

DURING A WEIGHT LOSS DIET THE USE OF MAP IN CONTRAST TO DIETARY PROTEINS OR MEAL SUBSTITUTES ALLOWS THE ACHIEVEMENT OF BODY'S NITROGEN BALANCE EQUILIBRIUM WITH ESSENTIALLY NO CALORIES

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Summary

Confirming previous findings, the results of this study, performed on 500 overweight subjects have showed a significant mean weight loss of 2.5 kg (5,5 Lb) per week. The results have showed that by providing MAP, a patented dietary supplement, in a dose of 400 mg/kg/day to each subject, in conjunction with the INRC's OMP diet, the subjects body overweight has been significantly reduced, both by reducing excessive fat tissue and by eliminating excessive water retention from the interstitial compartment. Providing, at the same time, the nitrogen balance equilibrium necessary: a. to preserve body's structural and functional proteins; b. to avoid or eliminate excessive water retention from the interstitial compartment; and c. to avoid the quick regain of the weigh lost, also known as the yo-yo effect.

Introduction

A low calorie diet, in order to be healthy and effective, must provide the dietary protein intake necessary to achieve body nitrogen balance equilibrium. Furthermore, it must be inter-balanced, namely it must provide, on one hand, the required amounts of essential nutrients, such as essential amino acids, vitamins, minerals, trace elements, essential fatty acids, and fiber necessary for a healthy and productive life (1). And, on the other hand, it must provide a reduced amount of non-essential nutrients, thus achieving the negative energy balance necessary to induce the catabolism of excessive fat tissue.

However, so far, the achievement of body nitrogen balance equilibrium, during low calorie diets, has been a scientific dilemma. This is because if the diet provides the required protein intake, also provides unnecessary calories, thus making weight loss minimal or even absent, especially among sedentary individuals. As a consequence, most weight loss diets by reducing calorie intake also reduce the required protein intake, thus causing a negative nitrogen balance. Has been scientifically proven that dietary supplements manufactured with bovine milk and/or soy proteins, marketed as meal substitutes for weight loss, cannot provide, in their recommended dosage, the subject's nitrogen balance equilibrium. Thus causing a negative nitrogen balance that leads to a reduction of body's structural and functional proteins (mainly lean tissue), causing life-threatening physical and physiological anomalies (1-8).

Recently, the discovery of the Master Amino Acid Pattern (MAP) (U.S. Patent 5,132,113) has been confirmed by the results of a comparative, double-blind, triple crossover, Net Nitrogen Utilization study (9). MAP is a dietary supplement, composed of a unique pattern of essential amino acids. The comparative results showed that MAP induced a Net Nitrogen Utilization (NNU) equivalent to a 99%. This means that 99% of its constituent amino acids followed the anabolic pathway, acting as precursors of body's protein synthesis, meanwhile the remaining 1% followed the catabolic pathway, originating only 1% of nitrogen catabolites and energy. The results showed that each subject achieved the nitrogen balance equilibrium with a MAP intake of only 400 mg/kg per day (equivalent to 64 mg/kg per day of N), with less than 2 kcal per day (9).

Therefore, by using MAP, in contrast to the use of dietary proteins or dietary supplements, body's nitrogen balance equilibrium can be achieved with essentially no calories, because 1 g of MAP provides only 0.04 kcal. Considering the previous unique characteristics of MAP, we conducted this multicentric study in the United States of America, Italy, Spain and Mexico, to evaluate the physical and physiological parameters of 500 overweight subjects undergoing the Overweight Management Program (OMP) of the International Nutrition Research Center (INRC).

Study Population

The study population included 500 overweight subjects (outpatients), randomly chosen, 407 women and 93 men with a mean age of 43 years (SD = 13.8; range 15-76), mean height of 165cm (SD = 8.5; range 147-194 cm), mean initial weight of 80.6 kg (SD = 16.6; range 50-138 kg), and with a mean initial Body Mass Index (BMI) of 29.6 (SD = 5.3; range 19.9-49.8) (Table I). The subjects were selected if they satisfied all the inclusion criteria and none of the exclusion criteria.

Inclusion criteria were:

- Overweight subjects
- Over 15 years old
- Either male or female subjects

Exclusion criteria were:

- Current pregnancy or lactation
- Current disease

All the subjects provided informed consent to participate in the study.

Study Design

During the study, each subject (outpatient) was evaluated for a period ranging from one to thirty consecutive weeks. The study mean period was of 3 weeks (SD = 2.1; range 1-30).

The subjects' post-study evaluation was carried out after the study's conclusion. A group of 107 subjects, randomly chosen, 90 women and 17 men, with a mean initial weight of 76.3 Kg were followed-up for a 90-day-period, in order to evaluate their body weight variations (Table VI). A group of 73 subjects, randomly chosen, 62 women and 11 men, with a mean initial weight of 74.2 Kg were followed-up for a 120-day-period, in order to evaluate their body weight variations (Table VII).

MAP Dosage

The daily MAP dosage was calculated per each subject by multiplying his/her Protein Daily Requirement (PDR) (Table VI) by 0.4. To illustrate: a 170 cm high male subject's PDR was 63 g of protein intake per day. Thus, by multiplying $63 \times 0.4 = 25$. Therefore, the daily MAP dosage was 25 g.

Diet Definition

The OMP diet (Table II) was inter-balanced. Namely, it provided the adequate amounts of essential nutrients, such as essential amino acids, vitamins, minerals, trace elements, essential fatty acids, and fiber (in accordance with the US Recommended Daily Allowance (RDA)), necessary for a healthy and productive life. At the same time, it provided a reduced amount of non-essential nutrients, to obtain the negative energy balance necessary to induce the catabolism of fat tissue.

Table II. The OMP Diet	
Breakfast	
• The required dosage of MAP	(mandatory)
• 1 tablet of Multivitamins	(mandatory)
• 700 g (1 ½ Lb) of fresh fruit	(mandatory)
• Coffee, tea or other infusions	(optional)
Lunch	
• The required dosage of MAP	(mandatory)
• 1 tablet of Multivitamins	(mandatory)
• 700 g (1 ½ Lb) of fresh fruit	(mandatory)
• 250 g (½ Lb) of fresh vegetables	(optional)
Dinner	
• The required dosage of MAP	(mandatory)
• 1 tablet of Multivitamins	(mandatory)
• 700 g (1 ½ Lb) of fresh fruit	(mandatory)
• 250 g (½ Lb) of fresh vegetables	(optional)
Snack	
• Fresh fruit, as much as desired, at any time	

- Allowed Beverages were: Non carbonated water, coffee, tea and other infusions.
- Allowed Seasoning were: Lemon juice, vinegar, pepper, and natural herbs.
- Allowed Sweetener was: Aspartame (Nutrasweet).
- The allowed fruits were chosen from Table III. Fresh fruits could be cooked or baked, without using sugar or fat. Canned or dried fruits were not allowed.
- Vegetables were chosen from Table IV. Fresh vegetables could be steamed, grilled or baked, without using salt or fat. Canned vegetables were not allowed.

Table III. Allowed Fruits	
Name	Energetic Value cal/3.5 Oz (100g)
Apricot	57
Pineapple	52
Cherry	63
Plum	47
Papaya	24
Peach	52
Strawberry	36
Pondapple	52
Guava	69
Fig	62
Lime	32
Lemmon	29
Tangerine	43
Mango	59
Apple	58
Cantaloupe	25
Honey Dew melon	44
Orange	42
Pear	56
Roseapple	63
Watermelon	22
Grapefruit	38
Grape	68
Loquat	44

Table IV. Allowed Vegetables	
Name	Energetic Value cal/3.5 Oz (100g)
Artichoke	29
Celery	19
Broccoli	39
Onion	45
Brussels Sprouts	50
Cabbage	28
Cauliflower	33
Endive	20
Asparagus	22
Spinach	30
Lettuce	13
Cucumber	15
Radish	23
Tomato	21
Carrot	41
Chicory	20

Required physical activity

Physical activity during the study was mandatory. Each subject chose his/her preferred daily physical activity from Table V. The physical activity had to be performed for the required time without interruptions.

Table V. Required Daily Physical Activity	
Physical Activity	Minimum Time
Walking	1 hr
Jogging	½ hr
Cycling (fixed or mobile)	1 hr
Skipping rope	½ hr
Skating	1 hr
Soccer	1 hr
Swimming	1 hr
Going up and down stairs	½ hr
Volleyball	½ hr
Tennis	½ hr
Aerobics	1 hr
Sitting down and standing up	½ h twice a day

Table VI. Protein Daily Requirements (PDR)		
Height (cm)	Male (g)	Female (g)
150 - 152	50 - 52	45 - 47
153 - 155	53 - 55	48 - 50
156 - 158	56 - 58	50 - 52
159 - 161	59 - 61	53 - 55
162 - 164	62 - 64	56 - 58
165 - 167	65 - 67	59 - 60
168 - 170	68 - 70	61 - 63
171 - 173	71 - 73	64 - 66
174 - 176	74 - 76	67 - 68
177 - 179	77 - 79	69 - 71
180 - 182	80 - 82	72 - 74
183 - 185	83 - 85	75 - 77
186 - 188	86 - 88	77 - 79
189 - 191	89 - 91	80 - 82
192 - 194	92 - 94	83 - 85
195 - 197	95 - 97	86 - 87
198 - 200	98 - 100	88 - 90

Subjects' medical supervision during the study

- The subject's recommended day to start the study was Monday.
- The subject was not allowed to start the study on Fridays.
- During the first week of the study, the subject's physical evaluation was performed each day, from Monday to Friday.
- During the second week of the study, the subject's physical evaluation was performed at least on Monday, Wednesday, and Friday. Under these circumstances, a phone consultation was required on Tuesday and Thursday.
- During the third and following weeks of the study, the subject's physical evaluation was performed at least, on Mondays and Thursdays. Under these circumstances a phone consultation was required on Tuesdays, Wednesdays and Fridays.

The subjects' physical medical evaluation and/or phone medical consultation included at least:

1. The assessment of the subject's quality of life by evaluating the presence or the absence of hypoglycemia or dehydration.
2. The assessment of the subject's quality of life by evaluating the presence or the absence of hunger, weakness, constipation, decreased libido, and/or headache by ketosis, by answering a questionnaire (Table VII).
3. The subject's pulse frequency; and blood pressure.
4. The subject's weight (kg), after urination, and after removing jacket, shoes, and pocket's contents. During the phone consultation, the subject reported his/her body weight difference during the last 24 hr, determined in the morning, naked, after urination and defecation. If the subject's weight increased or remained unchanged, a physical evaluation was performed.

Table VII. Quality of Life Questionnaire		
Hunger	<input type="checkbox"/> NO	<input type="checkbox"/> YES Did you eat the required amount of fruit? <input type="checkbox"/> NO <input type="checkbox"/> YES
Weakness	<input type="checkbox"/> NO	<input type="checkbox"/> YES Did you eat the required amount of fruit? <input type="checkbox"/> NO <input type="checkbox"/> YES
Constipation	<input type="checkbox"/> NO	<input type="checkbox"/> YES Did you eat the required amount of fruit? <input type="checkbox"/> NO <input type="checkbox"/> YES
Decreased Libido	<input type="checkbox"/> NO	<input type="checkbox"/> YES
Headache by Ketosis	<input type="checkbox"/> NO	<input type="checkbox"/> YES Did you eat the required amount of fruit? <input type="checkbox"/> NO <input type="checkbox"/> YES

Main Study Results

Table I summarizes the study population characteristics.

Table IV summarizes the study results.

Table V summarizes the quality of life questionnaire results.

Study Follow-up Results

Table VI summarizes the 90-day follow-up study results.

Table VII summarizes the 120-day follow-up study results.

Safety and Tolerance

Confirming previous studies results (9-11) none of the 500 subjects reported any side effects, and none showed any adverse effects on blood parameters.

Discussion and Conclusions

Previous studies results have shown that MAP intake in a dose of 400 mg/kg/day, can provide the subjects nitrogen balance equilibrium, releasing the lowest amount of nitrogen catabolites (1%), thus providing the lowest amount of energy (1 g = 0.04 kcal), in comparison to any dietary protein (9-11). Our study results showed, confirming previous findings (9-12), that MAP intake, in conjunction with the INRC's OMP Diet, have successfully prevented or halted those anomalies commonly associated with weight loss diets, such as body's negative nitrogen balance, hypoglycemia, hunger, weakness, headache caused by ketosis, constipation, or decreased libido.

Confirming previous findings (12,13), our subjects' mean weight loss, during the study, was a significant 2.5 kg/week. If this weight loss would have been caused only by the catabolism of fat tissue, the resulting negative energy balance should have been equivalent to 3,214 kcal/day. Considering that the OMP Diet provided to each subject approx. 1,600 kcal/day, the resulting energy expenditure should have been approx. 4,814 kcal/day. Of course, this is highly improbable considering that the subjects' physical activity was only 1 hour of walking per day. These facts, confirming previous findings (14) allow us to conclude that the subjects mean weight loss was not only fat/energy related. Actually, it was caused by both, the loss of excessive fat tissue and the loss of excessive water retention from the interstitial compartment. Confirming previous findings (14) we can conclude that MAP intake, by providing the

subjects nitrogen balances equilibrium, allowed the elimination of excessive water retention from the interstitial compartment

Confirming previous findings (12) the results of the 120-day follow up study, have showed that none of our subjects have regained any of the weigh lost, as a matter of fact most of them lost weight (Table...). This confirms that, as shown in previous studies (14) MAP intake, by providing the subjects nitrogen balances equilibrium, prevented the quick regain of the weight lost (also known as the yo-yo effect).

The subjects mean weight loss during the first week (3.5 kg) was greater in comparison to their mean weight loss per week (2.5 kg). Confirming previous findings (14), we can conclude that this weight difference should be attributed to the reduction, during the first week, of metabolic secretions, caused by the reduction of carbohydrate and fat intake. Of course, this is commonly a temporary weight loss, because once carbohydrate and fat intake is reassumed, the required amount of metabolic secretions is also reconstituted, thus proportionally increasing body weight.

To conclude, confirming previous findings, the results of this study (9-14) have showed that MAP intake in a dose of 400 mg/kg/day, in substitution of dietary protein or dietary supplements, and in conjunction with the OMP diet can significantly reduce body overweight both by reducing excessive fat tissue and by eliminating excessive water retention from the interstitial compartment. Providing, at the same time, the nitrogen balance equilibrium necessary: a. to preserve body's structural and functional proteins; b. to avoid or eliminate excessive water retention from the interstitial compartment; and c. to avoid the quick regain of the weigh lost, also known as the yo-yo effect.

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