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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. By attending the course clinicians will:

- **Understand the history and scientific theory behind BFR**
- **Learn to manipulate protocols to create a local or systemic response**
- **Understand tourniquet use and safety**
- **Learn how to determine individual limb occlusion pressures**
- **Learn to apply BFR to rehabilitating patients**

Testimonials:

“Johnny Owens teaching Blood Flow Restriction Training to us was invaluable. It is one of the biggest game changers in rehabilitation”.

Geoff Kaplan, Houston Texans

“Blood flow restriction training has been a huge compliment to the medical and performance care of our athletes. I just wish I knew about it sooner”.

Christopher Stackpole, Portland Trailblazers

“I have seen great gains in strength from patients in clinic to professional athletes in approximately 3-4 weeks using Blood Flow Restriction. This tool has been an influential game changer in my practice”.

Steve Scher, Detroit Lions, Team Rehabilitation

Blood Flow Restriction Rehabilitation (Objectives by Lecture/Activity)

Introduction to Blood Flow Restriction Training

- **History of Blood Flow Restriction Training**
- **How and Why I Implemented Blood Flow Restriction Training in the military**
- **A Paradigm Shift in Rehabilitation**
- **Current and Future Clinical Trials**

Evidence for Strength and Hypertrophy with BFR

- **ACSM Guidelines**
- **Low Intensity vs. Low Intensity with BFR**
- **High Intensity vs. Low Intensity with BFR**

Mechanisms

- **Mechanical Tension**
- **Metabolic Accumulation**
- **Cell Swelling**

Metabolite Theory: Lactate Production

- **Utilization of BFR to Induce the Cori Cycle**
- **The Accumulation of Lactate During BFR and Exercise**

Metabolite Theory: Increased Muscle Activation

- **Inducing a Hypoxic State to Increase Motor Unit Recruitment**
- **Increased Lactate Production and its Role in Increased iEMG**

Metabolite Theory: Growth Hormone (GH) Production

- **Inducing a Systemic Response Through Metabolite Accumulation**
- **Evidence and Science to Support Increased GH Production**
- **Growth Hormones Role in Recovery and Repair**

Metabolite Theory: Insulin Like Growth Factor (IGF1)

- **Inducing IGF1 With Metabolite Accumulations**
- **The Role of IGF1 in Muscle Hypertrophy**
- **Proliferation and Differentiation of Satellite Cells with BFR**
- **Making Lasting Changes in Muscle Through These Pathways**

Metabolite Theory: Down Regulation of Myostatin

- **Utilizing BFR to Block the Bodies Negative Hypertrophy Switch**
- **Clinical Studies to Support Down Regulation of Myostatin**
- **Potential Uses of BFR to Reduce Fibrotic Changes After Injury**

Metabolite Theory: Muscle Protein Synthesis

- **Using BFR to Activate MTORC1**
- **Evidence for Increased Muscle Protein Synthesis After BFR**
- **Manipulating Exercise Through BFR to Increase Protein Synthesis**
- **Proper Nutrition to Activate Protein Synthesis**
- **Proper Nutrition to Maximize Protein Synthesis**

Cell Swelling

- **Evidence Behind Cell Swelling to Improve Protein Synthesis**
- **Using BFR in the Early Phases of Rehab to Mitigate Atrophy**
- **Using BFR in the Sub-Acute Phases of Rehab to Mitigate Atrophy**

The Middle Ground: Cycling, Walking and Endurance with BFR

- **Changes in VO2 max with BFR**
- **Improved Endurance with BFR Cycling and Walking**
- **The Role of Increased Mitochondrial Density with BFR**
- **BFR and Aerobic Work in the Rehab Continuum for Improved Oxidative Capacity, Hypertrophy and Strength**

BFR and Bone

- **The Role of GH in Bone**
- **The Role of Interstitial Fluid Flow in Bone**
- **The Role of VEGF on Bone**
- **Evidence for Improved Bone Healing with BFR**

Proximal Effects

- **Evidence for Increased Strength and Hypertrophy on the Trunk Musculature**
- **How to Manipulate BFR Training for a Proximal Effect**

Safety: Muscle Damage and BFR

- **Comparison of BFR vs. HIT**
- **What Does the Evidence Show Concerning Muscle Damage After BFR**
- **Understanding Direct and Indirect Markers of Muscle Damage**
- **Staying on the Positive Side of Net Protein Balance**

Safety: Cardiac and Vascular Effects of BFR

- **The Central Cardiac Effects of BFR**
- **Peripheral Cardiac Effects of BFR**
- **Thrombus Potential and Vascular Effects**

Rehabilitation Studies

- **BFR and Rehabilitation Studies**
- **Translation of BFR Evidence to the Clinic**
- **Ongoing BFR Trials and Future Applications**

Rehabilitation Prescription and BFR: Best Evidence

- **Frequency**
- **Duration (Early Hypertrophy)**
- **Manipulating the Rest Periods**
- **Limb Occlusion Pressure (LOP)**
- **Using LOP to Account for Cuff Application, Limb Size and Shape and Systolic Blood Pressure**
- **Training Intensity**
- **Determining 1 Rep Maximum**
- **Exercise Volume**
- **Missing the Target**
- **Exercise Selection**
- **Rehabilitation Protocols**

Tourniquet Safety and Use

- **Tourniquets Roles as Medical Devices**
- **Using 3rd Generation Systems to Improve Safety**
- **Avoiding Potential Nerve Injury Through Proper Cuff Selection**
- **Decreasing Pressure Gradients Through Contoured Cuffs**
- **BFR Risks and Contraindications**

Delfi Personalized Tourniquet System for Blood Flow Restriction

- **Use and Understanding of the PTS for BFR**
- **Use and Application of Easy-Fit Variable Contour Cuff**
- **Determining LOP**
- **Proper Occlusive Pressure for Upper and Lower Extremities**
- **Use of the Delfi PTS for BFR During Exercise**

Lab One: Application of Blood Flow Restriction Training to the Lower Extremity and Lower Extremity Exercises

Lab Two: Application of Blood Flow Restriction Training to the Upper Extremity and Upper Extremity Exercises

Post Course Testing/Test Review

(Certification requires passing >80% on post test examination)