

Executive Summary

The overarching goal of this thesis was to assess the efficacy and safety of an innovative rehabilitation technique – functional electrical stimulation-assisted cycle ergometry – in critically ill patients.

We firstly (Project A) investigated physiological changes induced by this technique in a group of 14 healthy volunteers and compared it, in a cross-over design, to normal volitional low intensity exercise. We have shown an increase in whole-body energy expenditure similar to 25 W exercise.

Then (Project B) we have performed a meta-analysis of randomised-controlled studies available to date to compare in the population of critically ill patients the effect of neuromuscular electrical stimulation, passive cycling, and early goal-directed rehabilitation. We found that only goal directed rehabilitation has positive effects on patient-centred outcomes. There were no published studies using functional electrical stimulation-assisted cycle ergometry.

Lastly (Project C) in a large, single centre randomised controlled trial we have tested an innovative functional electrical stimulation-assisted cycle ergometry-based early rehabilitation protocol compared to standard of care in critically ill patient. We have not found any significant differences in the physical function after six months of surviving critical illness.