



## Owens Recovery Science: Blood Flow Restriction Rehabilitation

- Strength and Hypertrophy
  - According to the American College of Sports Medicine (ACSM), optimizing muscular strength and hypertrophy can be achieved through moderate to high intensities of resistance exercise that utilizes 8-10 upper and lower body exercises. These exercises should target major muscle groups 2-3 days per week at a training intensity of more than 65% of the subject's one-repetition maximum. (Donnelly 2009)
    - Unfortunately, people recovering from injury or the elderly may not be able to tolerate these loads, which can limit their ability to have an adequate strength and hypertrophy response.
- Blood Flow Restriction Rehabilitation
  - Blood Flow Restriction Rehabilitation (BFR) is a paradigm shifting intervention for the rehabilitation professional with over 160 peer-reviewed articles in the scientific literature. By applying a tourniquet briefly and intermittently to an exercising limb you can induce significant and substantial strength, hypertrophy and endurance changes while using a very light load.
- Why use BFR?
  - Blood flow restriction training has consistently demonstrated strength and hypertrophy gains vs controls and comparable gains to heavy load lifting.
    - Research suggests that low load resistance exercise (20-30% 1 RM) and low load aerobic exercise (<70 m/min walk training), which would not be expected to cause considerable increases in muscular quantity or quality under normal circumstances, when combined with BFR produce an exaggerated response for maximizing muscle strength and hypertrophy. (Slysz 2015)
    - Low-load resistance muscular training during moderate restriction of blood flow is an effective exercise for early muscular training after reconstruction of the anterior cruciate ligament. (Ohta 2003)
    - In a study by Abe et al., they examined BFR cycling at 40% VO<sub>2</sub> Max for 15 minutes compared to a control group that cycled for 45 minutes at 40% VO<sub>2</sub> max without BFR. Thigh and quad muscle volumes increased, extension strength increased, and VO<sub>2</sub>max increased in the BFR group compared to the control group. (Abe 2010)
- How does BFR work and who is appropriate to treat with it?
  - The exact mechanism behind the positive results seen with BFR is still being extensively researched. Theories range from a significant build-up of metabolites by anaerobic metabolism, a systemic anabolic response, and cellular swelling. It is most likely a combination of multiple factors. It does appear that muscle protein synthesis plays a significant role after BFR as this has been consistently demonstrated in the literature.



- Clinically we have applied it to many diagnoses with very positive results including but not limited to total joint arthroplasties, Achilles tendon repairs, fractures, rotator cuff repairs, muscle strains, nerve injuries, post-operative knee reconstructions and cartilage repairs, and tendinopathies.
- **Ongoing Clinical Research**
  - **Knee Arthroscopy Trial** (completed/submitted for publication)
  - **Anterior Cruciate Ligament Reconstruction**
  - **Chronic Thigh Weakness After Surgery**
  - **Femur Fractures**
  - **Chronic Achilles Tendinopathy**
  - **Distal Radius Fractures**
  - **Meniscus Repair**
  - **Articular Cartilage Repairs**
  - **Regenerative Medicine and BFR**
  - **Total Knee Arthroplasty**

These trials span across 14 different centers and total more than \$6,000,000 in grant funding. All trials utilize the Delfi Personalized Tourniquet System for Blood Flow Restriction.

We currently have 71 Owens Recovery Science Blood Flow Restriction certified professional and college teams along with healthcare systems such as UPMC, Memorial Herman, Methodist Houston, Beaumont Health.

Any questions contact:

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