EVIDENCE OF PROTEIN CATABOLISM DURING EXERCISE IN THE HORSE

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There is very limited data on the effects of exercise on protein or amino acid metabolism in the horse despite divergent views of the role of dietary protein in equine performance. While there is a widely held belief that dietary protein supplements are beneficial to performance there is another school of thought that high levels of dietary protein are detrimental (Glade, 1983). In the present study plasma concentrations of free amino acids were determined during and after submaximal exercise as an initial step in the quantification of the influence of exercise on amino acid metabolism.

Four, mature, thoroughbred geldings, 6-10 years of age were fed commercial pellets and lucerne hay twice daily and exercised on a treadmill twice weekly. On the day of the experiment each horse was trotted on an inclined treadmill (6^{o}) at 50% VO_2 max for 75 mins and mixed venous samples were obtained from the pulmonary artery (Evans and Rose, 1988) at 0, 30, 45, 60 and 75 mins after the commencement of exercise. Blood was also collected at 15, 45 and 120 mins post-exercise. Plasma was separated from blood quickly at 4^{o}C, deproteinised with 10% (w/v) sulphosalicyclic acid and free amino acids determined by ion-exchange chromatography.

The most noticeable change in circulating amino acid levels occurred in one or more of a group of amino acids (including carnosine and histidine metabolites, especially 3-methylhistidine), which eluded together. This peak continued to increase during exercise and was some 10 fold greater after 75 min than it was before the exercise period. The peak had started to decline 2 hr after the cessation of exercise. The amino acid(s) under the peak are at present being quantified and it is most likely to be 3-methylhistidine which would arise from breakdown of myofibrillar proteins in muscle (Young and Munro, 1978). There is increasing evidence from other species, especially man and the rat, that myofibrillar protein breakdown occurs during exercise and is followed by increased protein synthesis in the post-exercise period (Booth and Watson, 1985).

The present results appear to be the first evidence of muscle catabolism during exercise in the horse and are in accord with the observations of Freeman *et al.* (1988) that increased nitrogen retention occurs following exercise in this species.

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