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COMPARATIVE EXERCISE PHYSIOLOGY

ISSN 1755-2540 – 2022 – VOLUME 18 – SUPPLEMENT 1

Wageningen Academic Publishers

Serum acylcarnitine profiles in horses affected by type-1 PSSM before and after submaximal exercise

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The main trigger of clinical signs in horses with type-1 PSSM is less than 20 minutes of submaximal aerobic exercise. Horses with type-1 PSSM suffer from an impaired energy generation, despite substrate availability. Acylcarnitine (AC) are metabolic regulators involved in both glucose and lipid metabolism. These biomarkers provide a snapshot of energy substrate fluxes and are employed to diagnose metabolic disorders. Our aim was to assess plasma AC profiles in horses with type-1 PSSM at rest and after submaximal exercise, comparing them to controls performing the same effort. Blood was collected in seven horses (7.4±3.1 y.o., mixed breeds) with type-1 PSSM and in 9 healthy horses (16±6.1 y.o., mixed breeds), at rest and after 12 minutes exercise. Acylcarnitine profiles were assessed by tandem mass spectrometry; data were analysed by one-way ANOVA on repeated measures. Exercise induced a significant, chain- and group-dependent increase of 3 short- (SC) and 1 medium-chain (MC) AC profiles in PSSM horses while it increased acetylcarnitine and 3 long-chain (LC) profiles in controls. Several MC (3) and LC (6) profiles were significantly higher in PSSM horses than in controls, at rest and after exercise. Age difference between groups could have influenced the results, but exercise intensity more than age, diet or training acutely influences substrates utilisation. We suggest that exercise impacts differently substrate fluxes in PSSM horses compared to controls, and that the increase in MC and LC AC could represent an attempt of muscle to detoxify its mitochondria by removing excess acyl-CoA.

Effects on plasma AST activity in horses subjected to different levels of high intensity training

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It is known that exercise might increase plasma aspartate aminotransferase (AST) activity and that the increase appears to be linked to exercise intensity. However, detailed information about changes in plasma activity from horses subjected to different levels of long term training programs are scarce. In this study, we examined the effect of two high intensity training programs in Standardbred trotters from the age of 1.5 to the age of 3 years. All horses were fed a forage only diet (*ad libitum*). From the age of 2 one group (n=8) performed a standard training program and the other group (n=8) performed a training program where the high intensity training distance was reduced by 30% but with the same velocity. Morning blood samples were collected at 5 occasions from the age of 1.5 to the age of 3 years and the horses trained the day before blood samples was collected on four of the five occasions. Plasma was analysed for AST activity using a colorimetric method (IFCC/NADH with P-5'-P). Statistical analyses were carried out in R with packages *nlme* and *emmeans* and analysed using a mixed model that included effect of date, training group, and horse, which was considered random and repeated. The activity of AST increased over time (1st sample 3.2±0.3 µmol/s/l, 5th sample: 4.7±0.3 µmol/s/l, LS-mean ± SE, P=0.002) but there was no difference between training groups (3.5±0.3 µmol/s/l and 3.9±0.3 µmol/s/l, LS-mean ± SE, P=0.3). The results show that a 30% reduction in high intensity training distance does not affect AST activity.

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