.G. and FREEDLAND, R.A. (1977). *Enzyme* **22**: 348.