EFFECTS OF NUTRITIONAL SUPPLEMENTS DESIGNED TO PROMOTE LEAN TISSUE ACCRETION ON BODY COMPOSITION AND STRENGTH PERFORMANCE.

This study (double blind and placebo controlled) was carried out at the University of Colorado in Arapaho Community during the spring and summer of 1996. The study's main purpose was to test the effect of two nutritional preparations in developing muscle strength and muscle mass. Their effect was also studied with regard to any influence they might have on volunteer's testosterone and LH hormone levels, body composition (muscle weight in comparison to fat weight), and a number of subjective conditions. The preparations being tested were "Multifactor" (a composition which includes among other things 5 g egg powder and 5g creatine per day) and creatine Monohydrate (5g/day).

The volunteers: thirty two (32) 19-35 year old men and women (mean age of 30) were recruited from Arapaho Community College Fitness Center in Colorado, USA, to take part in a 6 week test of how the above-named preparation would affect a number of different dependent variables. Nineteen (19) of these volunteers completed the study. Their mean training time was 17.5 months. 10 volunteers took Multifactor and 9 volunteers took creatine.
In addition, a group consisting of 7 advanced bodybuilders with a mean training time of 6 years was recruited. This group took Multifactor.
Altogether, therefore 26 volunteers were included in the test. Volunteers not completing the test totaled 33% (i.e. 13 out of 39 persons).

Measurement of the study's dependent variables:

1. *Muscle mass* was measured in two ways: (a) by measuring the following parts of the body with a centimeter tape-measure, in most cases both tensed and relaxed: shoulders, chest (men only), waist, hips (women only) and thighs, also (b) by measuring body composition, which was determined partly by underwater weighing and partly by caliper and ordinary weighing scales.
2. *Strength* was measured in two ways, with bench press and leg press (a) maximum weight for one repetition (1RM) of both bench press and leg press, and (b) maximum number of repetitions with 70% of 1 RM weight for bench press and 80% of the 1 RM weight for leg press.

3 *Testosterone and LH levels* were measured by blood tests taken by personnel at the university hospital's clinical research center.

4 *Dietary records* were kept for four days by the volunteers. They were analyzed later by the personnel at the university hospital's clinical research center. This analysis provided information on the number of calories, amounts of protein, carbohydrate, fat, vitamins, minerals, water etc. the volunteer in question normally consumed per day.

5 Information about a number of *subjective conditions* (for instance, energy levels, training motivation, mental alertness, well-being, health, libido, self-evaluation, muscle strength and muscle mass), *training experience, diet and certain living habits* were defined by questionnaire at three points: before the test, after three weeks, and after six weeks at the end of the program.

3: Subjective measurements
(a scale of 9 where 1 = least and 9 = most):

How effective was the preparation in comparison with the other, in the following:

	Increased muscle definition:	Fat reduction	Increased energy:
Multifactor group:	8,0	7,5	8,0
Creatine group:	6,2	5,6	6,2

There is an almost statistically significant difference between the Multifactor group and the Creatine group (p=0,09) regarding fat reduction.

There is an almost statistically significant difference between the Multifactor group and the Creatine group (p=0,09) regarding increased energy.

Søyleforklaring

Multifactor

Creatine

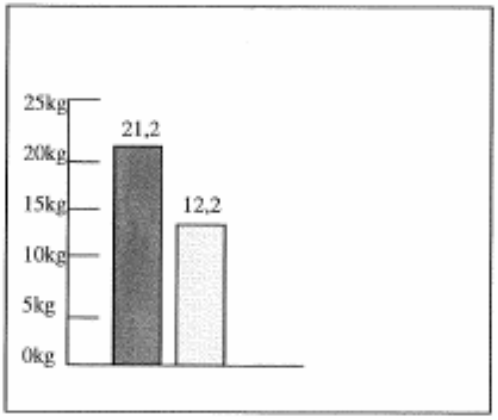


Fig.1 Strength increase in leg press after six weeks training and consumption of Multifactor and Creatine.

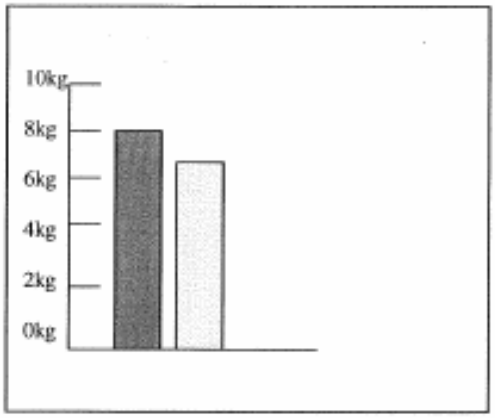


Fig.2 Strength increase in bench press after six weeks training and consumption of Multifactor and Creatine.

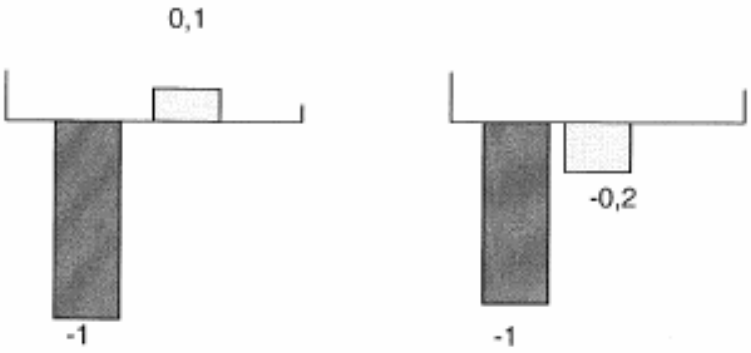


Fig. 3 Fat reduction after six weeks training with Multifactor and Creatine as diet supplement.

3. Subjective measurements

(a scale of 9 where 1= least and 9= greatest)

After 6 weeks on the program, changes in the following:

	Muscle mass	Strength	Physical shape	Training motivation
Multifactor group:	7,8	7,9	7,7	8,1
Creatine group:	6,9	6,9	6,3	6,6

There is an almost statistically significant difference between the Multifactor group and the Creatine group (p=0,09) regarding strength.

There is an almost statistically significant difference between the Multifactor group and the Creatine group (p=0,059) regarding physical shape

There is an almost statistically significant difference between the Multifactor group and the Creatine group (p=0,02) regarding training motivation.

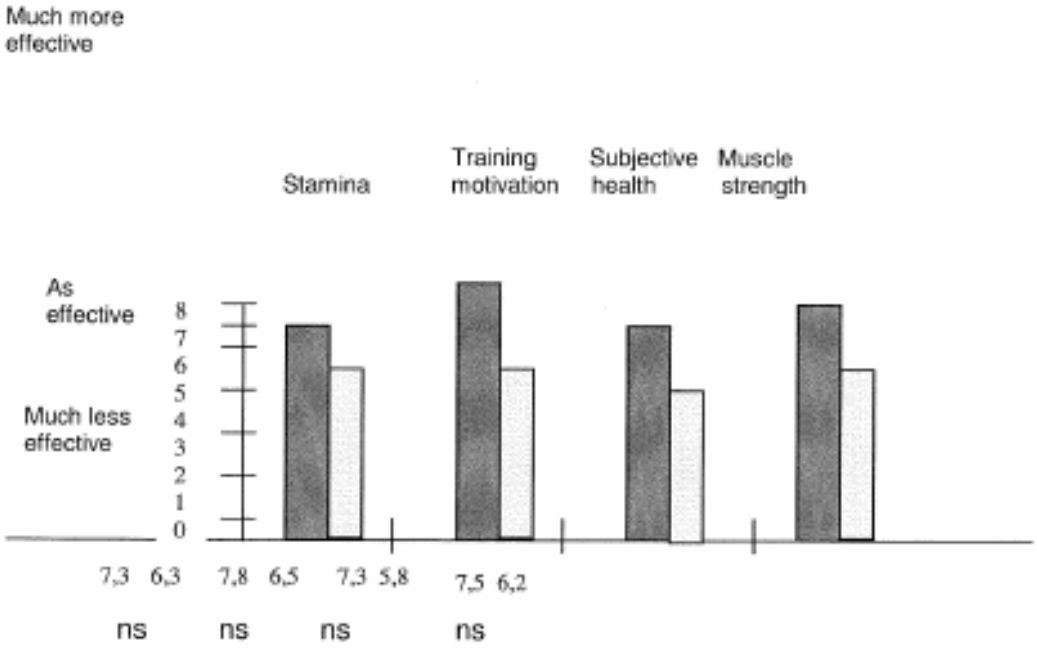


Fig 4 How effective were Multifactor and Creatine compared with other diet supplements?

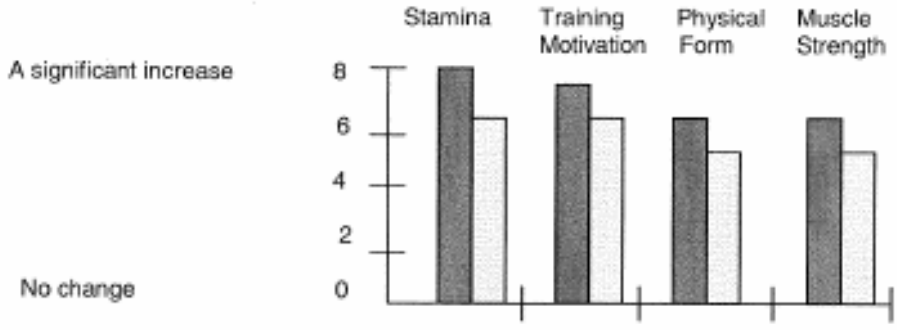


Fig 5 Increases after 6 weeks training with Multifactor and Creatine as diet supplement.

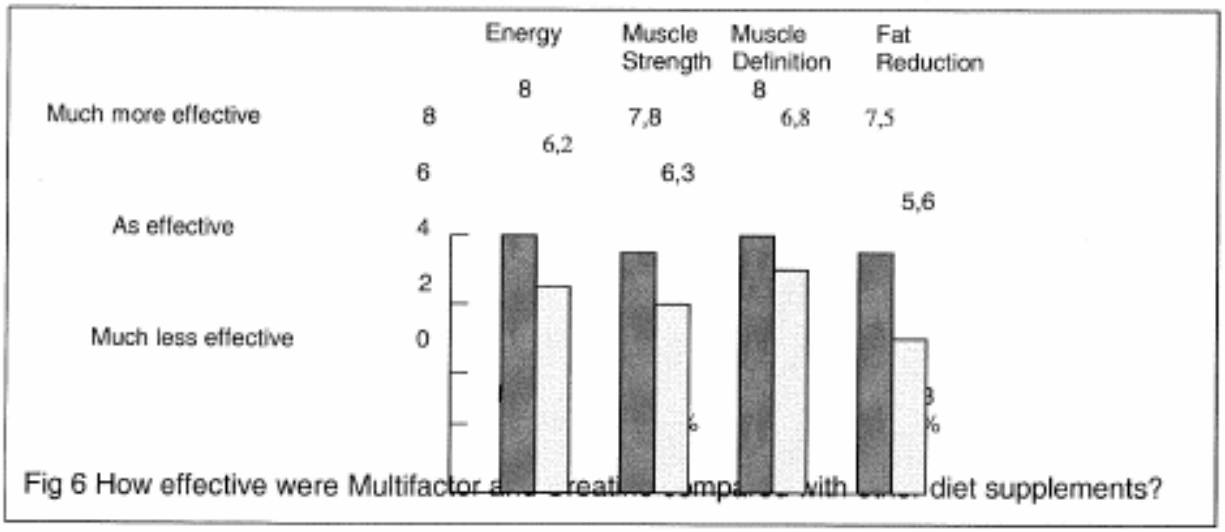


Fig 6 How effective were Multifactor and creatine compared with other diet supplements?

List of words in figures:

Fig 3
Calliper method
Hydrostatic weighing

Fig 4
Much more effective
As effective
Much less effective
Stamina
Training motivation
Physical form
Muscle strength

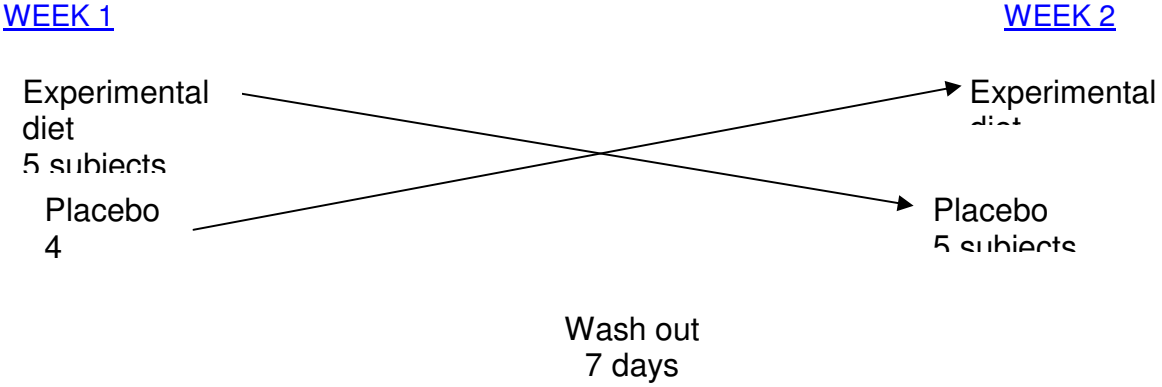
Fig 5
A significant increase
No change
Stamina
Training motivation
Physical form
Muscle strength

Fig 6
Much more effective
As effective
Much less effective
Energy
Muscle strength
Muscle definition
Fat reduction

OF HORMONES SUBSEQUENT TO HARD TRAINING.

(study conducted at the Norwegian Academy of Sport)

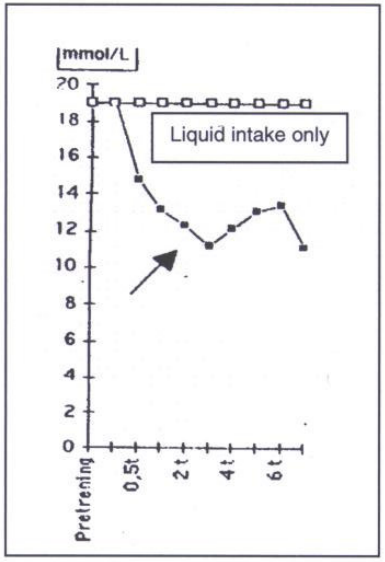
This study was carried out with 9 advanced bodybuilders between the age of 20 to 30. The criteria used in selecting the individual was at least 2 years strength training.
In the cross-over designed study the participants consumed a meal (500 Kcal in liquid form) of carbohydrates and protein in the ratio of 50:50.
Immediately after 2 hours hard training, and repeated 2 hours later.
Placebo group was given the same ratio on isoenergy basis, and the protein fraction to be studied was replaced by albumin from regular eggs.



Prior to the study, the participants did not train, and minimized their physical activity to the absolute minimum the last 48 hours.
They recorded their food intake 3 days prior to the study. As the study started as early as 7:00 AM, they had no food before the test.
Blood samples were collected from the jugular vein before exercise, immediately after, and 30 and 60 minutes after completed training. Thereafter every hour for 8 hours. The blood samples were analyzed for testosterone, insulin, kortisol, growth hormone and urea-N.
Increased cellular uptake of testosterone, higher insulin level and low kortisol values were recorded in individuals on the experimental diet, compared to control. The favorable cellular hormone state is likely to increase protein synthesis and decrease protein breakdown.
Interesting, the values of testosterone were declining after the hard work-out, and was even lower for the individuals on the protein supplement than the control, and may be caused by increased uptake of testosterone in the muscular tissue.
Since it is only free testosterone, and not the bounded that can be available for uptake in the muscle cells, it is important that the testosterone are not bound to SHBG. Higher uptake of testosterone results in more efficient protein synthesis via increased formation of mRNA.
Kortisol level were declining and more in the experimental group than the control. To keep this hormone as low as possible is of outmost interest in all physical training and competition, and important to obtain a positive N-balance and shortened time of restitution after a hard work-out.

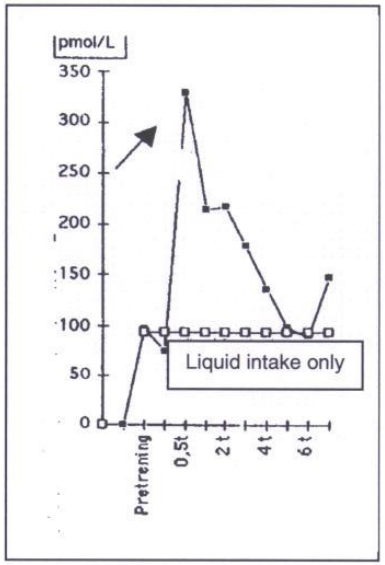
TESTOSTERONE

	Protein	Liquid
Pretraining	18,9	19
Posttraining	19,1	19
0,5hour	14,8	19
1hour	13,2	19
2hours	12,3	19
3hours	11,2	19
4hours	12,1	19
5hours	13,1	19
6hours	13,4	19
8hours	11,1	19



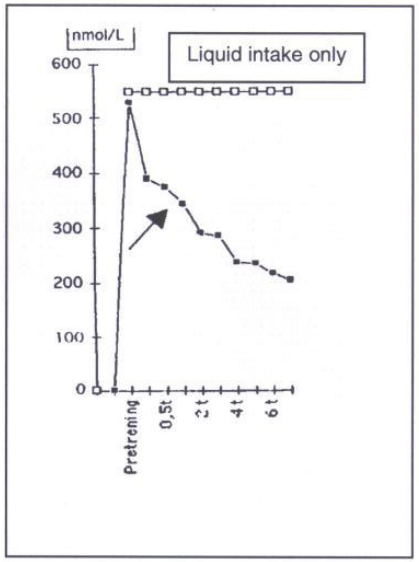
INSULIN

	Protein	Liquid
Pretraining	97,9	95
Posttraining	74,7	95
0,5hour	329,3	95
1hour	213,6	95
2hours	216,6	95
3hours	178,4	95
4hours	136,0	95
5hours	99,0	95
6hours	89,8	95
8hours	148,0	95



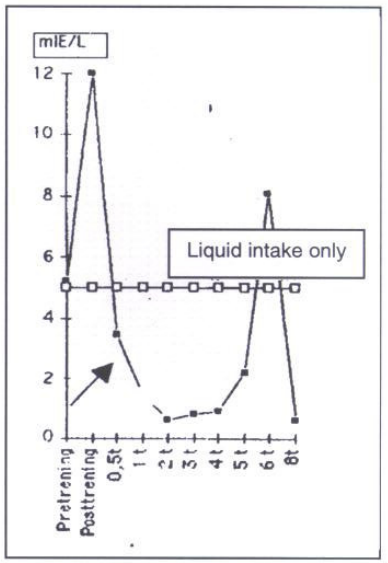
KORTISOL

	Protein	Liquid
Pretraining	530	550
Posttraining	390	550
0,5hour	375	550
1hour	345	550
2hours	290	550
3hours	285	550
4hours	238	550
5hours	236	550
6hours	218	550
8hours	205	550



GROWTH-HORMONE

	Protein	Liquid
Pretraining	5,2	5
Posttraining	12,0	5
0,5hour	3,5	5
1hour	1,4	5
2hours	0,6	5
3hours	0,8	5
4hours	0,9	5
5hours	2,2	5
6hours	8,1	5
8hours	0,6	5



The product has been tested in a double blind study approved by an ethical research council. As the graph shows the following effects have been achieved with the test product.

1. The test product shows significant reduced kortisol values (stress value) which is important to achieve a positive nitrogen balance.
2. Reduced testosterone levels – shows that the hormone are used in the muscle synthesis process.
3. The test product increases the Insulin production, which leads to an increased amino acid absorption.
4. The growth hormone is positively effected when taking the test product.