NUTRIENT SUPPORT FOR FAT LOSS-Research Abstracts

Carnitine-1
Metabolism 2002 Nov;51(11):1389-91 Related Articles, Links
ELSEVIER SCIENCE FULL-TEXT ARTICLE

A1.Effects of oral L-carnitine supplementation on in vivo long-chain fatty acid oxidation in healthy adults.

Muller DM, Seim H, Kiess W, Loster H, Richter T.

University of Leipzig, Children's Hospital, Germany.

Despite an abundance of literature describing the basic mechanisms of action of L-carnitine metabolism, there remains some uncertainty regarding the effects of oral L-carnitine supplementation on in vivo fatty acid oxidation in normal subjects under normal conditions. It is well known that L-carnitine normalizes the metabolism of long-chain fatty acids in cases of carnitine deficiency. However, it has not yet been shown that L-carnitine influences the metabolism of long-chain fatty acids in subjects without disturbances in fatty acid metabolism. Therefore, we investigated the effects of oral L-carnitine supplementation on in vivo long-chain fatty acid oxidation by measuring 1-[(13)C] palmitic acid oxidation in healthy subjects before and after L-carnitine supplementation (3 x 1 g/d for 10 days). We observed a significant increase in (13)CO(2) exhalation. This is the first investigation to conclusively demonstrate that oral L-carnitine supplementation results in an increase in long-chain fatty acid oxidation in vivo in subjects without L-carnitine deficiency or without prolonged fatty acid metabolism.

Carnitine-2
J Strength Cond Res. 2003 Aug; 17(3): 455-62. Related Articles, Links
Allen Press, Inc. Full-Text

A8. The effects of L-carnitine L-tartrate supplementation on hormonal responses to resistance exercise and recovery.

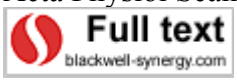
Kraemer WJ, Volek JS, French DN, Rubin MR, Sharman MJ, Gomez AL, Ratamess NA, Newton RU, Jemiolo B, Craig BW, Hakkinen K.

Human Performance Laboratory, Department of Kinesiology, University of Connecticut, Storrs, CT 06269, USA. kraemer@uconnvm.uconn.edu

The purpose of this investigation was to examine the influence of L-carnitine L-tartrate (LCLT) supplementation using a balanced, cross-over, placebo-controlled research design on the anabolic hormone response (i.e., testosterone [T], insulin-like growth factor-I, insulin-like growth factor-binding protein-3 [IGFBP-3], and immunofunctional and immunoreactive growth hormone [GHif and GHir]) to acute resistance exercise. Ten healthy, recreationally weight-trained men (mean +/- SD age 23.7 +/- 2.3 years, weight 78.7 +/- 8.5 kg, and height 179.2 +/- 4.6 cm) volunteered and were matched, and after 3 weeks of supplementation (2 g LCLT per day), fasting morning blood samples were obtained on six consecutive days (D1-D6). Subjects performed a squat protocol (5 sets of 15-20 repetitions) on D2. During the squat protocol, blood samples were obtained before exercise and 0, 15, 30, 120, and 180 minutes postexercise. After a 1-week washout period, subjects consumed the other supplement for a 3-week period, and the same experimental protocol was repeated using the exact same procedures. Expected exercise-induced increases in all of the hormones were observed for

GHir, GHif, IGFBP-3, and T. Over the recovery period, LCLT reduced the amount of exercise-induced muscle tissue damage, which was assessed via magnetic resonance imaging scans of the thigh. LCLT supplementation significantly ($p < 0.05$) increased IGFBP-3 concentrations prior to and at 30, 120, and 180 minutes after acute exercise. No other direct effects of LCLT supplementation were observed on the absolute concentrations of the hormones examined, but with more undamaged tissue, a greater number of intact receptors would be available for hormonal interactions. These data support the use of LCLT as a recovery supplement for hypoxic exercise and lend further insights into the hormonal mechanisms that may help to mediate quicker recovery.

Carnitine-3
Acta Physiol Scand. 2003 Aug;178(4):391-6. Related Articles, Links



Utilization of long-chain fatty acids in human skeletal muscle during exercise.

Kiens B, Roepstorff C.

Department of Human Physiology, The Copenhagen Muscle Research Centre, Institute of Exercise and Sport Sciences, University of Copenhagen, Copenhagen, Denmark.

Long-chain fatty acids (LCFA) are important sources of energy in contracting skeletal muscle: during the course of endurance exercise the contribution of LCFA in energy metabolism increases whereas when the intensity of exercise increases, the energy need is covered more and more by carbohydrates. Although this has been known for nearly 100 years, the mechanisms controlling fatty acid uptake and oxidation during various exercise modes are still not completely elucidated. Besides passive diffusion, data suggest that both membrane-associated and cytosolic fatty acid binding proteins are involved in the uptake of LCFA into skeletal muscle. However, data from human studies suggest that the regulation of fatty acid utilization in skeletal muscle during exercise lies mainly within the entrance into the mitochondria or metabolism within the mitochondria. Although possible compartmentalization within the cell makes definitive conclusions difficult, available evidence suggests that changes in malonyl CoA concentration in muscle do not play a major regulatory role in controlling LCFA oxidation during exercise in man. In contrast, it is suggested that the availability of free carnitine may play a major regulatory role in oxidation of LCFA during exercise.

Chromium-1
Diabetes Obes Metab. 1999 Nov;1(6):331-7. Related Articles, Links

Effects of niacin-bound chromium supplementation on body composition in overweight African-American women.

Crawford V, Scheckenbach R, Preuss HG.

Decades Inc., Washington, DC, USA.

AIM: This pilot study was designed to determine whether 600 microg niacin-bound chromium ingested daily over 2 months by African-American women undergoing a modest dietary and exercise regimen influences weight loss and body composition. METHODS: Twenty overweight African-American women, engaged in a modest diet-exercise regimen, participated in a randomized, double-blinded, placebo-controlled, crossover study. They received placebo three times a day (t.i.d.) during the control period and niacin-bound chromium, 200 microg t.i.d., during the verum period. Control and verum periods were each 2 months in duration. One-half received placebo first (group 1), the other half received chromium first (group 2). Body weights (b.w.) and

blood chemistries were measured by routine clinical methodology. Fat and nonfat body masses were estimated using bioelectrical impedance (electrolipography). RESULTS: In the first group of 10 women receiving niacin-bound chromium after the placebo period (group 1), b.w. loss was essentially the same, but fat loss was significantly greater and non-fat body mass loss significantly less with chromium intake. In contrast to the previous findings, there was a significantly greater loss of fat in the placebo compared to the verum period in the second group of eight women who received chromium first (group 2). Blood chemistries were not affected by intake of chromium for 2 months. CONCLUSIONS: Niacin-bound chromium given to modestly dieting-exercising African-American women caused a significant loss of fat and sparing of muscle compared to placebo. Once chromium was given at these dose levels, there was a 'carry-over' effect. Blood chemistries revealed no significant adverse effects from the ingestion of 600 microg of niacin-bound chromium daily over 2 months.

Chromium-2
Med Sci Sports Exerc. 1997 Aug;29(8):992-8. Related Articles, Links

Chromium and exercise training: effect on obese women.

Grant KE, Chandler RM, Castle AL, Ivy JL.

Department of Kinesiology and Health Education, University of Texas at Austin 78712, USA.

Chromium supplementation may affect various risk factors for coronary artery disease (CAD) and non-insulin-dependent diabetes mellitus (NIDDM), including body weight and composition, basal plasma hormone and substrate levels, and response to an oral glucose load. This study examined the effects of chromium supplementation (400 micrograms.d-1), with or without exercise training, on these risk factors in young, obese women. Chromium picolinate supplementation resulted in significant weight gain in this population, while exercise training combined with chromium nicotinate supplementation resulted in significant weight loss and lowered the insulin response to an oral glucose load. We conclude that high levels of chromium picolinate supplementation are contraindicated for weight loss in young, obese women. Moreover, our results suggest that exercise training combined with chromium nicotinate supplementation may be more beneficial than exercise training alone for modification of certain CAD and NIDDM risk factors.

CLA-1
J Nutr. 2000 Dec;130(12):2943-8. Related Articles, Links

Conjugated linoleic acid reduces body fat mass in overweight and obese humans.

Blankson H, Stakkestad JA, Fagertun H, Thom E, Wadstein J, Gudmundsen O.

Scandinavian Clinical Research AS, N-2027 Kjeller, Norway.

Conjugated linoleic acid (CLA) has been shown to reduce body fat mass (BFM) in animals. To investigate the dose-response relationships of conjugated linoleic acid with regard to BFM in humans, a randomized, double-blind study including 60 overweight or obese volunteers (body mass index 25-35 kg/m(2)) was performed. The subjects were divided into five groups receiving placebo (9 g olive oil), 1.7, 3.4, 5.1 or 6.8 g conjugated linoleic acid per day for 12 wk, respectively. Dual-energy X-ray absorptiometry was used to measure body composition [measurements at wk 0 (baseline), 6 and 12]. Of the 60 subjects, 47 completed the study. Eight subjects withdrew from the study due to adverse events; however, no differences among treatment groups were found regarding adverse events. Repeated-measures analysis showed that a significantly higher reduction in BFM was

found in the conjugated linoleic acid groups compared with the placebo group (P: = 0.03). The reduction of body fat within the groups was significant for the 3.4 and 6.8 g CLA groups (P: = 0.05 and P: = 0.02, respectively). No significant differences among the groups were observed in lean body mass, body mass index, blood safety variables or blood lipids. The data suggest that conjugated linoleic acid may reduce BFM in humans and that no additional effect on BFM is achieved with doses > 3.4 g CLA/d.

CLA-2
Int J Obes Relat Metab Disord. 2001 Aug;25(8):1129-35. Related Articles, Links

Conjugated linoleic acid (CLA) reduced abdominal adipose tissue in obese middle-aged men with signs of the metabolic syndrome: a randomised controlled trial.

Riserus U, Berglund L, Vessby B.

Clinical Nutrition Research Unit, Department of Public Health and Caring Sciences/Geriatrics, Faculty of Medicine, Uppsala University, Uppsala, Sweden. ulf.riserus@geriatrik.uu.se

BACKGROUND: Abdominal obesity is strongly related to metabolic disorders. Recent research suggests that dietary conjugated linoleic acid (CLA) reduces body fat and may improve metabolic variables in animals. The metabolic effects of CLA in abdominally obese humans have not yet been tested. OBJECTIVE: To investigate the short-term effect of CLA on abdominal fat and cardiovascular risk factors in middle-aged men with metabolic disorders. METHODS: Twenty-five abdominally obese men (waist-to-hip ratio (WHR), 1.05+/-0.05; body mass index (BMI), 32+/-2.7 kg/m(2) (mean+/-s.d.)) who were between 39 and 64-y-old participated in a double-blind randomised controlled trial for 4 weeks. Fourteen men received 4.2 g CLA/day and 10 men received a placebo. The main endpoints were differences between the two groups in sagittal abdominal diameter (SAD), serum cholesterol, low-density lipoprotein, high-density lipoprotein, triglycerides, free fatty acids, glucose and insulin. RESULTS: At baseline, there were no significant differences between groups in anthropometric or metabolic variables. After 4 weeks there was a significant decrease in SAD (cm) in the CLA group compared to placebo (P=0.04, 95% CI; -1.12, -0.02). Other measurements of anthropometry or metabolism showed no significant differences between the groups. CONCLUSIONS: These results indicate that CLA supplementation for 4 weeks in obese men with the metabolic syndrome may decrease abdominal fat, without concomitant effects on overall obesity or other cardiovascular risk factors. Because of the limited sample size, the effects of CLA in abdominal obesity need to be further investigated in larger trials with longer duration.

GLA-1
Comp Biochem Physiol B. 2000 Oct 1;127(2):213-222. Related Articles, Links

Dietary gamma-linolenic acid in the form of borage oil causes less body fat accumulation accompanying an increase in uncoupling protein 1 mRNA level in brown adipose tissue.

Takahashi Y, Ide T, Fujita H.

Laboratory of Nutrition Biochemistry, National Food Research Institute, Ministry of Agriculture, Forestry and Fisheries, 2-1-2 Kannondai, Tsukuba Science City, 305-8642, Ibaraki, Japan

Rats were fed a low-fat diet containing 2% safflower oil or 20% fat diets containing either safflower oil rich in linoleic acid, borage oil containing 25% gamma (gamma)-linolenic acid or enzymatically prepared gamma-

linolenic acid enriched borage oil containing 47% gamma-linolenic acid for 14 days. Energy intake and growth of animals were the same among groups. A high safflower oil diet compared with a low-fat diet caused significant increases in both epididymal and perirenal white adipose tissue weights. However, high-fat diets rich in gamma-linolenic acid failed to do so. Compared with a low-fat diet, all the high-fat diets increased mRNA levels of uncoupling protein 1 and lipoprotein lipase in brown adipose tissue. The extents of the increase were greater with high-fat diets rich in gamma-linolenic acid. Various high-fat diets, compared with a low-fat diet, decreased glucose transporter 4 mRNA in white adipose tissue to the same levels. The amount and types of dietary fat did not affect the leptin mRNA level in epididymal white adipose tissue. However, a high safflower oil diet, but not high-fat diets rich in gamma-linolenic acid relative to a low-fat diet, increased perirenal white adipose tissue leptin mRNA levels. All high-fat diets, relative to a low-fat diet, increased the hepatic mitochondrial fatty acid oxidation rate and fatty acid oxidation enzyme mRNA abundances to the same levels. High-fat diets also increased these parameters in the peroxisomal pathway, and the increases were greater with high-fat diets rich in gamma-linolenic acid. The physiological activity in increasing brown adipose tissue gene expression and peroxisomal fatty acid oxidation was similar between the two types of borage oil differing in gamma-linolenic acid content. It was suggested that dietary gamma-linolenic acid attenuates body fat accumulation through the increase in gene expressions of uncoupling protein 1 in brown adipose tissue. An increase in hepatic peroxisomal fatty acid oxidation may also contribute to the physiological activity of gamma-linolenic acid in decreasing body fat mass.

Green tea-1
Am J Clin Nutr. 1999 Dec;70(6):1040-5. Related Articles, Links

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Efficacy of a green tea extract rich in catechin polyphenols and caffeine in increasing 24-h energy expenditure and fat oxidation in humans.

Dulloo AG, Duret C, Rohrer D, Girardier L, Mensi N, Fathi M, Chantre P, Vandermander J.

Department of Physiology, Faculty of Medicine, University of Geneva. abdul.dulloo@unifr.ch

BACKGROUND: Current interest in the role of functional foods in weight control has focused on plant ingredients capable of interfering with the sympathoadrenal system. OBJECTIVE: We investigated whether a green tea extract, by virtue of its high content of caffeine and catechin polyphenols, could increase 24-h energy expenditure (EE) and fat oxidation in humans. DESIGN: Twenty-four-hour EE, the respiratory quotient (RQ), and the urinary excretion of nitrogen and catecholamines were measured in a respiratory chamber in 10 healthy men. On 3 separate occasions, subjects were randomly assigned among 3 treatments: green tea extract (50 mg caffeine and 90 mg epigallocatechin gallate), caffeine (50 mg), and placebo, which they ingested at breakfast, lunch, and dinner. RESULTS: Relative to placebo, treatment with the green tea extract resulted in a significant increase in 24-h EE (4%; $P < 0.01$) and a significant decrease in 24-h RQ (from 0.88 to 0.85; $P < 0.001$) without any change in urinary nitrogen. Twenty-four-hour urinary norepinephrine excretion was higher during treatment with the green tea extract than with the placebo (40%, $P < 0.05$). Treatment with caffeine in amounts equivalent to those found in the green tea extract had no effect on EE and RQ nor on urinary nitrogen or catecholamines. CONCLUSIONS: Green tea has thermogenic properties and promotes fat oxidation beyond that explained by its caffeine content per se. The green tea extract may play a role in the control of body composition via sympathetic activation of thermogenesis, fat oxidation, or both.

Green tea-2
: Int J Obes Relat Metab Disord. 2000 Feb; 24(2): 252-8. Related Articles, Links

Green tea and thermogenesis: interactions between catechin-polyphenols, caffeine and sympathetic

activity.

Dulloo AG, Seydoux J, Girardier L, Chantre P, Vandermander J.

Institute of Physiology, University of Fribourg, Fribourg, Switzerland. abdul.dulloo@unifr.ch

The thermogenic effect of tea is generally attributed to its caffeine content. We report here that a green tea extract stimulates brown adipose tissue thermogenesis to an extent which is much greater than can be attributed to its caffeine content per se, and that its thermogenic properties could reside primarily in an interaction between its high content in catechin-polyphenols and caffeine with sympathetically released noradrenaline (NA). Since catechin-polyphenols are known to be capable of inhibiting catechol-O-methyl-transferase (the enzyme that degrades NA), and caffeine to inhibit trancellular phosphodiesterases (enzymes that break down NA-induced cAMP), it is proposed that the green tea extract, via its catechin-polyphenols and caffeine, is effective in stimulating thermogenesis by relieving inhibition at different control points along the NA-cAMP axis. Such a synergistic interaction between catechin-polyphenols and caffeine to augment and prolong sympathetic stimulation of thermogenesis could be of value in assisting the management of obesity.
International Journal of Obesity (2000) 24, 252-258

Green tea-3
J Nutr Biochem. 2003 Nov; 14(11): 671-6. Related Articles, Links
ELSEVIER FULL-TEXT ARTICLE

Green tea reduces body fat accretion caused by high-fat diet in rats through beta-adrenoceptor activation of thermogenesis in brown adipose tissue.

Choo JJ.

Department of Foods and Nutrition, Kunsan National University, Kunsan, Cheollabuk-do 573-701, South Korea. jjchoo@kunsan.ac.kr

The aim of the present study was to investigate body fat-suppressive effects of green tea in rats fed on a high-fat diet and to determine whether the effect is associated with beta-adrenoceptor activation of thermogenesis in brown adipose tissue. Feeding a high-fat diet containing water extract of green tea at the concentration of 20g/kg diet prevented the increase in body fat gain caused by high-fat diet without affecting energy intake. Energy expenditure was increased by green tea extract which was associated with an increase in protein content of interscapular brown adipose tissue. The simultaneous administration of the beta-adrenoceptor antagonist propranolol(500 mg/kg diet) inhibited the body fat-suppressive effect of green tea extract. Propranolol also prevented the increase in protein content of interscapular brown adipose tissue caused by green tea extract. Digestibility was slightly reduced by green tea extract and this effect was not affected by propranolol. Therefore it appeared that green tea exerts potent body fat-suppressive effects in rats fed on a high-fat diet and the effect was resulted in part from reduction in digestibility and to much greater extent from increase in brown adipose tissue thermogenesis through beta-adrenoceptor activation.

Green tea-4
Crit Rev Food Sci Nutr. 2002 Mar;42(2):163-78. Related Articles, Links

A functional food product for the management of weight.

Bell SJ, Goodrick GK.

Functional Foods, Inc., Belmont, MA 02478, USA. staceyjbell@yahoo.com

More than half of Americans have a body mass index of 25 kg/m2 or more, which classifies them as overweight or obese. Overweight or obesity is strongly associated with comorbidities such as type 2 diabetes mellitus, hypertension, heart disease, gall bladder disease, and sleep apnea. Clearly, this is a national health concern, and although about 30 to 40% of the obese claim that they are trying to lose weight or maintain weight after weight loss, current therapies appear to have little effect. None of the current popular diets are working, and there is room for innovation. With the advancing science of nutrition, several nutrients - low-glycemic-index carbohydrates, 5-hydroxytryptophan, green tea extract, and chromium - have been identified that may promote weight loss. The first two nutrients decrease appetite, green tea increases the 24-h energy expenditure, and chromium promotes the composition of the weight lost to be fat rather than lean tissue. These have been assembled in efficacious doses into a new functional food product and described in this review. The product is undergoing clinical testing; each component has already been shown to promote weight loss in clinical trials.

Green tea-5
Med Hypotheses. 2001 Sep;57(3):324-36. Related Articles, Links
ELSEVIER FULL-TEXT ARTICLE

Hepatothermic therapy of obesity: rationale and an inventory of resources.

McCarty MF.

Pantox Laboratories, San Diego, California 92109, USA.

Hepatothermic therapy (HT) of obesity is rooted in the observation that the liver has substantial capacities for both fatty acid oxidation and for thermogenesis. When hepatic fatty acid oxidation is optimized, the newly available free energy may be able to drive hepatic thermogenesis, such that respiratory quotient declines while basal metabolic rate increases, a circumstance evidently favorable for fat loss. Effective implementation of HT may require activation of carnitine palmitoyl transferase-1 (rate-limiting for fatty acid beta-oxidation), an increase in mitochondrial oxaloacetate production (required for optimal Krebs cycle activity), and up-regulation of hepatic thermogenic pathways. The possible utility of various natural agents and drugs for achieving these objectives is discussed. Potential components of HT regimens include EPA-rich fish oil, sesamin, hydroxycitrate, pantethine, L-carnitine, pyruvate, aspartate, chromium, coenzyme Q10, green tea polyphenols, conjugated linoleic acids, DHEA derivatives, cilostazol, diazoxide, and fibrate drugs. Aerobic exercise training and very-low-fat, low-glycemic-index, high-protein or vegan food choices may help to establish the hormonal environment conducive to effective HT. High-dose biotin and/or metformin may help to prevent an excessive increase in hepatic glucose output. Since many of the agents contemplated as components of HT regimens are nutritional or food-derived compounds likely to be health protective, HT is envisioned as an on-going lifestyle rather than as a temporary 'quick fix'. Initial clinical efforts to evaluate the potential of HT are now in progress.

Omega-3 fats-1
Br J Nutr. 2000 Mar;83 Suppl 1:S59-66. Related Articles, Links

Polyunsaturated fatty acid regulation of gene transcription: a mechanism to improve energy balance and insulin resistance.

Clarke SD.
This review addresses the hypothesis that polyunsaturated fatty acids (PUFA), particularly those of the n-3 family, play essential roles in the maintenance of energy balance and glucose metabolism. The data discussed indicate that dietary PUFA function as fuel partitioners in that they direct glucose toward glycogen storage, and

direct fatty acids away from triglyceride synthesis and assimilation and toward fatty acid oxidation. In addition, the n-3 family of PUFA appear to have the unique ability to enhance thermogenesis and thereby reduce the efficiency of body fat deposition. PUFA exert their effects on lipid metabolism and thermogenesis by upregulating the transcription of the mitochondrial uncoupling protein-3, and inducing genes encoding proteins involved in fatty acid oxidation (e.g. carnitine palmitoyltransferase and acyl-CoA oxidase) while simultaneously down-regulating the transcription of genes encoding proteins involved in lipid synthesis (e.g. fatty acid synthase). The potential transcriptional mechanism and the transcription factors affected by PUFA are discussed. Moreover, the data are interpreted in the context of the role that PUFA may play as dietary factors in the development of obesity and insulin resistance. Collectively the results of these studies suggest that the metabolic functions governed by PUFA should be considered as part of the criteria utilized in defining the dietary needs for n-6 and n-3 PUFA, and in establishing the optimum dietary ratio for n-6:n-3 fatty acids.

High protein-1

Int J Obes Relat Metab Disord. 2004 Jan; 28(1): 57-64. Related Articles, Links

K4. High protein intake sustains weight maintenance after body weight loss in humans.

Westerterp-Plantenga MS, Lejeune MP, Nijs I, Van Ooijen M, Kovacs EM.

Department of Human Biology, Maastricht University, Maastricht, The Netherlands.

BACKGROUND:: A relatively high percentage of energy intake as protein has been shown to increase satiety and decrease energy efficiency during overfeeding. AIM:: To investigate whether addition of protein may improve weight maintenance by preventing or limiting weight regain after weight loss of 5-10% in moderately obese subjects. DESIGN OF THE STUDY:: In a randomized parallel design, 148 male and female subjects (age 44.2+/-10.1 y; body mass index (BMI) 29.5+/-2.5 kg/m(2); body fat 37.2+/-5.0%) followed a very low-energy diet (2.1 MJ/day) during 4 weeks. For subsequent 3 months weight-maintenance assessment, they were stratified according to age, BMI, body weight, restrained eating, and resting energy expenditure (REE), and randomized over two groups. Both groups visited the University with the same frequency, receiving the same counseling on demand by the dietitian. One group (n=73) received 48.2 g/day additional protein to their diet. Measurements at baseline, after weight loss, and after 3 months weight maintenance were body weight, body composition, metabolic measurements, appetite profile, eating attitude, and relevant blood parameters. RESULTS:: Changes in body mass, waist circumference, REE, respiratory quotient (RQ), total energy expenditure (TEE), dietary restraint, fasting blood-glucose, insulin, triacylglycerol, leptin, beta-hydroxybutyrate, glycerol, and free fatty acids were significant during weight loss and did not differ between groups. During weight maintenance, the 'additional-protein group' showed in comparison to the nonadditional-protein group 18 vs 15 en% protein intake, a 50% lower body weight regain only consisting of fat-free mass, a 50% decreased energy efficiency, increased satiety while energy intake did not differ, and a lower increase in triacylglycerol and in leptin; REE, RQ, TEE, and increases in other blood parameters measured did not differ. CONCLUSION:: A 20% higher protein intake, that is, 18% of energy vs 15% of energy during weight maintenance after weight loss, resulted in a 50% lower body weight regain, only consisting of fat-free mass, and related to increased satiety and decreased energy efficiency.International Journal of Obesity (2004) 28, 57-64. doi:10.1038/sj.ijo.0802461

High protein-2

Curr Opin Clin Nutr Metab Care. 2003 Nov; 6(6): 635-8. Related Articles, Links

K1.The significance of protein in food intake and body weight regulation.

Westerterp-Plantenga MS.

Department of Human Biology, PO Box 616, 6200 MD Maastricht, The Netherlands.
m.westerterp@hb.unimaas.nl

PURPOSE OF REVIEW: To highlight the underexposed but important role of protein in food intake and body weight regulation. RECENT FINDINGS: Protein plays a key role in food intake regulation through satiety related to diet-induced thermogenesis. Protein also plays a key role in body weight regulation through its effect on thermogenesis and body composition. A high percentage of energy from dietary protein limits body weight (re)gain through its satiety and energy inefficiency related to the change in body composition. SUMMARY: Protein is more satiating than carbohydrate and fat in the short term, over 24 h and in the long term. Thermogenesis plays a role in this satiety effect, but the role of satiety hormones still needs to be elucidated. On the short-term 'fast' proteins are more satiating than 'slow' proteins, and animal protein induces a higher thermogenesis than vegetable protein. In the longer term the higher postabsorptive satiety and thermogenesis are sustained irrespective of the protein source. High-protein diets affect body weight loss positively only under ad-libitum energy intake conditions, implying also a decreased energy intake. Body composition and metabolic profile are improved. Additional protein consumption results in a significantly lower body weight regain after weight loss, due to body composition, satiety, thermogenesis, and energy inefficiency, while the metabolic profile improves. Implications from these findings are: for practice, recommendations for increasing the percentage of energy from protein while reducing energy intake; for clinical research, assessment of the paradox of increasing the percentage energy from a highly satiating macronutrient; of the potential roles of protein in a negative and positive energy balance; assessment of possibilities of replacing dietary protein by effective amino acids or peptides that may show a similar impact on body weight regulation.

5-HTP-1

Int J Obes Relat Metab Disord. 1998 Jul;22(7):648-54. Related Articles, Links

Effects of oral 5-hydroxy-tryptophan on energy intake and macronutrient selection in non-insulin dependent diabetic patients.

Cangiano C, Laviano A, Del Ben M, Preziosa I, Angelico F, Cascino A, Rossi-Fanelli F.

Department of Clinical Medicine, University of Rome La Sapienza, Italy.

OBJECTIVE: In obese patients, brain serotonergic stimulation via orally administered 5-hydroxy-tryptophan (5-HTP), the precursor of serotonin, causes decreased carbohydrate intake and weight loss. Since diabetes mellitus is associated with depressed brain serotonin, hyperphagia and carbohydrate craving, we hypothesized that in diabetic patients, orally administered 5-HTP stimulates brain serotonergic activity and thus normalizes eating behaviour. To test this hypothesis, we investigated whether in diabetic patients: 1) predicted brain serotonin concentrations are depressed as a result of decreased availability of the precursor, tryptophan; and 2) oral 5-HTP is effective in reducing energy and carbohydrate intake. SUBJECTS AND METHODS: 25 overweight non-insulin dependent diabetic outpatients were enrolled in a double-blind, placebo-controlled study, and randomized to receive either 5-HTP (750 mg/d) or placebo for two consecutive weeks, during which no dietary restriction was prescribed. Energy intake and eating behaviour, as expressed by macronutrient selection, were evaluated using a daily diet diary. Plasma amino acid concentrations and body weight, as well as serum glucose, insulin and glycosylated haemoglobin were assessed. RESULTS: 20 patients (nine from the 5-HTP group and 11 from the Placebo group) completed the study. Brain tryptophan availability in diabetic patients was significantly reduced when compared to a group of healthy controls. Patients receiving 5-HTP significantly decreased their daily energy intake, by reducing carbohydrate and fat intake, and reduced their

body weight. CONCLUSIONS: These data confirm the role of the serotonergic system in reducing energy intake, by predominantly inhibiting carbohydrate intake, and suggest that 5-HTP may be safely utilized to improve the compliance to dietary prescriptions in non-insulin dependent diabetes mellitus.

5-HTP--2
J Neural Transm. 1989;76(2):109-17. Related Articles, Links

The effects of oral 5-hydroxytryptophan administration on feeding behavior in obese adult female subjects.

Ceci F, Cangiano C, Cairella M, Cascino A, Del Ben M, Muscaritoli M, Sibilia L, Rossi Fanelli F.

Department of Internal Medicine, University of Rome La Sapienza, Italy.

Nineteen obese female subjects with body mass index ranging between 30 and 40 were included in a double-blind crossover study aimed at evaluating the effects of oral 5-hydroxytryptophan administration on feeding behavior, mood state and weight loss. Either 5-hydroxytryptophan (8 mg/kg/day) or placebo was administered for five weeks during which patients were not prescribed any dietary restrictions. Feeding behavior was investigated by means of a questionnaire designed to establish the onset of anorexia and related symptoms. Food intake was evaluated using a three-day diet diary. BDI, SI, STAI-T, and STAI-S were used to assess mood state. The administration of 5-hydroxytryptophan resulted in no changes in mood state but promoted typical anorexia-related symptoms, decreased food intake and weight loss during the period of observation.

5-HTP-3
Am J Clin Nutr. 1992 Nov;56(5):863-7. Related Articles, Links

Eating behavior and adherence to dietary prescriptions in obese adult subjects treated with 5-hydroxytryptophan.

Cangiano C, Ceci F, Cascino A, Del Ben M, Laviano A, Muscaritoli M, Antonucci F, Rossi-Fanelli F.

3rd Department of Internal Medicine, University of Rome, La Sapienza, Italy.

Previous observations have shown that oral administration of 5-hydroxytryptophan (5-HTP) without dietary prescriptions causes anorexia, decreased food intake, and weight loss in obese subjects. To confirm these data over a longer period of observation and to verify whether adherence to dietary restriction could be improved by 5-HTP, 20 obese patients were randomly assigned to receive either 5-HTP (900 mg/d) or a placebo. The study was double-blinded and was for two consecutive 6-wk periods. No diet was prescribed during the first period, a 5040-kJ/d diet was recommended for the second. Significant weight loss was observed in 5-HTP-treated patients during both periods. A reduction in carbohydrate intake and a consistent presence of early satiety were also found. These findings together with the good tolerance observed suggest that 5-HTP may be safely used to treat obesity.

CLA-1