

# THE STUDIES & SCIENCE



RECOVERY  
PUMP®

# About RecoveryPump

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## **What is the RecoveryPump?**

The RecoveryPump system is a medical grade compression device that has revolutionized the speed with which athletes can now recover at home, every day. Simply zip in to the RecoveryBoots and turn the device on. High levels of adjustable compression quickly fill the RecoveryBoots with superior bottom-to-top Sequential Compression that forces the body to reabsorb metabolic waste causing soreness and fatigue in the muscle. Our specially designed foot compartment accesses the bottom of the foot, which can increase circulation up to 25% in comparison to devices without this bottom-of-the-foot chamber. One to two hours of use can produce results that would take 12 to 48 hours to achieve with rest alone. It is the most compact and durable system on the market designed for thousands of hours of operation and ready to go everywhere you do.

## **Why is recovery important?**

Elite athletes know the constant rigors of training will break the body and muscles down before building them up. One of the most under-appreciated aspects of the training formula is recovery and it's often this very distinction that separates the top athletes from the pack. How you recover after every training session and competition makes a big difference in your performance the next day. Increased circulation between training sessions helps to remove waste products, decrease inflammation and restore the delivery of nutrients to the muscles. RecoveryPump significantly increases circulation during use and can be used daily to accelerate the recovery process and allow for better quality workouts and more training volume.

## **How does the RecoveryPump work?**

The RecoveryPump system expedites your body's natural ability to flush metabolic waste from the muscle via targeted compression levels (measured in mmHg) and a medically proven "milking" sequence which increases circulation during use. This combination allows for much faster recovery time between workouts and can be used daily as an aggressive recovery treatment for fatigued muscles.

Our entire system is designed for optimal muscle recovery results. Pressure settings are designed to never exceed a level which begins to constrict the vascular system and maxes at 80mmHg for this reason. The cycle time and sequence delivers the largest area of compression in the shortest amount of time, which results in faster absorption of fatigue-causing metabolic waste.

# TheScience



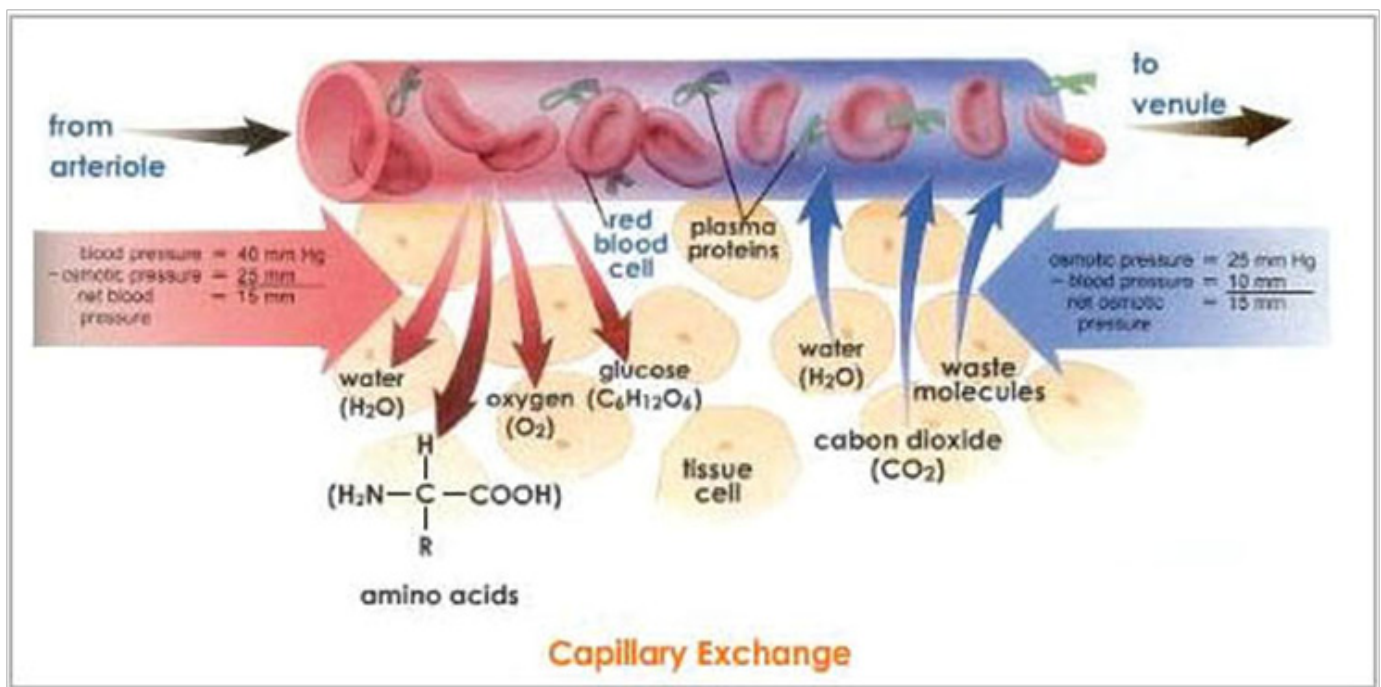


# The Science

## Physiological Conditions Created During and After Exertion

### During Exertion

High levels of exercise produce high levels of metabolic waste, which the body cannot clear completely during exercise. This is a cascading effect. The longer the duration of high exertion exercise, the greater the accumulation of metabolic waste and water. Simply put, the increasing accumulation of waste and water in the muscle causes a decrease in performance and an increase of muscle fatigue. In the endurance racing community, this is known as VO<sub>2</sub> max and Lactate Threshold but research has shown the Lactic Acid is not the only culprit to fatiguing muscles and decreasing performance. Many elements make up metabolic waste, the two most notable are lactic acid and carbon dioxide. There is a long list of other elements that need to be removed as well, to allow muscle to perform at their peak. Athletes that efficiently excise these elements via the venous and lymphatic system can usually perform at a higher



level (at or near lactate threshold) with greater endurance.

Much of the training for endurance athletes is to increase their lactic threshold and VO<sub>2</sub> max so as to maintain very high levels of activity just below the thresholds. In effect, they are training to burn less and perform more. Less they burn, the longer one can go and the slower the build-up of metabolic waste in the muscle causing fatigue. They are training their bodies to clear as much as they burn. Unfortunately for most, the clearing function cannot keep-up with the burn rate of the fuel delivered. It is a fact of life that the arterial system is designed to deliver lots of fuel for the Fear-Flight response but the venous system does not have corresponding capacity to keep up for long duration. The arterial system has much

more capacity than we can use under most circumstances. The problem is getting the waste removed so that fatigue does not set in or getting the waste removed quickly so that we are ready to perform in the shortest time possible. We are designed to flee and then have adequate time to recover. How much time to recover is a challenge for the endurance athlete.

### **After Exertion**

When the athlete stops exercising, venous return decreases significantly, slowing the evacuation of Lactic Acid, Carbon Dioxide, other Metabolic Waste and water. The challenge is to continue the process of clearing these elements after exercise has stopped so as to NOT allow the accumulation of these waste to sit in the muscle for long periods of time. By clearing these elements quickly, better O<sub>2</sub> perfusion occurs as does the delivery of plasma through capillary action of blood flow. Plasma and O<sub>2</sub> are the lifeblood of health cells. The more cells get, the healthier they are. The accumulation of Lactic Acid, Carbon Dioxide, water and the other metabolic waste blocks the perfusion of new “food” to the cells. Lactic Acid clears relatively quickly (in a matter of a couple of hours or less), but many of the elements in Metabolic Waste can take a much longer time, so long that soreness can increase or even onset up to 48 hours later. Thus, clearing these elements quickly and efficiently through improved and energized venous return is essential for healthy cell proliferation and activity.



# About **The Arteries** and **Veins**





## About The Arteries and Veins

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Arteries deliver fuel in the form of blood and plasma; veins remove deoxygenated blood, water, CO<sub>2</sub> and other metabolic waste molecules from the muscle and surrounding tissue. Arteries pump and veins do not. Arteries have the benefit of the heart to pressurize the system and have smooth muscle that rhythmically pump blood throughout the body and into the capillary where O<sub>2</sub>, water, nutrients such as proteins, glucose, amino acids, hormones, minerals, everything a cell needs to survive and synthesize energy is delivered. Water, CO<sub>2</sub>, Lactic Acid (in muscle tissue) and a myriad of other metabolic waste molecules are the absorbed into the veins or lymphatic system. Vein take up 80 to 90% of the fluid and micro-molecular waste. Veins rely on skeletal muscle activity to move the deoxygenated blood and fluid back to the heart, lungs and organs for processing. The Calf muscle and the bottom of the Foot are the primary pumps in our legs. Exercise is essential to remove large amounts of fluid and waste from tissue and muscles. What keeps the venous system moving while at rest is breathing and contraction of the abdominal respiratory muscles. Replicating the muscle pumps in the legs, while at rest, is key to enhancing recovery.



***Our lymphatic system and blood vessels work together to flush waste from our cells naturally. Muscular movement however is needed to stimulate this process because the lymphatic system does not have a pump, like the heart. Often athletes will perform light exercise to achieve this muscle contraction and increase circulation in the body, thereby reducing soreness in the muscles.***

## RecoveryPump Mimics Active Recovery

The problem elite athletes face is that active recovery sessions cannot be performed after every training session. Instead, passive recovery such as time on the couch between workouts is used to rest the body. RecoveryPump can be used during this passive rest time to simulate an active recovery session so the body is able to recover more quickly without expending further energy. The stroking and kneading of the leg and muscles is achieved through RecoveryPump's specific sequential compression sequence.



## Active Recovery vs. Passive Recovery

**Active Recovery** is generally defined as light aerobic exercise such as a brisk walk, jog, low intensity cycling, some forms of yoga, or any exercise that is minimal in intensity. The point is to clear lactic acid quickly and energize all levels of the venous system. Because this type of recovery involves exercise, it is relatively poor at respiratory recovery and processing large quantities of CO<sub>2</sub> as well as restoring Glucose, amino acid levels and replenishing other essential elements in the muscle.

**Passive Recovery** employs R.I.C.E. - Rest, Ice, Compression and Elevation. Rest allows the muscles to be replenished with glucose, amino acids and other essential elements relatively quickly especially in conjunction with ice baths and Hot-Cold contrast therapy. Ice and contrast therapy is the passive technique to keep the blood flow energized to delivery larger quantity of nutrients to the muscles. Compression in the form of Hydrotherapy



or compression garments serves recovery in two ways, first to increase pressure in the interstitial space and increase osmosis of fluid into the venous system and secondly to increase CO2 uptake into the blood. Elevation further promotes venous flow by means of gravity.

**The RecoveryPump® delivers the best of both worlds** as it temporarily increases circulation at all levels of the venous system, Deep Veins, Saphenous veins, Superficial and Perforator veins and reduces soreness and fatigue, simulates muscle massage all while at rest, using compression and can be done with legs elevated.

## Compression Therapy Choices for Athletic Recovery

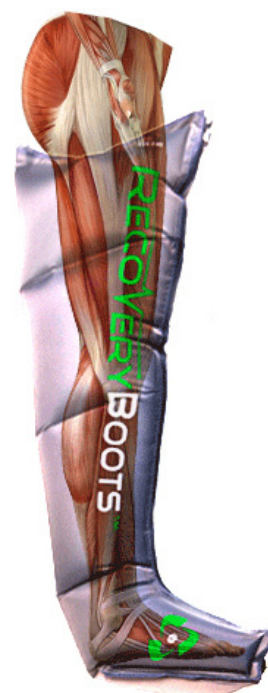
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### Compression Garments: Socks, Pants, and Tights

A lot of athletes are using passive compression as a major part of their Recovery process. The use of compression stockings are common place in the endurance sports but like in the medical field, they are effective at preventing conditions from getting worse but are minimally effective at evacuating fluid and blood without ambulation. Compression garments do increase the pressure in the interstitial spaces, the area between the skin and the muscle which helps increase absorption of collected fluids back into the veins. If a walk, stationary bike at low intensity, Yoga or other exercise program is part of your recovery routine, using compression garments during these activities will work well. For those that stand for long periods of time, or are attached to a desk, the compression garments do help to prevent pooling of blood and fluid but one must ambulate to remove the excess. We are advocates of using stockings after use of the RecoveryPump® System so as to maintain the therapeutic value of the RecoveryPump having temporarily increased venous return and reduced swelling.

### Pneumatic (Air) Compression Boots

Pneumatic compression systems like the RecoveryPump®, mimics the action of the Calf and Foot Pumps in our legs when we exercise. The nature of the pumping action of the RecoveryPump is considered Active Recovery as stated in the science and in a study conducted on the subject of Sports Recovery (see studies on this subject at the end of this e-book) but achieves the benefits of Passive Recovery because the therapy is conducted at rest. Until Pneumatic Compression was introduced to endurance sports, Active Compression involved light exercise, preferably weight bearing ambulation. Even this level of exercise accompanied with passive compression (Garments), takes considerable time to clear the muscle because there is significant delivery of "fuel" from the cardio-vascular response to this activity. RecoveryPump is used while at rest to achieve aggressive muscle recovery without expending additional energy associated with light exercise.

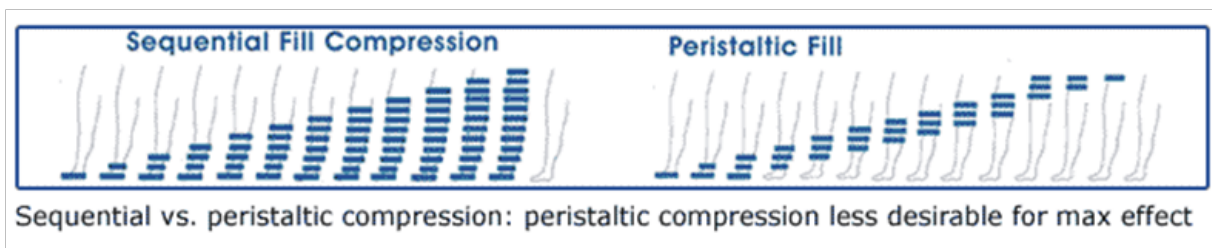


# Compression Sequence

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The compression sequence of a pneumatic compression device has everything to do with how effective that tool will be at removing waste both quickly and efficiently. Some devices fill and release chamber by chamber while others fill the entire compression boot with air before deflating. This difference can have a significant impact on recovering a muscle in the shortest amount of time with the greatest result. Read below to understand why RecoveryPump's sequential compression sequence is superior to anything else available.

## Know the Difference



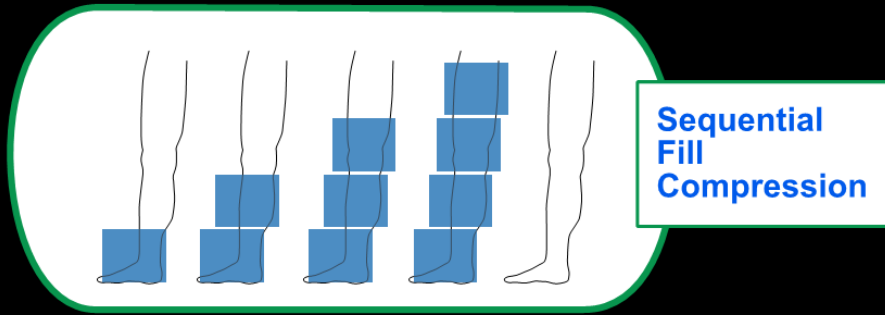
**Peristaltic “Wave Form” or “Pulse” Compression** sequence has been touted as “mimicking the normal physiology and rhythm of the body”. However, it is normal physiology that does not keep up with the build-up of metabolic waste and accumulation of fluids. Peristaltic compression pumps only apply 8 to 12 seconds of compression to any part of the extremity. Most of the extremity is uncompressed during the cycle. The peristaltic rhythm is not adequate to clear the venous system for enough duration to aggressively promote osmosis and absorption of fluid and excise the waste built up in the muscle tissue. Just as rest will eventually produce the desired effect, peristaltic compression takes time to be effective, significantly more time than systems applying sequential compression.

With **Sequential Compression like the RecoveryPump**, each cycle continuously offloads the venous system during a 30 to 40 second sequence thus moving significantly more blood and ultimately waste product. Sequential compression is an effective therapy where 1-2 Hours per day will produce results compared to Rest taking 12-48 hours to achieve similar benefit. Peristaltic “Wave-Form” or “Pulse” pumps require several more hours of use to produce equivalent results compared to that of SIPC pumps. Most athletes don't have the time or patience to sit for long periods of time.

Sequential Compression is proven therapy through scientific study, research and experience, both in the medical field and Sports Physiology. To date there is no scientific study material on the effectiveness of peristaltic “pulse” compression for sports recovery or other medical conditions.

## SEQUENTIAL COMPRESSION THERAPY

1-2 Hours Per Day Can Produce Results Compared To Rest Taking 12-48 Hours To Achieve Similar Benefit



### HOW DOES IT WORK?

- ▶ Each sequential compression cycle offloads the venous system during a 30 to 40 second sequence
- ▶ An offloaded venous system allows the removal of waste build-up in the muscle tissue by promoting osmosis and absorption of fluid



## The Studies

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Interested in exploring even more about Sequential Pneumatic Compression Therapy? Take a look at our library of Medical documentation and scientific studies, available as a downloadable PDF.

### **Compression Pumps in Athletics**

Compression Therapy for Sports Recovery Full Study

IPC Sports Recovery Enhancement2.pdf

Intermittent compression after exercise.pdf

IPC Effect on stiffness, soreness strength.pdf

### **Sports Physiology**

2.1 Study Exercise Recovery.full.pdf

2.2 Bbloodflow thru Calf.pdf

2.3 Exercise, Lactate and Anaerobic Threshold.pdf

### **Abstracts - Sports Physiology and Recovery**

(For full text studies of these abstracts, please contact Hillary Hanson at [HHanson@RecoveryPump.com](mailto:HHanson@RecoveryPump.com) to order)

Various - Exercise Physio Abstracts.pdf

Sports Recovery Abstracts.pdf

We challenge you to take your recovery as seriously as a training or nutrition regimen and use the RecoveryPump every day. Order the Complete RecoveryPump System today to get started.

*"When riding the big stage races, recovery is paramount to performance. The guys have trained all year to raise their fitness to a level that enables them to compete at the highest level of cycling in North America. However, inadequate recovery between stages can wreck their chances to use the fitness they have worked so hard to achieve. The RecoveryPump System is one of the key aspects of recovery Team Exergy uses to mix it up with some of the best cyclists in the world day after day."*

*Jeff Shilt, M.D*

