Increased xanthine oxidase-related ROS production and TRPV1 synthesis preceding DOMS post-eccentric exercise in rats

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Aims It is well-known that unaccustomed exercise, especially eccentric exercise, is associated to delayed onset muscle soreness (DOMS). Whether DOMS is associated with reactive oxygen species (ROS) and the transient receptor potential vanilloid 1 (TRPV1) is still an open question. Thus, the aim of this study was to investigate the association between TRPV1 and xanthine oxidase-related ROS production in muscle and DOMS after a bout of eccentric exercise. Main methods Male Wistar rats performed a downhill running exercise on a treadmill at a - 16° tilt and a constant speed for 90 min (5 min/bout separated by 2 min of rest). Mechanical allodynia and grip force tests were performed before and 1, 3, 6, 9, 12, 24, 48 and 72 h after the downhill running. Biochemical assays probing oxidative stress, purine degradation, xanthine oxidase activity, Ca2 + ATPase activity and TRPV1 protein content were performed in gastrocnemius muscle at 12, 24, and

48 h after the downhill running. Key findings Our statistical analysis showed an increase in mechanical allodynia and a loss of strength after the downhill running. Similarly, an increase in carbonyl, xanthine oxidase activity, uric acid levels and TRPV1 immunoreactivity were found 12 h post-exercise. On the other hand, Ca2 + ATPase activity decreased in all analyzed times. Significance Our results suggest that a possible relationship between xanthine oxidase-related ROS and TRPV1 may exist during the events preceding eccentric exercise-related DOMS.

DOMS

Eccentric exercise

Oxidative stress

TRPV1

Xanthine oxidase

adenosine triphosphatase (calcium)

reactive oxygen metabolite

uric acid

vanilloid receptor 1

xanthine oxidase

adenosine triphosphatase (calcium)

antioxidant

reactive oxygen metabolite

Trpv1 protein, rat

vanilloid receptor

xanthine oxidase

adult

allodynia

animal experiment

animal tissue

Article

delayed onset muscle soreness

enzyme activity

enzyme degradation

exercise

gastrocnemius muscle

grip strength

high performance liquid chromatography

male

motor performance

muscle disease

nonhuman

protein determination

protein synthesis

rat

running

animal

biosynthesis

drug effects

enzymology

exercise

hand strength

hyperalgesia

metabolism

myalgia

physiology

protein carbonylation

psychology

skeletal muscle

Wistar rat

Animals

Antioxidants

Calcium-Transporting ATPases

Hand Strength

Hyperalgesia

Male

Muscle, Skeletal

Myalgia

Physical Exertion

Protein Carbonylation

Rats

Rats, Wistar

Reactive Oxygen Species

Running

TRPV Cation Channels

Uric Acid

Xanthine Oxidase