

Stamina of smokers and non-smokers after β -alanine-rich diet

Pintér Gergő

β -alanine is the decomposition product of the dipeptide, carnosine. Carnosine is a dipeptide that consists of Beta-alanine and an essential amino acid, histidine. It is mainly stored in type 2, fast-twitch muscle fibres. One of its most important feature that it neutralises H^+ ions, and keeps pH value of muscles on an optimal level during high intensity training. If the body's Beta-alanine level drops ,acidification starts earlier. β -alanine is used by skeletal muscles to form carnosine with the help of carnisone synthetase enzyme when coupled with histidine. Our team examined the biological effects of β -alanine after executing a 6-week-long training cycle. Aims of the present study were to examine if any obvious physiological differences appear among users and non-users of β -alanine, and to examine possible parametric disparities among smoker and non-smoker subjects after the 6-week-long training.

The aims of our research was :

- to examine the effects of physical activity on inactive people's body
- examine main effects and action-mechanism of Beta-alanine,
- to exploring differences physical parametrical ,between smokers and non-smokers,
- to find differences between supplement users and non-users.

Participants were volunteers (n=43) aged between 18 and 25 years (mean age was 22), smokers and non-smokers as well; sexes were represented almost equally (58% male, 42% female). Before the training protocol we examined the participants' health status and fitness level (anthropometric data, spirometry, 20m shuttle run test, measuring maximal muscle strength with dynamometer).

43 participants took place in the research: 16 smokers and 27 non-smokers. The ratio of males and females was almost equal. After analysing the results we found no significant differences between men and women so we decided to divide volunteers into 4 groups, namely:

- Smoker users,(N=9)-SU-
- Smoker non-users, (N=7)-SNU-
- Users, (N=14)-U-
- Non-users. (N=13)-NU-

Half of each group got pills containing Beta-alanine, they took pill consistently on an everyday basis in the doses of 50 mg/ bodyweight kg. The other half of the groups took placebos. Groups were formed by a randomized double-blind test and all the supplements were ensured by Scitec Nutrition.

Participants were examined both before and after the 6-week-long training period. These tests were the following :

- Anthropometric measurements (general body composition measurement by a bioimpedance measuring tool, skin fold measurement, body weight),
- Examination of lung function
- 20 metre shuttle run test for measuring VO2max,
- measuring maximal strength of knee extensor muscles, examination of workout efficiency with dynamometric protocol.

Anthropometric results

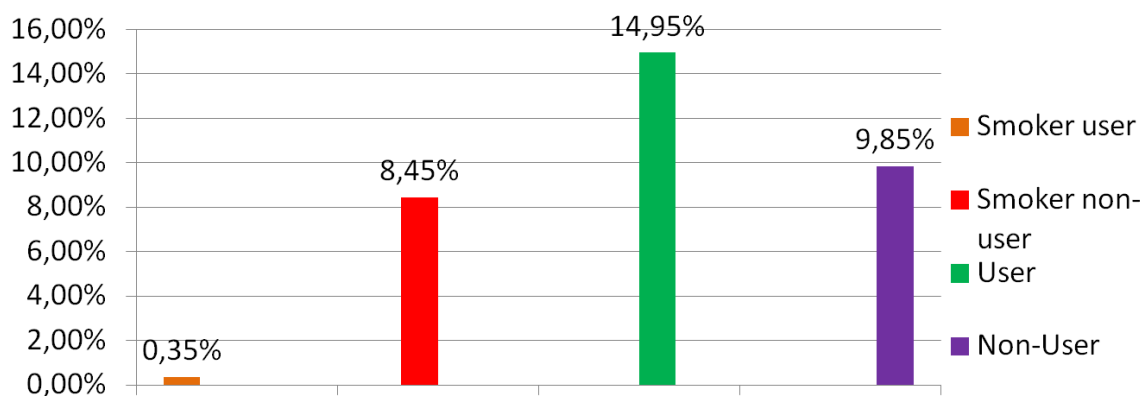
We made measurements both before and after the 6-week-long training. Skin fold was measured on 4 body parts which were the biceps, triceps, subscapula, suprailliac. It is visible that the biggest fat loss happened in the group of supplement users.

An interesting fact,

90% of volunteers lost muscles mainly because of the following reasons:

- bad eating habits which means low level protein input
- weekly 3 trainings during 6 weeks led to overtraining
- poor quality of their rests

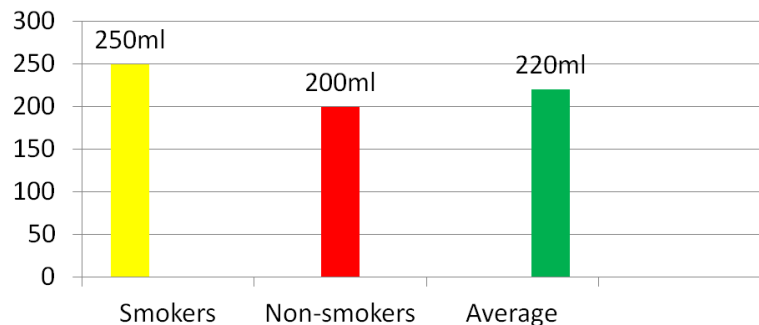
Skin fold average differences after 6 weeks



Spirometric results

The following table shows the improvement of vital capacity after the 6-week-long training. On an average, the vital capacity of participants improved 220 ml. This means 250 mls growth in case of smokers and 200 mls in case of non-smokers.

**Differences in the maximal vital capacity
after 6 weeks**

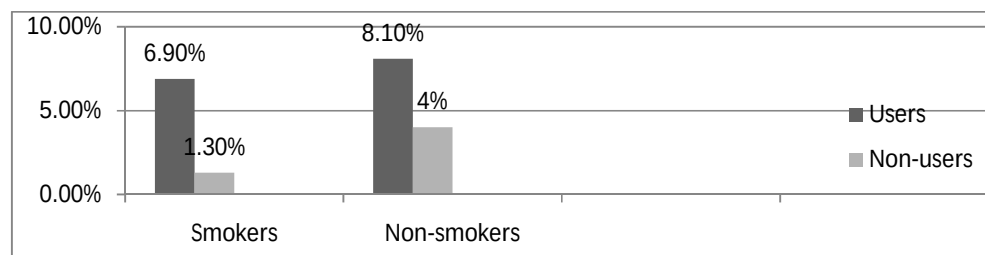


20 m shuttle run test

The table shows how oxygen uptake (VO_2max) changed after 6 weeks. It is noteworthy that Beta-alanine users reached a higher level of Oxygen consumption. With respect to power, this means that non-users ran 150 metres more during the second shuttle run test than before, while users ran 270 metres more. The maximal oxygen uptake generally increased, but difference was found among groups (SU +6.9%, SNU +1.3%, U +8.1%, NU +4%). Vital capacity also increased with 6.05% (mean = $106.05 \pm 8.5\%$), showing the improved condition of respiratory muscles.

The effects of Beta-alanine on maximal VO_2 and lean body mass were also examined by another research. Within the group of users they found unquestionable improvement in both parameters.

Shuttle run test (VO_2max) results



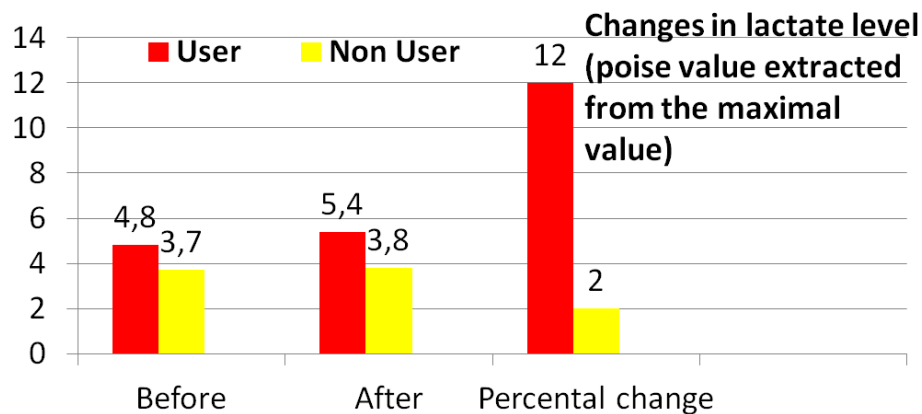
Maximal strength results

Maximum strength of the right legs increased by 8.45% on average (before training 258.31 Nm, after training 280.69 Nm). The following table shows the maximal isometric contraction of right leg in a 50 degree angle. Interestingly, non-users had better results but no significant difference was found. In case of users, smokers' level of improvement was higher than of non-smokers and this certified one of our hypothesis.

	Power improvement (Newtonmeter)			Power improvement (Newtonmeter)		Average:	
Smoker users	+27,57 Nm	+10,80%	Users:	+12,64 Nm	+4,25%	Users:	+7,50%
Smoker-non users:	+21,28 Nm	+6,40%	Non-users:	+33,3 Nm	+13,80%	Non-users:	+10,10%
<i>Smoker average:</i>	<i>+24,42Nm</i>	<i>+8,6%</i>	<i>Non-smokers average:</i>	<i>+22,97Nm</i>	<i>+9,03%</i>		

Workout results

It is visible that all 4 groups showed an almost equal improvement in performance. What really changed is the difference between lactate acid levels (1 minute after straining in poise state) in the groups of users and non-users. Higher level of lactate acid means, that the glycolytic enzyme system developed faster and better than the mitochondrial enzyme system.



We can conclude that:

- Cellular metabolism can be improved by Beta Alanine supplementation and proper training
- Those who suffered from metabolic drawback (smokers) showed greater improvement
- Beta-alanine affects aerobic stamina
- Some results are hardly explainable because of the low number of smoker participants.

Our research indicates that cellular metabolism can be improved by using food supplements and a proper training program. The improvement was greater among those who suffer from a metabolic drawback (smokers).