“USING SINGLE-LEGGED CYCLING FOR QUADRICEPS AVOIDANCE REHABILITATION POST-ACL RECONSTRUCTIVE SURGERY”
Most patients, after surgery, will alter their gait in order to avoid anterior displacement of the tibia which occurs with quadriceps contraction.

“…a pattern similar to quadriceps avoidance observed in gait (decreased quadriceps muscle activation, decreased knee joint extensor moment) also occurs during stationary cycling (M.A. Hunt et al. 2003)\(^1\).”

Cycling ~ Walking/Running
To see if the factors associated with quadriceps avoidance are improved in single-legged cycling versus double-legged in ACL reconstructive surgery patients

Major Factor:
- Electromyography (EMG)

Additional Factors:
- Peak Knee Extensor Moment
- Pedal Force
- Joint Power of the Knee
- Joint Power of the Hip
- Joint Power of the Ankle
EXPERIMENTAL PROTOCOL

- 18 randomized trials, 15 seconds each
  - 3 Double Legged w/biofeedback
  - 3 Double Legged w/o biofeedback
  - 3 Left Legged w/ biofeedback
  - 3 Left Legged w/o biofeedback
  - 3 Right Legged w/ biofeedback
  - 3 Right Legged w/o biofeedback
Max Voluntary Contraction (MVC)
Record muscle activity of the quadriceps and the hamstrings. Muscle activity is related to voltage rating (mV)

Rectus Femoris

![Graph showing muscle activity related to voltage rating]
Qualysis camera systems capture the motion of the kinematic markers through its 8 cameras.
EVALUATING DATA IN VISUAL 3D TO LOOK AT JOINT EXTENSOR AND FLEXOR MOMENTS, JOINT POWER, AND FORCE FROM THE PEDALS

SINGLE leg LEFT vs SINGLE leg RIGHT (sagittal plane)

- Ankle Angle
- Knee Angle
- Hip Angle
- Ankle Velocity
- Knee Velocity
- Hip Velocity
- Ankle Acceleration
- Knee Acceleration
- Hip Acceleration
- Ankle Moment
- Knee Moment
- Hip Moment
- Ankle Power
- Knee Power
- Hip Power
QUESTIONS OR COMMENTS?
