

# N-acetylcysteine reduces skeletal muscles oxidative stress and improves grip strength in dysferlin-deficient BLA/J mice

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Dysferlinopathy is an autosomal recessive muscular dystrophy resulting from mutations in the dysferlin gene. Absence of dysferlin in the sarcolemma and progressive muscle wasting are hallmarks of this disease. Signs of oxidative stress have been observed in skeletal muscles of dysferlinopathy patients, as well as in dysferlin-deficient mice. However, the contribution of the redox imbalance to this pathology and the efficacy of antioxidant therapy remain unclear. Here, we evaluated the effect of 10 weeks diet supplementation with the antioxidant agent N-acetylcysteine (NAC, 1%) on measurements of oxidative damage, antioxidant enzymes, grip strength and body mass in 6 months-old dysferlin-deficient Bla/J mice and wild-type (WT) C57 BL/6 mice. We found that quadriceps and gastrocnemius muscles of Bla/J mice exhibit high levels of lipid peroxidation, protein carbonyls and superoxide dismutase and catalase activities, which were significantly reduced by NAC supplementation. By using the Kondziela's inverted screen test, we further demonstrated that NAC improved grip strength in dysferlin deficient animals, as compared with non-treated Bla/J mice, without affecting body mass. Together, these results indicate that this antioxidant agent improves skeletal muscle oxidative balance, as well as muscle strength and/or

resistance to fatigue in dysferlin-deficient animals. © 2020 by the authors. Licensee MDPI, Basel, Switzerland.

Dysferlin

Dysferlinopathy

N-acetylcysteine

Oxidative stress

acetylcysteine

amino acid

arginine

carbonyl iron

catalase

cytochrome

dysferlin

hydrogen

hydrogen peroxide

immunoglobulin enhancer binding protein

lipid

lysine

malonaldehyde

proline

protein

reduced nicotinamide adenine dinucleotide phosphate oxidase 2

serum albumin

superoxide dismutase

thiobarbituric acid reactive substance

threonine

trolox C

tyrosine

xanthine

xanthine oxidase

animal experiment

animal model

animal tissue

antioxidant activity

antioxidant assay

Article

body mass

body weight loss

comparative study

controlled study

diet supplementation

dysferlinopathy

enzyme activity

fatigue

gastrocnemius muscle

gene mutation

genotyping technique

grip strength

kinetics

Kondzielas inverted screen test

latency to fall

lipid peroxidation

lipid peroxidation assay

mouse

muscle atrophy

muscle mass

muscular dystrophy

nonhuman

oxidative stress

polymerase chain reaction

protein carbonylation

quadriceps femoris muscle

retroposon

skeletal muscle

transient absorption spectroscopy

ultraviolet spectrophotometry