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Evaluation of muscle oxygenation by near infrared spectroscopy in patients with facioscapulohumeral muscular dystrophy.

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Abstract

The purpose of the study was to determine muscle metabolism adaptation to exercise in facioscapulohumeral muscular dystrophy patients (FSHD) and to study the correlation with clinical functional status (6-min walk test). 8 FSHD patients and 15 age-matched healthy controls (Controls) performed two isokinetic constant-load knee extension exercises: (1) at 20% of their maximal extensors' peak torque (i.e. the same relative workload) and (2) at (20N m) (the same absolute workload) for up to 4 min. All exercises consisted of rhythmic, voluntary, isokinetic, concentric contractions of the quadriceps femoris at 90°/s, whereas the flexion was performed passively at the same speed. Muscle oxygenation in the vastus lateralis was evaluated using near-infrared spectroscopy (NIRS). The FSHD patients displayed a lower maximal peak torque than controls (-41%, $p < 0.05$). During the two-exercise modalities, deoxygenated haemoglobin (HHb) and total haemoglobin volume (tHb) were lower in the FSHD patients ($p < 0.05$). The initial muscle deoxygenation time delay was shorter in the control group (FSHD: 15.1 ± 4.1 s vs.

CONTROLS: 10.4 ± 2.1 s, $p < 0.05$). Mean response time and maximal peak torque were both correlated with functional impairment (walking endurance). The results suggest that FSHD patients present an impairment in their capacity to deliver or to use oxygen.

KEYWORDS: Exercise; Muscle oxygenation; Near-infrared spectroscopy; Neuromuscular disease

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