RehabMove 2018: HANDCYCLING IN AN MRI: A NEW PLATFORM TO UNDERSTAND LOCAL METABOLIC CHANGES BECAUSE OF TRAINING

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INTRODUCTION: Mechanical efficiency (ME) improves as a result of low-intensity interventions. However, underlying working mechanisms at the level of individual muscles, their local energy metabolism and coordination have been negated so far. The aim of this research was therefore on the changes in muscle activation, force production, ME, and local muscle metabolism as a result of a three-week handcycle-like practice intervention.

METHODS: A newly developped MR-compatible handcycle allowed for a multitude of measurement tools. 6 participants completed 80 minutes of handcycling training. During the first pre- and post-test measurements of EMG, force production and gas exchange were performed. During the second pre- and post-test phosphocreatine depletion, phosphomonoester accumulation and pH were determined using 31P-Magnetic Resonance Spectroscopy (31P-MRS).

RESULTS: The participants used three different strategies to propel the handcycle; pushing, pulling or a mixture of both. On a group level no significant improvements in terms of muscle activation were observed. Individually all participants were found to require a reduced muscle activation. Furthermore, absolute force production and variation of the force signal was reduced. In terms of ME an overall significant improvement was found. There were no significant changes in terms of local muscle metabolism.

CONCLUSIONS: Through 80 minutes of motor learning improvements in terms of propulsion technique and mechanical efficiency were observed. Contrary to our expectations, the above improvements were not found to be related to significant changes in local muscle metabolism. Interestingly, several different strategies were observed and appeared to remain the same for nearly all participants over the intervention. The current study proved the feasibility of dynamic metabolic measurements during a cyclic upper body task in combination with several additional relevant parameters.