

*Brief Communication*

VITAMIN E IN SERUM AND SKELETAL MUSCLE TISSUE  
AND BLOOD GLUTATHIONE PEROXIDASE ACTIVITY FROM  
HORSES WITH THE AZOTURIA-TYING-UP SYNDROME

Vitamin E and selenium are required by most young domestic animals including the horse, in order, among other things, to prevent muscular dystrophy (*Lannek & Lindberg 1975, Van Vleet 1980*). Although the effect of vitamin E supplementation in adult horses is not clearly established, it is also considered to have a favourable effect on muscle function. Thus, vitamin E and selenium are often used therapeutically to treat muscular weaknesses, tying-up syndrome (azoturia or rhabdomyolysis) and other muscle problems (*Hill 1963, Lindholm & Åsheim 1973, Geiser 1975*). The aim of this study was to compare the concentrations of vitamin E present in the serum and skeletal muscle, and the blood GSH-Px of horses with tying-up syndrome and clinically healthy horses.

Serum samples and muscle biopsies were taken for vitamin E analysis from 6 adult standardbred horses with symptoms of the azoturia-tying-up syndrome, including elevated ASAT activities in the range of 20—440  $\mu\text{kat/l}$ , and stiffness and sore muscles. Twelve clinically healthy standardbreds with normal ASAT activities, less than 9.2  $\mu\text{kat/l}$ , were used as controls. Muscle biopsies were taken according to *Lindholm & Piehl (1974)*. Vitamin E analyses were performed using High Performance Liquid Chromatography, as previously described by *Hakkarainen et al. (1984)*. Glutathione peroxidase activity in the blood was determined according to the method of *Paglia & Valentine (1967)* using cumene hydroperoxide as substrate.

The mean  $\pm$  s values for total tocopherol in the serum and the skeletal muscle of the horses with the tying-up syndrome were  $1.15 \pm 0.58$  mg/g serum lipid and  $12.85 \pm 8.0$   $\mu\text{g/g}$  tissue, respectively. The corresponding concentrations for the control horses were  $0.66 \pm 0.08$  mg/g serum lipid and  $4.23 \pm 0.83$   $\mu\text{g/g}$  muscle tissue. Thus, the horses with the tying-up syndrome showed

higher concentrations of total tocopherol, than the control horses both in the serum ( $P < 0.05$ ), and in the skeletal muscle ( $P < 0.01$ ). The mean blood GSH-Px activity of the 6 horses with this syndrome,  $1276 \pm 598 \mu\text{kat/l}$ , was also higher than that of the 12 healthy horses,  $695 \pm 278 \mu\text{kat/l}$  ( $P < 0.05$ ).

The results of this pilot study indicated that low vitamin E or GSH-Px concentrations in the tissues did not appear to be the cause or "triggering factor" in the development of the azoturia-tying-up syndrome in standardbred horses. Their high vitamin E and GSH-Px concentrations may have been due to prophylactic doses of vitamin E and selenium in their feed, since several of the horses in this group had problems with the tying-up syndrome previously. The tissue concentration of vitamin E of these horses were similar to those observed in healthy horses given a daily supplement of 1800 mg DL- $\alpha$ -tocopheryl acetate or more (Ronéus *et al.* 1985).

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