BLOOD FLOW RESTRICTION FOR RUNNERS

What is BFR? And how can I benefit from it?

Introduction

Blood flow restriction (BFR) training has gained a lot of traction and popularity in recent years, from the rehabilitation setting to the performance and recovery setting. Originating

in Japan in 1973 by Dr. Yoshiaki Sato, KAATSU training, or “added pressure” involves external pressure to a limb in order to restrict blood flow to the working muscles with the goal of increased muscle mass. The Western version of BFR originated in the early 2000’s by an Army physical therapist named Johnny Owens, who used BFR on himself as well as active service members to increase strength and hypertrophy (increase in the muscle fiber size). This was particularly useful for amputees, who are unable to perform traditional strength training exercises.

What is BFR?

BFR is either done on the arm(s) or the leg(s) via a belt, band, strap, tourniquette, or sleeve. The external pressure partially occludes arterial blood (blood in the arteries to the muscles), and fully occludes venous return (blood in the veins from the muscles).

But don’t worry, you don’t have to use any random belt/band/strap laying around the house and wonder (at best) if it’s tight enough to do anything or (at worst) if you’ll lose the foot by strapping it too tight. Nowadays, there are FDA-approved BFR companies with comfortable straps, and we can measure exactly how much pressure it takes to fully occlude the blood flow in the limb using a Doppler ultrasound unit to hear the pulse as the cuff is inflated. Think of the Doppler as the stethoscope of BFR. Once we have the full limb occlusive pressure, we can calculate the working pressure for either the arm or leg.

The occlusion of blood to the working muscles results in a crap ton of hormonal changes that stimulate muscle growth, without the added heavy resistance/weights! BFR has consistently been shown to increase muscular strength and hypertrophy, as well as aerobic conditioning parameters such as improved VO2max and Time To Exhaustion (see below for further explanation). Traditional strength training with heavy loads results in mechanical stress to the system, resulting in adaptive changes to increase strength, hypertrophy, etc. But with BFR using light resistance, it is the metabolic stress to the system which triggers the same adaptive changes in the body. Stress the body, and change will occur!

The term VO2max refers to the maximum volume of oxygen consumed by a person during exercise/activity. As exercise intensity increases, so does oxygen demands to fuel the working muscles. So, a higher VO2max means a greater volume of oxygen consumed and available to keep the muscles working hard to sustain the pace/activity. Your VO2max will

increase over time with aerobic conditioning, especially with higher intensities where oxygen demands are greater. Time To Exhaustion is quite literally what it says: the amount of time it takes during a given activity until a person reaches exhaustion. These parameters go hand-in-hand, because as you reach or exceed your VO2max, the Time To Exhaustion will be minimal. AKA, you will bonk/hit the wall very soon (ask my professional triathlete brother Jon Waltman this story about me some day....).

How is BFR used?

The appeal of BFR compared to traditional strength training is simply that it allows for similar gains with significantly lighter resistance/weights. This is useful in the rehabilitation setting where many individuals are either in pain, just had surgery, or are too weak to tolerate significant external loads. Enter BFR, which allows the individual to complete very low resistance exercises, but experience the gains of heavy resistance training.

There are specific parameters for amount of cuff pressure, sets, reps, number of exercises, and rest breaks, but the general idea is low resistance/high reps instead of high resistance/low reps as in traditional strength training.

Examples of BFR use:

Just had surgery on your knee and can't walk very far? Don't worry, we can improve strength and hypertrophy of your leg muscles using BFR with easy exercises and some treadmill walking to start.

Just finished your first marathon and now your knee is killing you? No problem, we'll use BFR to maintain/progress your strength, hypertrophy, and Vo2max on the bike or treadmill until you are ready to run again.

No more pain in the knee but still isn't as strong as the other leg? You're almost there! We'll keep using BFR with lighter resistance to improve motor control, endurance, and skill work, but we'll use heavier resistance without BFR since we know that we can achieve greater strength gains this way.

If BFR is so great, why not just use it all the time and not lift heavy weights??

Great question! Although we know that BFR increases strength and hypertrophy using 20-40% of your 1 Rep Max (1RM) resistance, it does not produce the same strength gains as with higher resistance training of ~80% 1RM without BFR. So, what that means is we just have to be systematic in terms of when we use it and when we don't.

Also, exposing the body to heavy loads simply provides a stress/stimulus to the system that BFR alone cannot provide. For example, compressive forces through the spine and long bones of the lower extremities (femur and tibia) is extremely beneficial not just for stimulating bone growth/health to keep these bones strong for running, but for long term health as well to protect against osteoporosis.

Heavy resistance also strengthens the connective tissues of the body, such as the tendons and fascial network, which is vital for providing a "spring" mechanism to the body. As your

foot strikes the ground during running, these connective tissues absorb and store the energy from ground reaction force, and then recoil/release the energy to propel you off the ground quickly.

But I'm not injured and can run just fine, so how can BFR help me?

Another great question!

As we mentioned earlier, BFR improves aerobic capacity via increased VO2max and Time To Exhaustion. That's nice, but does improving aerobic capacity also improve my performance, AKA make me run faster?

According to the research, BFR with aerobic exercise can improve aerobic capacity AND performance. This has been shown with both walking, running, and cycling, all of which can improve performance measures such as 1.5 mile time-trial performance. So, you can still improve your aerobic base and performance without busting your butt every single day by adding excessive mileage that will likely break you down in the long run (pun intended), resulting in a very preventable overuse injury.

Still not convinced? What if I told you that you can do your sprint intervals as usual, AND increase VO2max during recovery between sets? Well, research shows that is exactly what BFR allows you to do! While you are lying down resting in between sprints, you can literally increase your VO2max significantly by using BFR on your legs.....just lying there.....resting.....

Bottom line

The options are endless for utilizing BFR for runners to improve aerobic base and performance, not to mention the strength benefits.

Just as "no pain no gain" is outdated at this point, so is the notion that increased mileage/volume is the only way to improve running performance. Certainly, having the required tissue strength, resilience, and aerobic base to tolerate running mile-after-mile is necessary for every runner.

If nothing else, BFR can be a great tool to implement into the program to improve aerobic capacity, while we reduce your running volume and focus on the skill development of running (stay tuned for a future blog on this topic. Hint: quit heel striking, damnit!!).

Life is a marathon, not a sprint. But sometimes you have to sprint to improve the marathon!

Stay Committed!

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