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**Observation of the regeneration of top athletes when using
Vacusport LBNPD (lower body negative pressure device)**

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The use of a device to improve blood circulation in the tissue in order to compensate for weightlessness in space has been known in space technology for some time. Scientists of NASA and the DLR (German Aerospace Society) have found that using the Vacumed (similar Vacusport) device of the firm Weyergans High Care AG leads to strong capillary dilation and capillarisation and to an increase in micro- and macro-perfusion in the lower limbs. In competitive sport regeneration plays a vital role – those who regenerate better and faster can also train better and faster and more intensively and at the same time guard against an increased proneness to injury through intensive strain.

Negative pressure treatment leads to better blood circulation of the tissue according to the general state of knowledge. Negative pressure allows more oxygen-enriched blood to be sucked into the tissue, overpressure leads to blood low in oxygen and waste products produced by metabolism being carried away via the venous system and the lymphatic vessels.

The effects of a manual massage and/or manual lymph drainage are well-known for the regeneration of athletes. The lymphatic flow is stimulated, the arterial-venous blood exchange is boosted resulting in an accelerated venous reflux and an increased arterial discharge. In addition muscle tone is reduced and the concentration of endorphins in the brain increased.

In this context we carried out a 12-week observation on 50 top athletes from different Olympic disciplines to investigate the question of whether continuous use of the LBNPD results in measurably accelerated regeneration.

Treatment plan:

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-minute 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 2 x per week before and after training a blood sample was taken from the athletes (both Vacumed group and non-Vacumed groups) and the following parameters measured:

- repose lactate (directly before training)
- post-strain lactate (directly after training)
- CK, urea, uric acid and leukos.

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.

Treatment plan

Initial test
50 athletes

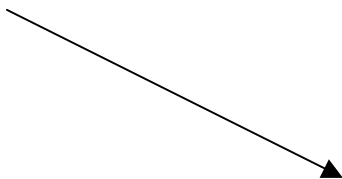
Group A/25



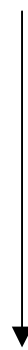
Every 2 days Vacuumed



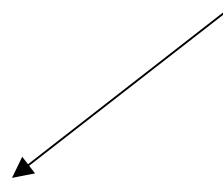
2 x per week
blood sample before +
before +
after training



Group B/25



2 x per week
blood sample
after training



Final test
50 athletes

12
W
E
E
K
S

	Initial test	Training day	Training day	Training day	Training day	Training day	Training day	Training day
No.	m/sec	repose lactate	CK	urea	uric acid	leuko	strain lactate	rating
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
	Final test							
	m/sec							

1.) How is your motivation for training today?

moderate	okay	good	very good
1	2	3	4

2.) How do your muscles feel?

heavy	okay	good	very good
1	2	3	4

3.) Do you feel well regenerated in general?

no	so-so	fine	well regenerated
1	2	3	4

4.) Do you have the impression that the “regeneration tube” helps?

no	so-so	helpful	very helpful
1	2	3	4

Results:

1. The strain tests (scaled lactate test on the running belt with 2.5 – 3.0 – 3.5 – 4.0 – 4.5 m/sec strain over 4 minutes resp.) at the beginning and at the end of the observation period revealed that all the groups of athletes – regardless of the main focus of training (condition, technique, strength, etc.) – experienced an improvement in general dynamic stamina.

Group A / Vacumed

Initial test: 4.05 m/sec

Final test: 4.32 m/sec

Group B / non-Vacumed

Initial test: 4.12 m/sec

Final test: 4.29 m/sec

2. Repose lactate	:	1,48 mmol/l	1,59 mmol/l
CK	:	262 U/l	284 U/l
Urea	:	40 mg/dl	43 mg/dl
Uric acid	:	3,9 mg/dl	4,85 mg/dl
Leuko	:	6,2 TSD/Microliter	6,0 TSD/Microliter
Strain lactate	:	8,24 mmol/l	8,16 mmol/l

3. Rating scale

Question 1	:	3,2	2,8
Question 2	:	2,7	2,1
Question 3	:	3,2	2,6
Question 4	:	3,7	- - -

Interpretation and conclusions:

Re. 1

All the athletes carried out the 12-week training cycle. On the whole no serious enough illness or injury occurred to keep an athlete out of the training process for more than 3 days. All the athletes achieved an improvement in the area of general-dynamic stamina.

Re. 2

A total of 1,200 blood tests were carried out.

The tests show a

- reduction in repose lactate levels before beginning training (1.48 mmol/l – 1,59 mmol/l)
- reduction in urea (40mg/dl – 43 mg/dl) and in uric acid concentration (3.9 mg/dl . 4.85 mg/dl)
- reduction in creatinkinasis (262 u/l – 284 u/l)

The white blood corpuscle levels (leukocytes 6.2 TSD – 6.0 TSD) and the post-strain lactate (8.24 mmol/l – 8.16 mmol/l) are in the area of measurement fluctuations.

Re. 3

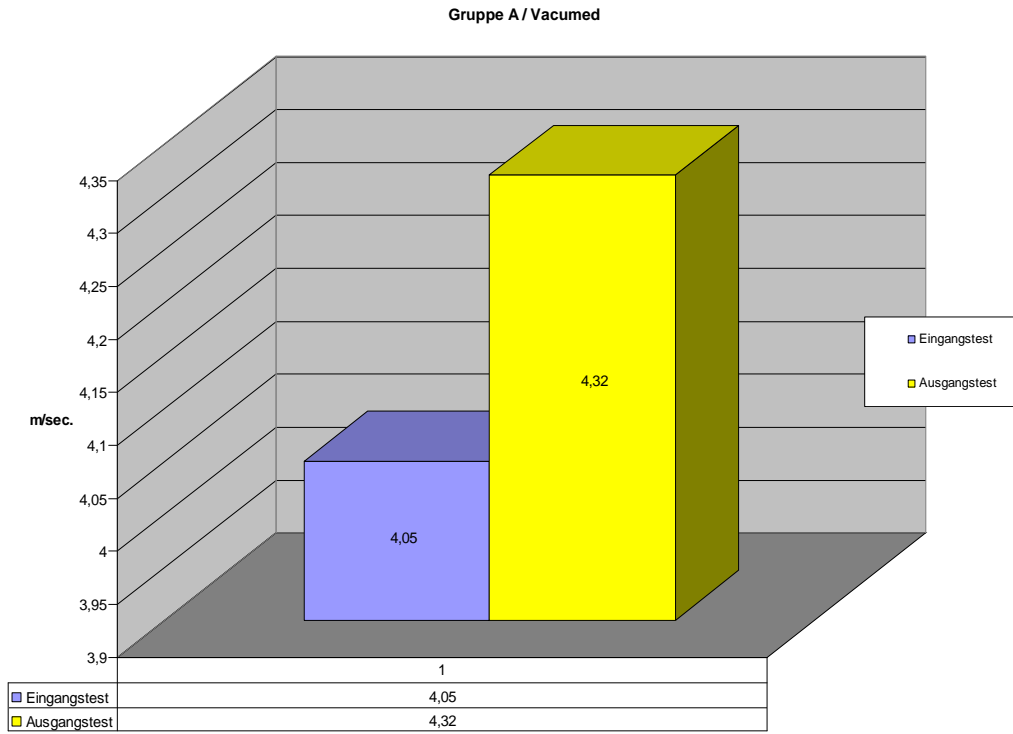
In the area of the subjective feelings of the athletes (minimum 1 point – maximum 4 points) the athletes who were treated with the Vacumed in addition to the general training report

- a clear increase in training motivation (3.2 to 2.8 points)
- a much better muscle feeling (2.7 to 2.1 points)
- improved regeneration in general (3.2 to 2.6 points)

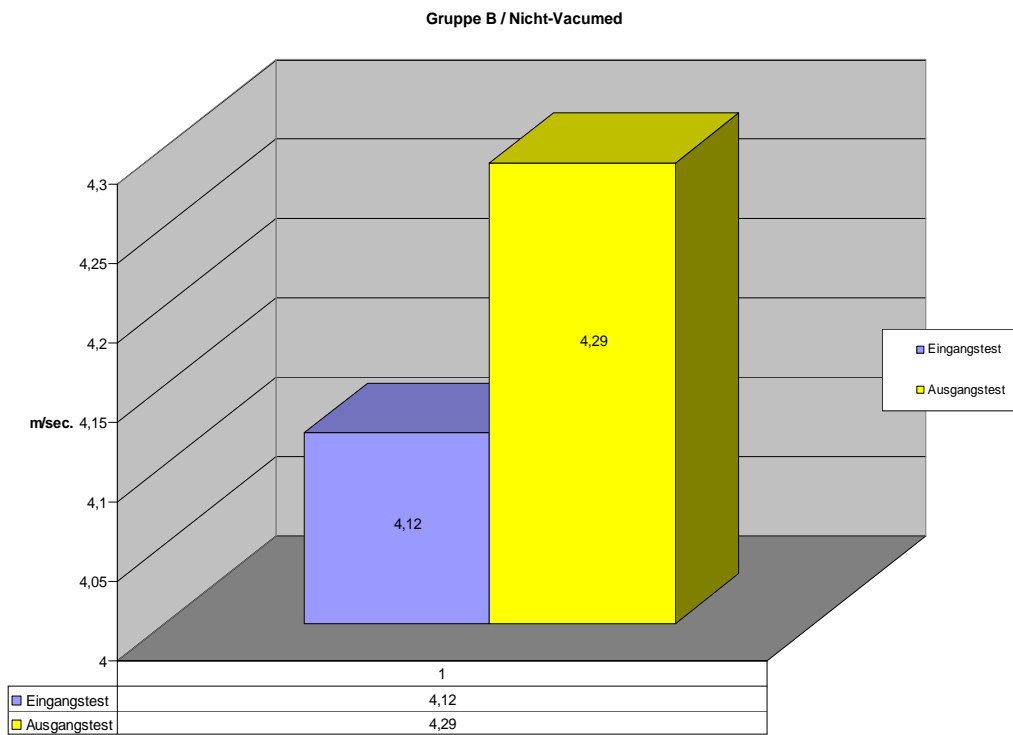
The athletes who experienced the “regeneration tube” rated the effectiveness of this treatment very highly with 3.7 out of a possible 4 points.

To sum up, after 12 weeks it can be established that the use of the Vacumed device results in greatly improved regeneration. The performance, the motivation and the subjective well-being of the athletes have increased so that we can fully recommend the use of the Vacumed device in sport.

Group A / Vacumed

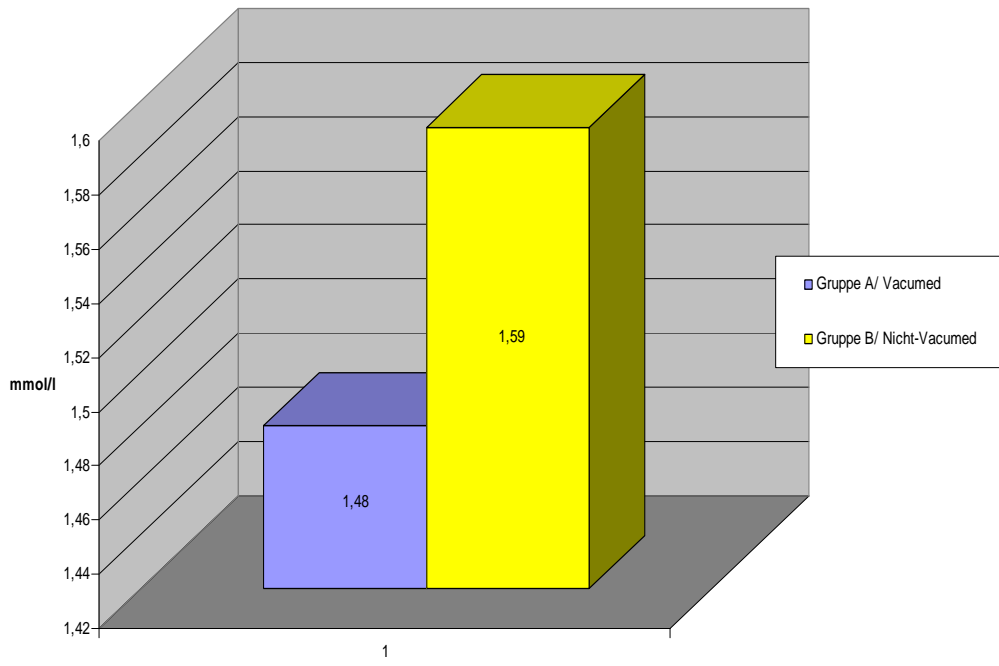


Group B / non-Vacumed

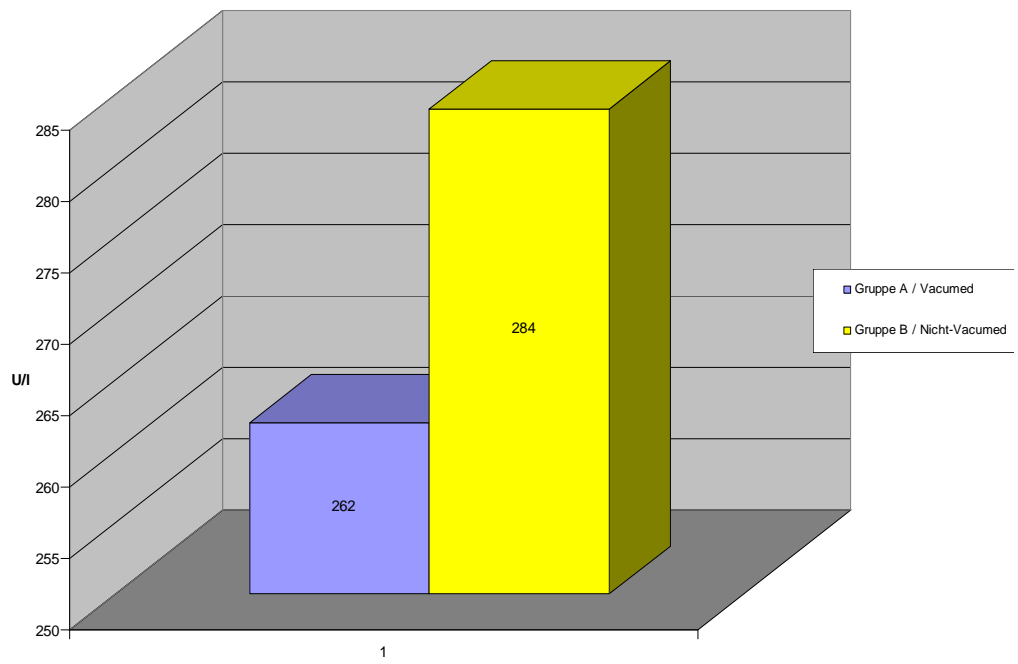


Repose
lactate

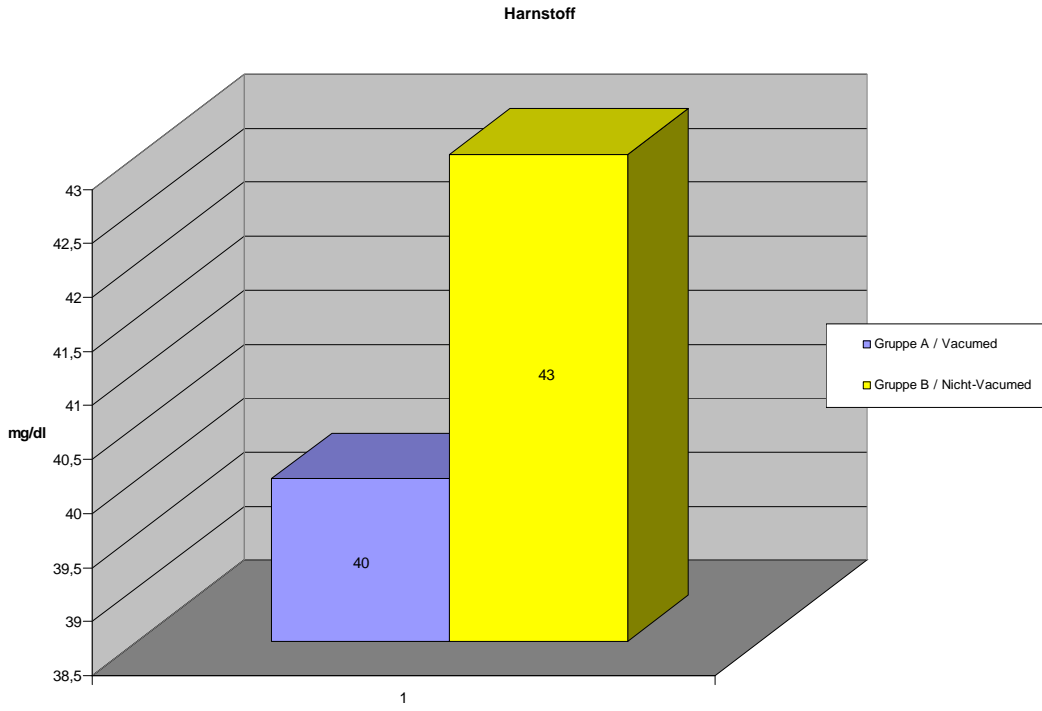
Ruhe-Laktat



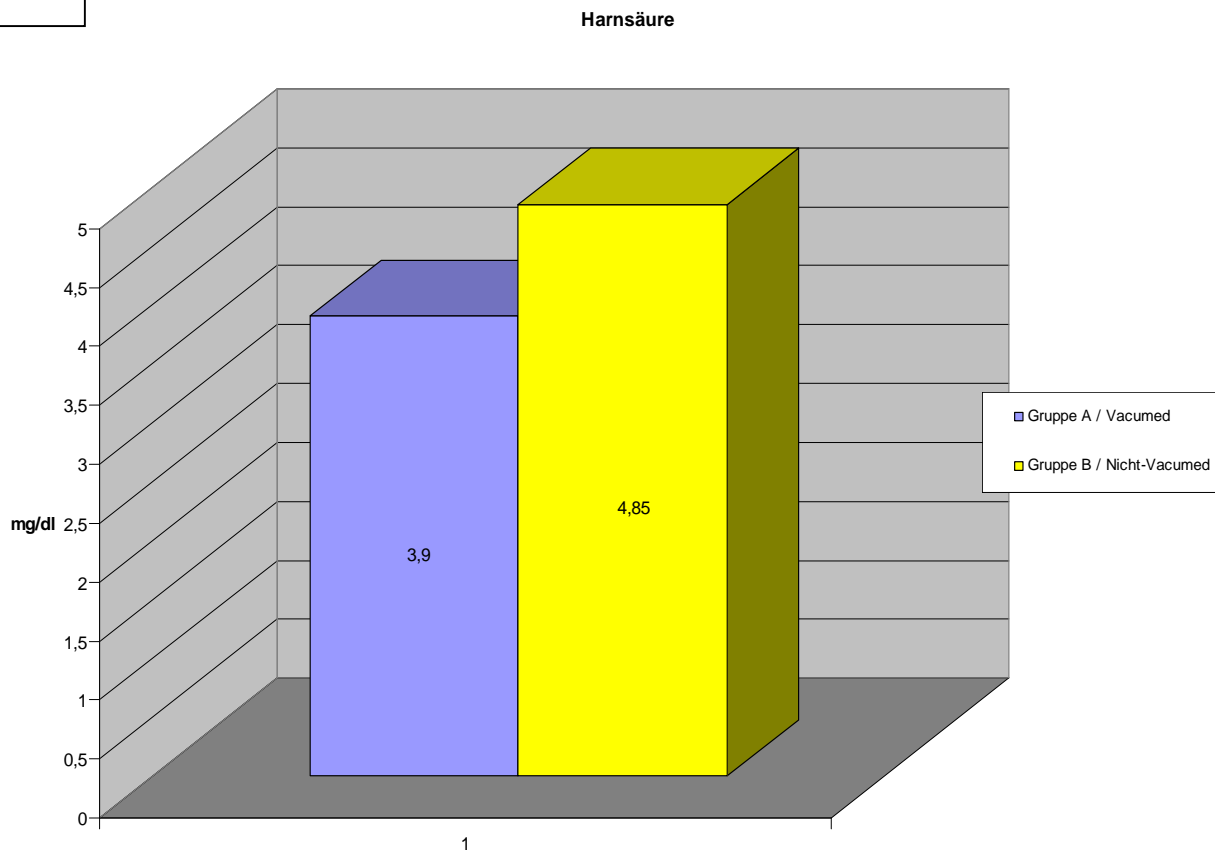
CK



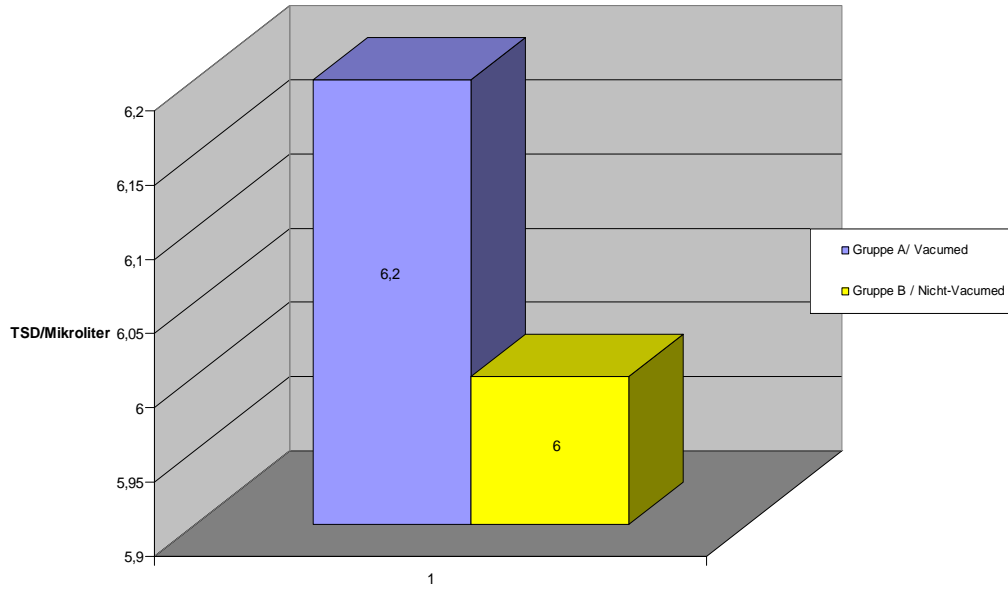
Urea



Urea acid

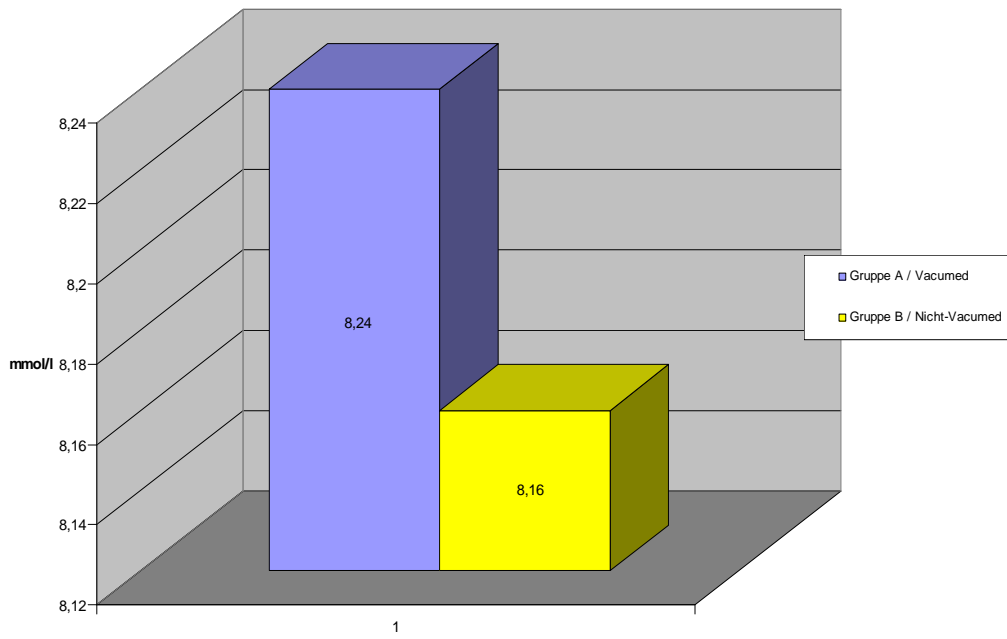


Leuko



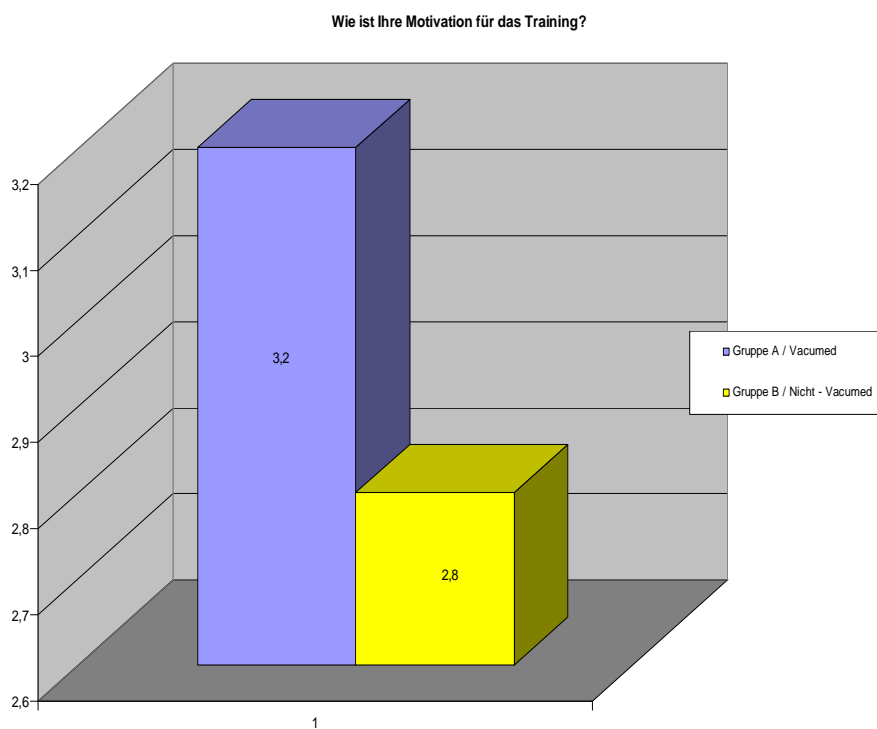
Strain
lactate

Belastungs - Laktat



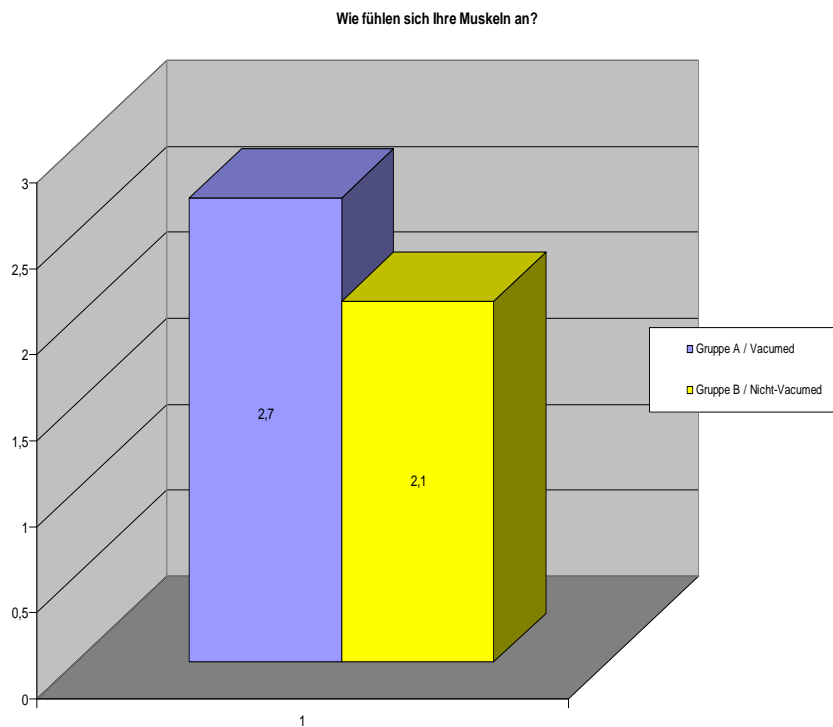
How is your motivation for training today?

- moderate = 1
- okay = 2
- good = 3
- very good = 4



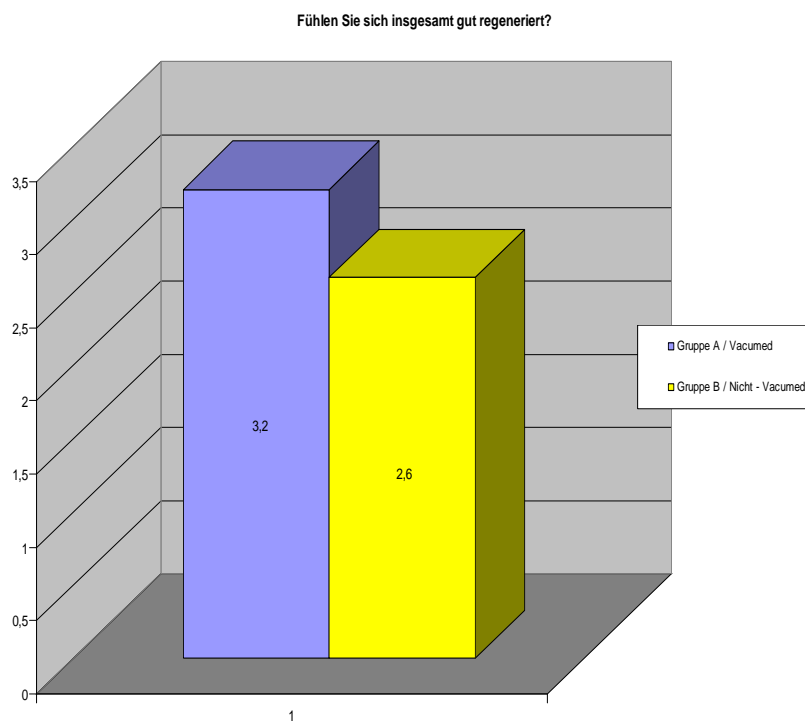
How do your muscles feel?

- heavy = 1
- okay = 2
- good = 3
- very good = 4



Do you feel well regenerated in general?

- no = 1
- so-so = 2
- fine = 3
- well regenerated = 4



Do you have the impression that the „regeneration tube“ helps?

- no = 1
- so-so = 2
- helpful = 3
- very helpful = 4

