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EFFECT OF EXERCISE CONDITIONING AND TYPE ON SERUM CREATINE KINASE AND ASPARTATE AMINO-TRANSFERASE ACTIVITY

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Exertional myopathies result in a several fold increase in serum muscle enzymes (SME) (e.g. creatine kinase and aspartate amino-transferase). However, smaller, yet significant, increases are noted following exercise in clinically normal horses. The physiological significance of these increases are uncertain; but in humans, increases in SME are associated with muscle soreness. Periodic evaluation of post-exercise elevations in SME has been suggested to be useful in monitoring the status of the muscular system during training in horses.

The following experiment was conducted to investigate the effect of type of exercise and state of physical condition on post-exercise elevation in SME in order to develop an exercise test for use in future studies on dietary effects which may influence the equine muscular system during training.

In experiment 1 five mature, unconditioned, Thoroughbred geldings performed an initial submaximal exercise test (UC) prior to any conditioning, and a final test (C) following 8 weeks of conditioning. Serum creatine kinase (CK) and aspartate amino-transferase (AST) activity was measured before and for 72 hours post-exercise. Plasma lactate was used as an indicator of exercise conditioning. Serum CK and AST activity remained increased ($P<0.05$) above pre-exercise from 0-24 hours, and 0-8 hours post-exercise, respectively. There was a time by exercise conditioning interaction ($P<0.05$) for AST, CK, and plasma lactate resulting in an attenuated response of each variable following exercise test C as compared to following exercise test UC. These results indicate that submaximal exercise can elevate serum AST and CK, and conditioning can attenuate these changes. A second study using eight mature Thoroughbred horses was conducted to evaluate the effect of two different types of exercise, short term high intensity (STHI); and repeated submaximal (RS) on serum AST and CK activities. Serum AST and CK activities during the post-exercise period were higher ($P<0.05$) in response to the RS test as compared to the STHI test.

The results of this study indicate greater leakage of intracellular muscle enzymes from the skeletal muscle occur in unconditioned horses during repeated submaximal exercise. An exercise model employing repeated submaximal exercise in unconditioned horses may be a useful model for studying the physiological significance of post-exercise elevations in SME. In addition, this test may be useful in evaluating the effect of various nutrients which are thought to be important in maintaining the integrity of skeletal muscle (e.g. vitamin E).

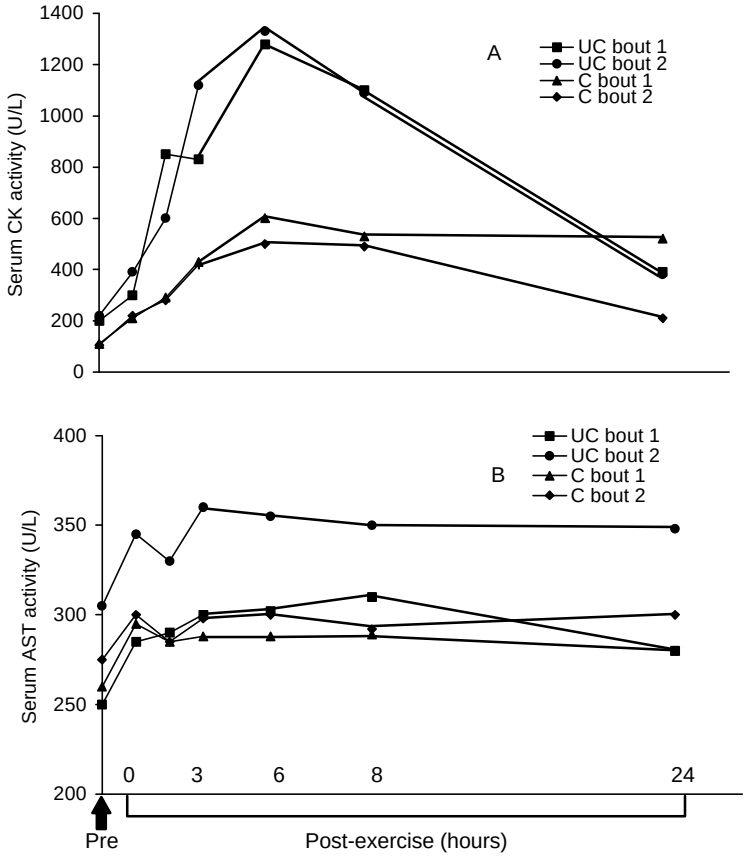

Figure 1. Serum CK response (panel A) to two bouts (1 & 2) of repeated submaximal exercise conducted 48 hours apart before (UC) and after (C) exercise conditioning in experiment 1. Exercise conditioning (UC vs C) $P<0.05$; time by exercise conditioning $P<0.05$. pooled S.E. = 316. Serum AST response (panel B) to two bouts (1 & 2) of repeated submaximal exercise conducted 48 hours apart before (UC) and after (C) exercise conditioning in experiment 1. Exercise conditioning (UC vs C) $P<0.05$; time by exercise conditioning $P<0.05$; bout (1 vs 2) $P<0.05$; bout by exercise condition $P<0.05$. Pooled S.E. = ±20. (From: Siciliano *et al.*; 4th ICEEP, Brisbane Australia)

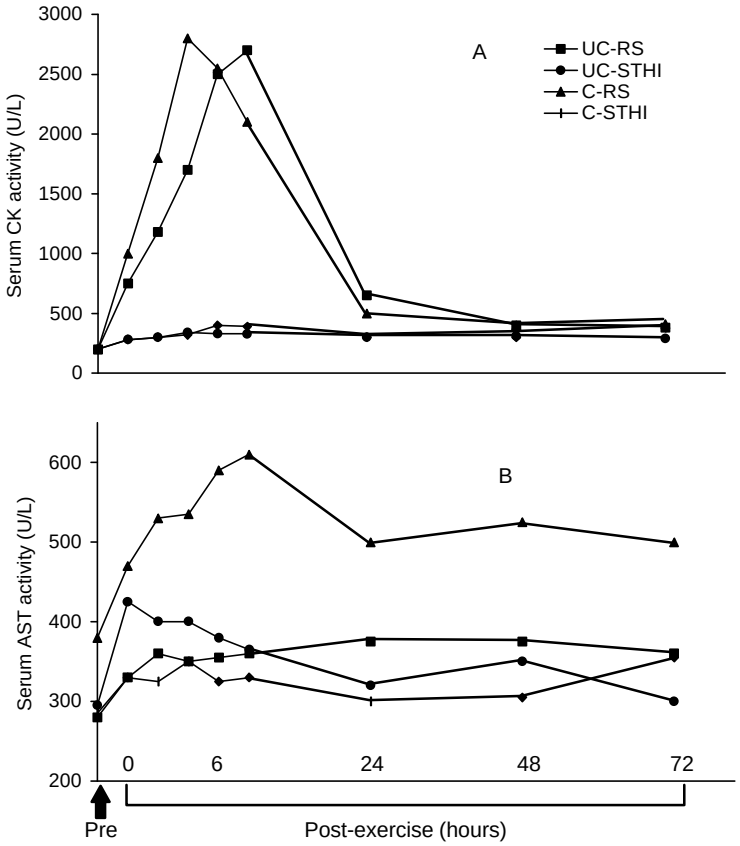

Figure 2. Serum CK response (panel A) to repeated submaximal (RS) and short term high intensity exercise (STHI) before (UC) and after (C) in experiment 2. Exercise test (RS vs STHI) $P<0.05$. Pooled S.E. = ±933.
Serum AST response (panel B) to repeated submaximal (RS) and short term high intensity exercise (STHI) before (UC) and after (C) exercise conditioning in experiment 2. Exercise test (RS vs STHI) $P<0.05$; time by exercise test $P<0.05$; exercise test by exercise conditioning $P<0.05$. Pooled S.E. = ±93. (From: Siciliano *et al*.; 4th ICEEP, Brisbane Australia)


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