

## Publication in Sport Science in the Heart of the Arab Spring Hurghada

### **The Effect of Lower Body Negative Pressure Device on Regeneration of Basketball Players**

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#### **Introduction:**

In competitive sports like Basketball, the regeneration phase can be as important as the training itself. There is a lack of research that follows changes in lactate concentration as a result of Vacusport regeneration device.

So the purpose of this study was to examine the effect of Vacusport regeneration device on lactate concentration after stress test in 10 basketball players.

**Methods:** 10 basketball players took part in the investigation (age, 17.72 +/- 1.93 yr.; weight, 77.17 +/- 4.14 kg; height, 184.77 +/- 5.45 cm; body mass index, 19.89 +/- 2.23 Kg/m<sup>2</sup>). All subjects were tested in lactate graded exercise test (Bruce Protocol) followed directly by 30 minutes treatment with the Vacusport (40 – 50 mbar, pressure / negative pressure ratio = 7/5 sec.).

**Results:** The results showed significant decrease in lactate concentration between the pre and post test after 30 minutes of Vacusport regeneration session.

**Conclusion:** After 30 minutes of treatment with Vacusport regeneration device a significant decrease of lactate concentrations was found.

**Key words:** Regeneration, Lower Body Negative Pressure Device and Vacusport, Graded exercise test.

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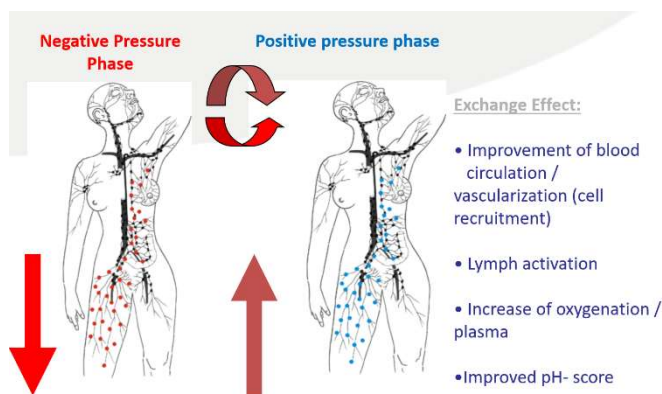
## Introduction:

Manned space missions happen in weightlessness. Weightlessness means absence of gravity. Absence of gravity leads to orthostatic complications and complications of the baroreceptor reflex. This situation needs a solution. Without a solution, manned space missions would not be possible. The name of the solution is **LBNPD** = Lower Body Negative Pressure Device (The Vacusport Regeneration Device).

The basic research for this solution was carried out in space, aimed at improving the blood flows in astronauts experiencing negative effects of extended periods of weightlessness. This technology has now been refined to improve athletic performance. The athlete immediately feels the effect.

## The physical principle is the alternating vacuum:

Intermittent negative pressure application



**The technique:** Increase of microcirculation and improvement of capillarization through rhythmical capillary dilation and capillary compression caused by cyclical positive and negative pressure changes act like a second external heart in the lower body.

The post exercise laboratory values have been measured and confirm the improvement of the aerobic – anaerobic endurance.

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The effect of exchange between negative and positive pressure phases:

- Improvement of blood circulation
- Lymph activation
- Increase of infiltrations

### **Improved performance by quicker regeneration**

In competitive sports, the regeneration phase can be as important as the training itself. The period between two exercise sessions is used to replenish the athlete's body systems in the quickest possible time, especially in sports utilising the large muscle systems of the lower body.

World class athletes all follow perfectly designed training schedules, but the athlete who has the advantage of shortening their regeneration time will not only be able to train as hard and intensively as their competitors, but will be able to do so more often.

The best athlete is the one who recovers quicker than the others and who can get back to peak training earlier.

The VACUSPORT Regeneration System is a new system for quicker regeneration and the replenishment of the athlete's performance in competitive sports. It offers new dimensions to the science of training, adding one further dimension to performance improvement.

The device's method is to increase tissue and muscle perfusion to achieve waste product removal and to accelerate reduction of lactate and creatinekinase.

On contrary, in the one study that examined the effect of a 12 week of VACUMED (similar to VACUSPORT) sessions (1 session every 2 days) on the level of lactate and creatinekinase showed that quicker reduction was happened (1).

In this study a total of 50 athletes were accompanied in their training process over a period of 12 weeks. Canoeists, swimmers, rowers, football players, tennis players and track and field athletes took part in the investigation. The athletes from different sport disciplines trained in the same training group with half of the training group being subjected to a 30- minutes treatment with the VACUMED every 2 days (40 – 50 mbar, pressure / negative pressure ratio = 7 / 5 sec.). At the same time all the athletes took part in the regeneration training prescribed by the trainer. In addition 2x per week before and after training a blood sample was taken from the athletes (both VACUMED group and non- VACUMED group) and the following parameters measured:

Resting lactate (directly before training) – post-strain lactate (directly after training – CK, urea, uric acid and leukos (1.200 blood examinations on the 50 athletes).

At the beginning of the observation and at the end of the observation a scaled lactate test was carried out on all the athletes. In addition, before the beginning of each training session, all the athletes were questioned on their motivation and subjectively- felt degree of regeneration using a numeric rating scale. The athletes belonging to the VACUMED group were additionally questioned on their opinion of the effectiveness of the VACUMED.

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Dr. med. Alf explained that the treatment method works like an external lymph heart. This is proven by laboratory values and the improvement of aerobic- and anaerobic condition as well as by former studies of space medicine, which was originally the starting point of this unique treatment procedure.

It is clear that more data are needed to determine the effects of the different regeneration methods on the removal of lactic acid and waste products (5), (6), (7), (8), (9).

### Methods:

10 basketball players took part in the investigation (age, 17.72 +/- 1.93 yr.; weight, 77.17 +/- 4.14 kg; height, 184.77 +/- 5.45 cm; body mass index, 19.89 +/- 2.23 kg / m<sup>2</sup>). All subjects were tested in a graded exercise stress test (Bruce Protocol) in a laboratory setting (Table 1 (2)). During the test the speed and the elevation of the treadmill was increased at regular intervals (every 3 min) and blood samples were taken by h/p cosmos portable Sirius lactate test meter at each increment as follows:

**Table (1)**  
**Lactated Graded Test (Bruce Protocol)**

Km/h	Elevation %	Time
2.7	10.00	3
4.00	12	3
5.4	14	3
6.7	16	3
8.00	18	3
8.8	20	3
9.6	22	3

The graded exercise stress test was followed directly by 30 minutes treatment with the VACUSPORT (40 – 50 mbar, pressure / negative pressure ratio = 7/5 sec.). Blood lactate is then plotted against each workload interval to give a lactate performance curve for each player (10), (11), (13). The percent of lactate changes from pre-training to post- training were calculated. All subjects were examined by a physician, and none had any medical problems.

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## Results

The results (table 2) showed significant decrease in lactate concentration between the pre test (8.8 +/- 2.1mmol/L) (and post test after 30 minutes of VACUSPORT regeneration session (1.1 +/- .36 mmol/L) (P < 0.05).

**Table (2)**  
**Significance of differences between pre & post lactate concentration**

	Pre Test		Post Test	
lactate concentration mmol/L	Avg	Std Dev	Avg	Std Dev
	8.8	2.1	1.1	.36

## Conclusion

The result of the research is clear. Due to an improved blood circulation and purification a quicker reduction of lactate could be verified. This is the result of an enhancement of the microcirculation and the optimization of the capillarisation through rhythmical capillary dilatation and capillary compression achieved by pressure and negative pressure.

## References

- 1- **Alf, M. D. (2007)**. Observation of the regeneration of top athletes when using VACUSPORT LBNPD (lower body negative pressure device). Institute of sports medicine Olympic Base Rhein- Rhur.
- 2- **Armstrong, RB**. Mechanisms of exercise- induced delayed onset muscular soreness: A brief review. Med Sci Sports Exerc 16: 529-538; 1984.
- 3- **Brummitt J**: The role of massage in sports performance and rehabilitation: Current evidence and future direction. N Am J Sports Phys Ther 3: 7-21, 2008.
- 4- **Byrnes WC, Clarkson PM**. Delayed onset muscle soreness and training. Clin Sports Med 5: 605-614, 1986.
- 5- **Cafarelli E, Flint F**. The role of massage in preparation for and recovery from exercise. An overview. Sports Med 14: 1-9, 1992.
- 6- **Hemmings B, Smith M, Graydon J, Dyson R**: Effects of massage on physiological restoration, perceived recovery and repeated sports performance. Br J Sports Med 34: 109-114, 2000.

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- 7- **Herbert RD, de NM**, Kamper SJ. Stretching to prevent or reduce muscle soreness after exercise. *Cochrane Database Syst Rev* 2011; CD004577.
- 8- **Hinds T, McEwan I, Perkes J, Dawson E, Ball D, George K**. Effects of massage on limb and skin blood flow after quadriceps exercise. *Med Sci Sports Exercise* 36: 1308-1313, 2004.
- 9- **Hughson RL, Weisiger KH, Swanson GD**. Blood lactate concentration increases as a continuous function in progressive exercise. *J Appl Physiol*. 1987 May; 62 (5): 1975-81.
- 10- **Maud PJ and Foster C (eds.)**. (1995): *Physiological Assessment of Human Fitness*. Champaign, IL: Human Kinetics
- 11- **McArdle WD, Katch FI and Katch VL**. (2000): *Essentials of Exercise Physiology*: 2nd Edition Philadelphia, PA: Lippincott Williams & Wilkins.
- 12- **Weerapong P, Hume PA, Kolt GS**. The mechanisms of massage and effects on performance, muscle recovery and injury prevention. *Sports Med* 35: 235-256, 2005.
- 13- **Wilmore JH and Costill DL**. (2005). *Physiology of Sport and Exercise*: 3rd Edition. Champaign, IL: Human Kinetics.

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