Background

- ICU-acquired muscle weakness (ICU-AW) leads to impaired physical functioning in individuals who survive the initial insult of critical illness
- Muscle wasting occurs early and rapidly (up to 30% in first 10 days)
- Patients on life-supporting intervention like extracorporeal membrane oxygenation (ECMO) and/or undergoing organ transplant may be at increased risk for ICU-AW
- ICU rehabilitation is safe and is associated with improved outcomes, but initiation is often delayed by patient’s inability to actively participate
- Assistive technologies may enable therapy to commence early in ICU admission and help preserve muscle mass

Purpose

1. Examine the safety and efficacy of functional electrical stimulation (FES)-cycling (FES-C) in a patient pre and post bilateral orthotopic lung transplantation (BOLT)
2. Monitor leg muscle mass and echointensity (quality) with ultrasound (US), ambulation distances, and FES-C metrics

Case Description

- **Subject**: 30 y/o female, independent in ADLs and walked full-time
- **Diagnosis**: Cystic fibrosis with severe obstructive pathophysiology (FEV1 <15%), pneumonia, respiratory failure
- **Equipment**: Mechanical Ventilation (MV) and veno-venous (V-V) ECMO via internal jugular as bridge to BOLT
- **Timeline**: Day 1: Admission Day 10: BOLT Day 26: Hospital D/C Days 30-63: Outpatient pulmonary rehabilitation
- **Inpatient Intervention**: FES-C with stim to both lower extremities (RT 300, Restorative Therapies) plus conventional acute care rehabilitation
- **Outpatient Intervention**: Incremental aerobic and resistive exercise

Outcomes

- **FES-Supine Cycle Metrics**
  - Passive-Assisted Cycling, Aerobic Training
  - Active-Assisted Cycling, Interval Training
  - Crank Velocity
  - Target Speed
  - Power
  - Stimulation Level
  - Resistance

Discussion/Relevance

- FES-C was safe and feasible with no adverse events
- Contrary to what has been reported in literature with conventional rehabilitation, muscle wasting was not evident
- Quantitative US holds great potential in clinical and research evaluation of ICU-AW
- Future research is needed to confirm the effectiveness and optimal dosage of FES-C in this population

Acknowledgements/References