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GBX BURN™

Burn Brightly with GBX Burn

amare®

TECHNICAL DATA SHEET

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*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.

AMARE GBX BURN™

Burn Brightly with GBX Burn

Burn the fat BEFORE it weighs you down with Amare GBX Burn! GBX Burn is a stimulant free synergistic blend of natural herbs, spices and amino acids that have been clinically studied to increase caloric burn and support weight management.*† #AmareBurnBrightly

Why You'll Love It

- Increases thermogenesis, which is your body's way of burning calories and fat for heat*
- Supports weight management and appetite control*†
- A stimulant free way to increase energy expenditure*
- Promotes a balanced microbiome and supports metabolic wellness*
- May reduce visceral fat storage*
- Supports gut integrity*

What It Is

- All natural thermogenic that works synergistically with Amare GBX Fit™*.
- A stimulant free way to increase burning of calories.*
- Natural herbs and spices that promote healthy weight management.*†
- Burns fat in partnership with a healthy diet and exercise.*†
- Amino acids that increase energy and reduce fatigue.*

How It Works

Our proprietary GBX Burn formula combines scientifically-validated Grains of Paradise, Glomerata Fruit, Carrot Pomace and BCAAs that synergize together to accelerate the burning of fat before it's stored in your body.*†

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†Individual weight loss results may vary. It's possible for individuals to lose 1-2 pounds a week using Amare products and following the Amare Fit Program. However, there is no guarantee of specific weight loss results.

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Brief Description:

All natural, stimulant free “thermogenic fat-burner” that will contains a combination of 4 ingredients that have been clinically studied to promote weight loss, metabolic wellness, and microbiome balance.

What is a thermogenic? Thermogenic means tending to produce heat. Thermogenic fat burners work with your metabolism and cause it to speed up and become more efficient. The result is that you burn more fat and calories from a workout and overall increasing energy/caloric expenditure.

Key Ingredients:

Dyglomera™ is a patented extract of Dichrostachys glomerate, a traditional west African spice and potent antioxidant that supports healthy weight loss. D. glomerata (DG) is a deciduous tree of western Cameroon whose fruits and seeds are edible. The fruits are dry dehiscent constricted pods commonly used as spices in a traditional soup eaten with taro. Dyglomera reduces oxidative stress that has been linked to cell damage and a contributing factor to obesity and high body mass index.

Used in traditional West African Medicine - similar to curcumin or ginseng, the extract has been used traditionally as a spice for years, and recent clinical studies have shown its helpful effects on physiology. Clinical trials have shown Dyglomera to have an impact on body weight, and other indicators of metabolic health. Dyglomera impact on weight loss is attributed to its relationship to the hormone leptin and the inflammatory marker C reactive protein.

Leptin is a master hormone produced by fat cells that regulate satiety and appetite control—essentially it sends signals to the brain and lets it know that the stomach feels “full.” C reactive protein intercepts the leptin before it can make it to the brain, and therefore, the sensation of satiety isn't felt. Dyglomeras main benefit for weight management is that it decreases C reactive protein and allows leptin to run its course, meaning a person can listen to their stomach and not overeat.

BeniCaros® is an award-winning natural immune health ingredient. It is a unique polysaccharide (fiber) also known as rhamnogalacturonan-I (RG-I), derived from upcycled carrot pomace, a by-product of carrot juice production. RG-I is a complex polysaccharide, a part of pectin that is a major component in the cell walls of all plants. The carrot derived cRG-I in BeniCaros® is unlocked from the carrot cell wall through a proprietary extraction method.

Sustainably sourced and upcycled from carrot pomace BeniCaros then transits to the large intestine, where it is fermented by the gut microbiota and selectively stimulates the growth of beneficial microorganisms and leads to the increased production of beneficial metabolites such as short chain fatty acids. Short chain fatty acids can leave the gut (via the blood/circulation) and are known to interact with immune cells (all over the body), thereby influencing immune responsiveness. SCFAs influence a myriad of health and microbiome benefits. Initiates protein synthesis for muscle growth and metabolism. It preserves muscle weight, sheds fat weight.

ThermoGP™ also known as Grains of Paradise, Aframomum melegueta, is an ancient, edible spice that is part of the ginger family. It is native to West Africa and has been used in traditional African medicine for hundreds of years. Its seeds are used as a spice (ground or whole); it imparts a pungent, black-pepper-like flavor with hints of citrus. Its uses have included both digestive health and thermogenesis. ThermoGP™ is a modern extract containing a high level of 6-Paradol. 6-Paradol is the active constituent that provides the basis for thermogenesis and therefore makes it ideally suited for weight management and sports performance products.

The mechanism of action for increased thermogenesis and reductions in visceral fat is believed to be the effect of grains of paradise on brown adipose tissue (BAT). BAT is a highly thermogenic fat tissue that burns calories to generate heat. The paradol and gingerol compounds in grains of paradise activate thermogenesis in BAT. Has stimulant like effects without using stimulants or having side effects of jitters, heart palps, etc.

2:1:1 Ratio BCAA - The best BCAA ratio is 2:1:1. Why? As mentioned, leucine offers the strongest anabolic effects on protein synthesis. That means a bigger portion of leucine to isoleucine and valine helps boost muscle strength and lean muscle mass. That doesn't mean you should go for ratios like 4:1:1 or 10:1:1. Taking a 2:1:1 ratio of BCAA's promotes protein synthesis even better than these ratios or taking leucine alone, so it's best to stick to that.

If you're interested in losing weight, then that's another reason why 2:1:1 is the preferred ratio. Thanks to the BCAA isoleucine, the 2:1:1 ratio helps burn fat efficiently. The amino acid offers the ability to activate special receptors known as PPAR. This helps boost fat burns and prevents fat storage. PPAR works to boost the activity of genes that promote powerful fat burning in the body while lessening the activity of genes that usually encourage fat storage. As a result, there's a better ability to burn fat alongside less chance of storing fat.

Taking a 2:1:1 ratio helps burn fat efficiently.

The amino acid offers the ability to activate special receptors known as PPAR. This helps boost fat burns and prevents fat storage. PPAR works to boost the activity of genes that promote powerful fat burning in the body while lessening the activity of genes that usually encourages fat storage. As a result, there's better ability to burn fatalongside less chance of storing fat.

BCAAs are a staple for bodybuilders and athletes. They can also support weight loss efforts and the fitness goals of everyday gymgoers. Experts say BCAAs taken at a 2:1:1 ratio are the most optimal for health.

Dylgomera Studies

The effect of extracts of Irvingia gabonensis (IGOB131) and Dichrostachys glomerata (Dyglomera™) on body weight and lipid parameters of healthy overweight participants

Boris Azantsa, Dieudonne Kuate, Raoul Chakokam, Ghislain Paka, Barbara Bartholomew, Robert Nash

Abstract

Background: Previous work reported the benefits of extracts of 2 Cameroonian spices – Irvingia gabonensis and Dichrostachys glomerata— on obese people with metabolic syndrome. Considering the physio-metabolic changes that accompany obesity, the present study investigates the effects of these extracts on healthy overweight participants over an 8-week test period.

Methods: The study was an 8 week randomized double-blind, placebo controlled design involving 48 overweight (BMI 26 – 30) participants (27 females and 19 males), divided into 3 groups – placebo, 300 mg I. gabonensis extract (IGOB131), or 300 mg D. glomerata extract (DyglomeraTM). Capsules containing the placebo or the test formulations were administered once daily before the main meal of the day. No major dietary changes or changes in physical activity were demonstrated during the study. Weight and blood lipid parameters were measured at baseline, and at the 4 and 8 weeks interval.

Results: Compared to the placebo group, there were significant ($p<0.05$) reductions in weight of participants in both test groups over the 8 week period. However, these significant changes were not observed in the initial 4 weeks, even though the lipid parameters in the test groups changed significantly ($p<0.05$).

Conclusion: The extracts of Irvingia gabonensis and Dichrostachys glomerata, at a dose of 300 mg per day, were effective in reducing weight and positively modifying lipid parameters in healthy overweight participants.

Anti-amylase, anti-lipase and antioxidant effects of aqueous extracts of some Cameroonian spices.

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Abstract

Diabetes mellitus and associated co-morbidities including cardiovascular disease (CVD) and obesity are leading causes of mortality. In developing countries, where the per capita income is low, it is

necessary to seek affordable alternative therapies. This study investigated 19 different commonly used Cameroonian spices for their polyphenol content, as well as their in vitro antioxidant, anti-amylase and anti-lipase activities. Results indicated that the aqueous extracts of Aframomum daniellii, Hypodapnis zenkeri, Echinops giganteus, Aframomum citratum, Xylopia aethiopica, had more than 75% inhibitory activity for pancreatic amylase. Xylopia aethiopica (92.25%) and Scorodophloeus zenkeri (56.39%) were most effective in inhibiting the activity of pancreatic lipase. Dichrostachys glomerata (81.58%), Tetrapleura tetraptera (83.94%) and Xylopia parviflora (90.55%) exhibited the most potent 2, 2′-Azinobis (3-ethylbenzothiazoline-6-sulfonic acid) (ABTS+) radical scavenging activity. These spices therefore exhibited properties that are beneficial to health and could therefore be used as an alternative and/or complementary strategy in managing risk factors and associated co-morbidities of diabetes mellitus.

Understanding Antioxidants and the power of Dyglomera®

Dyglomera® is an advanced, naturally derived, self-affirmed GRAS, standardized extract of Dichrostachys glomerata fruit which has a long history of use as a culinary spice and for medicinal purposes in its native West Africa. Clinically tested (two Gold Standard human clinical studies), patented DygloFit™ (U.S. Patent # 8,361,523) possesses polyphenol bioactives with multifunctional properties that help promote both healthy weight management and comprehensive metabolic wellness based on multiple mechanisms of action.

Before we dive into the antioxidant power of Dyglomera® it is necessary to further understand free radicals, antioxidants and the testing methods needed to accurately define and evaluate the full potential benefits of any antioxidant ingredient. Granted some of this may be a bit fundamental yet it is important to fully understand all three areas to be able to glean the true potential impact that any antioxidant ingredient may have. Not all antioxidants are created equal and without the fundamental knowledge behind the assessment process one may fall prey to gimmicky marketing and invalid claims.

Free Radicals (Not Hippies from the 60's)

Free radicals are atoms, ions, or molecules that contain an unpaired electron. The unpaired electron makes them unstable and highly reactive. In a process called oxidation, free radicals steal electrons from other molecules such as fats, proteins, cell membranes, and even DNA leading to the alteration of the fundamental structure of the affected molecule. One unbalanced molecule may not sound like a major concern, but oxidation sets off a chain reaction by damaging a cell's DNA, structure, and ability to function. Free radicals are produced as part of our normal metabolism. Like an automobile, the body takes in fuel, burns it to get energy and exhaust. The exhaust, if not neutralized or vented from the car, will eventually make the car not run properly or can even make it stop working altogether. Just like with a car, the faster you go the more exhaust you will produce. This exhaust (free radicals) will cause damage to healthy cells and trigger a cascade of events leading to poor health if it is not neutralized. Additionally, free radicals come from outside sources too. These outside sources include; exposure to radiation (x-rays, sun exposure) cigarette smoke, unsaturated fats, alcohol, ozone, automobile exhaust, heavy metals, pesticides, drugs and from many other sources found in our air, water and foods. Free radical damage can also be referred to as oxidative (Oxygen) and/or nitrosative (Nitrogen) stress because free

radicals are either Reactive Oxygen Species (ROS) or Reactive Nitrogen Species (NRS). Simplifying these two terms, the unpaired electron(s) of "mutant" oxygen or nitrogen molecules are linked to the damage to cell. Both ROS and RNS free radicals can play either a beneficial or toxic role in the body depending on the amounts circulating in the body. At low levels ROS/RNS have beneficial effects in various physiological functions such as in immune function i.e. defense against pathogenic microorganisms and in a number of cellular signaling pathways. At higher concentrations though, free radicals are linked to diseases such as; diabetes, neurodegenerative (Alzheimer's, Parkinson's etc.) connective tissue (rheumatoid arthritis), age related eye (Macular Degeneration and cataracts), cardiovascular, respiratory as well as in the everyday aging process. Free radicals can impose their damage inside and outside the cell membrane and will cause damage to any cell in the body.

Antioxidant 101

As stated above, free radical production in small amounts can be beneficial and in large or imbalanced amounts will lead to destructive effects in the body. This is where antioxidants become critical. Free radicals forage through the body looking for electrons to steal (or give away) in order to become balanced. Antioxidants stop free radical damage to molecules by accepting or donating an electron to make the free radical stable. Antioxidants are unique in that they remain stable even when they donate an electron. Antioxidant sources are often discussed in terms of their free radical scavenging abilities. The free radical scavenging activity of antioxidants varies depending on its source i.e. plant, synthetic, vitamin, mineral, etc. In addition, the body naturally produces it's own antioxidants such as glutathione, SOD, uric acid and ubiquinol. Regretfully the amounts the body produces can't always keep up with the demand. Poor lifestyle choices and environmental exposure swing the balance the wrong direction that exposes the body to free radical overload and eventual cellular damage. It is this imbalance that necessitates the need to consume outside sources of antioxidants i.e. foods and supplements.

Antioxidant Testing

Knowing that the imbalance of free radicals leads to disease and that consuming more antioxidant-rich foods and supplements is critical leads to the big question; How do we evaluate the antioxidant potential of these foods and supplements? First and foremost, antioxidant activity or potential should NOT be concluded based on a single antioxidant test model because antioxidants act by several mechanisms. Performing a single test will only measure one potential facet of an antioxidant and most likely leave behind one of these other mechanisms of action:

- Scavenging reactive oxygen and the nitrogen free radical species
- Decreasing the localized oxygen concentration thereby reducing the molecular oxygen's oxidation potential
- Metabolizing lipid peroxides to non-radical products
- Chelating metal ions to prevent the generation of free radicals.
- Donating hydrogen to radicals
- Reducing power

- Inhibition of β-carotene bleaching

In fact, this realization has lead to the formation of many in vitro testing methods to ensure capturing the full potential of antioxidants. Using multiple test methods will give a better evaluation of the overall antioxidant potency.

According to a paper published in Saudi Pharmaceutical Journal Volume 21, Issue 2, April 2013, Pages 143-152 there are currently 19 in vitro methods of testing being used to evaluate antioxidants. The paper evaluated the different testing methods used in and the solvents as a part of extracting antioxidants from natural sources.

In the case of Dyglomera® this has been achieved. Dyglomera® has had 10 different testing methods done on 3 different extraction methods to show not only its effectiveness as an antioxidant but what extraction gives the highest activity level. The study published in CyTAJournal of Food in March 2010 titled Antioxidant characteristics of Dichrostachys glomerata spice extracts examined “the antioxidant activity of aqueous extract, ethanol extract, and hydroethanolic pod extract of a Cameroonian spice Dichrostachys glomerata (D. glomerata)”. Each extraction process was measured for the phenolic content and their effectiveness in the following antioxidant test methods:

- Ferric reducing antioxidant power FRAP- reducing power
- Free radical scavenging activity on DPPH -scavenging
- Antioxidant activity in a linoleic acid system
- ABTS decolorization assay- Scavenging
- Superoxide anion radical (O72) scavenging activity
- Nitric oxide radical scavenging assay
- Ferrous metal ion chelating activity
- Scavenging of hydroxyl radical
- In vitro copper-induced oxidation of human low-density lipoprotein assay

Please note that the study of Dyglomera® used over half of the known testing methods (10/19) for in vitro evaluation which is considered far greater than most botanical extracts that are evaluated. Dyglomera® contains several polyphenolic compounds found in the fruit of the plant. Keeping thing simple, polyphenols are considered micronutrients found in plants and fall into four groups; Flavonoids, Stillbenes, Lignans and phenolic acids. Plants that are high in polyphenolic compounds are usually associated with having a wide range of benefits such as antioxidants, blood sugar control and blood clot reduction, immune support, inflammation reduction and so much more. In the study mentioned above, Dyglomera® was evaluated using 3 different extraction processes against all ten assay methods. In short, Dyglomera® showed to have excellent free radical scavenging activity in all ten testing methods. In another study (8-weeks double-blind placebo controlled study) done with Dyglomera®, consumption of whole D. glomerata ground spice resulted in significant improvements in antioxidant activity in subjects (compared to placebo). Multiple in vitro testing assays as well as the observation of increased levels of important antioxidant enzymes found in subjects’ blood including catalase and superoxide dismutase. The later observation of the blood work shows that not only does Dyglomera® work in vitro but also in

vivo. In vivo testing is even a more accurate measure of antioxidant potential due to its ability to show what is actually occurring in the body. By combining the results from these 2-published studies we can see that Dyglomera® should be considered as a first-line ingredient when seeking an antioxidant.

Finally, we now know that not only is the body is a free-radical manufacturing facility but it is environmental exposed to even more free radical damage thru pollution, pesticides, smoking and more. Additionally, modern medicine has shown that an abundance of free radicals can and will lead to other more serious health concerns that are either debilitating or life threatening i.e. diabetes, neurodegenerative (Alzheimer's, Parkinson's etc.) connective tissue (rheumatoid arthritis), age related eye (Macular Degeneration and cataracts), cardiovascular, respiratory as well as in the everyday aging process. It is for these combined reasons that the amounts of antioxidants consumed through diet and supplementation is required. When seeking a botanical antioxidant it is important to choose one with multiple proven assay methods showing its antioxidant potential. In the case of Dyglomera® one can rest and be assured of its proven effects at neutralizing free radicals through ten-plus assay methods.

Antioxidant characteristics of Dichrostachys glomerata spice extracts

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Abstract

The antioxidant activity of aqueous extract, ethanol extract, and hydroethanolic pod extract of a Cameroonian spice Dichrostachys glomerata (D. glomerata) was investigated. When compared with the two other extracts, the aqueous extract exhibited the lowest phenolic content, AEABTS (Antiradical Efficiency) and AEDPPH values whereas the ethanol extract had the highest phenolic content, AEABTS and AEDPPH values. The DPPH (α, α-diphenyl-β-picrylhydrazyl) radical and ABTS (2, 2′ -azinobis (3-ethylbenzothiazoline-6-sulfonic acid) cation radical scavenging activities were proven and correlated with the reductive potential and phenolic content of the extracts with r 2 greater than 0.9. All extracts had effective, superoxide anion radical, hydroxyl radical and nitric oxide scavenging activity, at all tested concentrations in a concentration-dependent manner. Each extract showed a concentration-dependent effect on chelating activity and α-linoleic acid oxidation inhibition activity. When compared with the controls, each extract significantly decreased malondialdehyde and lipid hydroperoxides formation in low-density lipoprotein (LDL). The hydroethanolic extract exhibited the highest inhibition of LDL oxidation. These results suggest that pods from D. glomerata can be good source of natural antioxidants.

Effectiveness of Dichrostachys glomerata Spice Phenolics in Reduction of Oxidative Stress Associated with Obesity and Type 2 Diabetes; a Randomized, Double-Blind Placebo-Controlled Clinical Trial

Dieudonne Kuate Anne Kengne William Dakam Blanche Etoundi Ghislain Paka Judith Ngondi Julius Oben

Abstract

This work evaluated the effect of Dichrostachys glomerata on the improvement of antioxidant biomarkers in obesity and type 2 diabetes participants, in an eight-week randomized, double-blind, placebo-controlled design study. The active (400 mg) or placebo formulation were administered twice daily throughout the study period to two normoglycemic and two diabetic obese random groups. Plasma levels of a total of 8 biochemical parameters were taken at the baseline and after 4 and 8 weeks of treatment. No differences in urate variation were observed while the plasma phenolic content as well as the reduced glutathione level, ascorbate concentration, FRAP value and enzymatic antioxidant activities significantly increased with a concomitant reduction of MDA after 8 weeks compared to placebo ($P < 0.01$). On the contrary to urate and ascorbate, plasma polyphenol content correlated well with FRAP level in both treated groups indicating that phenolics from the spice greatly contributed to the antioxidant activity.

Anti-inflammatory, anthropometric and lipomodulatory effects Dyglomera® (aqueous extract of Dichrostachys glomerata) in obese patients with metabolic syndrome

Dieudonne Kuate, Blanche C. Etoundi, Judith L. Ngondi, Wan Muda, Julius E. Oben

Abstract

Background: Increased visceral fat, dyslipidemia and increased markers of inflammation and coagulation are cardiovascular risk factors commonly encountered in obese people with metabolic syndrome. Previous studies have shown that ground Dichrostachys glomerata (DG), a spice used in Western Cameroon, can have beneficial effects on inflammation and various other cardiovascular disease risk factors. The purpose of the present study was to evaluate the effects of Dyglomera®, an aqueous extract of DG (standardized to NLT 10% polyphenols) on certain anthropometric, biochemical (including pro-inflammatory and pro-thrombotic states) and hemodynamic parameters in obese patients with metabolic syndrome.

Methods: The study was an 8-week randomized, double-blind, placebo-controlled trial involving 116 males and 202 females aged between 24 and 58 years. Participants were randomly divided into two groups: treatment and placebo. Capsules containing the active treatment (200 mg Dyglomera®) or placebo (200 mg maize powder) were administered 30–60 minutes before lunch and dinner throughout the study period. Various biochemical (namely, blood glucose, lipid profile, pro-inflammatory and pro-thrombotic markers), anthropometric and hemodynamic parameters were measured at baseline and after 4 and 8 weeks of treatment.

Results: At the end of the study, the Dyglomera® group showed statistically significant differences in all 16 parameters compared to baseline values. Changes in BMI and waist circumference were accompanied by changes in biochemical parameters, with the exception of adiponectin levels which were not correlated to waist circumference and PAI-1 values. The results confirm the hypothesis that Dyglomera®, the aqueous extract of DG, has anti-inflammatory properties, and is effective in reducing cardiovascular disease risk factors associated with metabolic syndrome in obese human subjects.

Anti-Obesity Effect of Dyglomera® Is Associated with Activation of the AMPK Signaling Pathway in

3T3-L1 Adipocytes and Mice with High-Fat Diet-Induced Obesity

Hae-Lim Kim, Sung-Kwon Lee, Da-Eun Min, Bong-Keun Choi, and Dong-Ryung Lee*

Tzu-Ming Pan, Academic Editor, Wei-Dong Xie, Academic Editor, and Chun-Lin Lee, Academic Editor

Abstract

Dyglomera® is an aqueous ethanol extract of the fruit pods of Dichrostachys glomerata, a Cameroonian spice. Several studies have shown its anti-diabetic and anti-obesity effects. However, the underlying mechanisms for such effects remain unclear. Thus, the objective of this study was to investigate the anti-obesity effect of Dyglomera® and its underlying mechanisms in mice with high-fat diet-induced obesity and 3T3-L1 adipocytes. Our results revealed that Dyglomera® inhibited adipogenesis and lipogenesis by regulating AMPK phosphorylation in white adipose tissues (WATs) and 3T3-L1 adipocytes and promoted lipolysis by increasing the expression of lipolysis-related proteins. These results suggest that Dyglomera® can be used as an effective dietary supplement for treating obesity due to its modulating effect on adipogenesis/lipogenesis and lipolysis.

Keywords: Dichrostachys glomerata extract, Dyglomera®, anti-obesity, adipogenesis, lipogenesis, lipolysis, 3T3-L1 adipocytes, high-fat diet-induced obesity

Benicaros Studies

The Dietary Intake of Carrot-Derived Rhamnogalacturonan-I Accelerates and Augments the Innate Immune and Anti-Viral Interferon Response to Rhinovirus Infection and Reduces Duration and Severity of Symptoms in Humans in a Randomized Trial

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Catherine L. Carpenter, Academic Editor

Author information Article notes Copyright and License information Disclaimer

Abstract

Acute respiratory infections are an important health concern. Traditionally, polysaccharide-enriched extracts from plants, containing immunomodulatory rhamnogalacturonan-I (RG-1), were used prophylactically. We established the effects of dietary supplementation with carrot-derived RG-I (cRG-I, 0–0.3–1.5 g/day) in 177 healthy individuals (18–65 years) on symptoms following infection with rhinovirus strain 16 (RV16). Primary outcomes were changes in severity and duration of symptoms, and viral load in nasal lavage. Secondary outcomes were changes in innate immune and anti-viral responses, reflected by CXCL10 and CXCL8 levels and cell differentials in nasal lavage. In a nested cohort, exploratory transcriptome analysis was conducted on nasal epithelium. Intake of cRG-I was safe, well-tolerated and accelerated local cellular and humoral innate immune responses induced by RV16 infection, with the strongest effects at 1.5 g/d. At 0.3 g/d, a faster interferon-induced response, induction of the key anti-viral gene EIF2AK2, faster viral clearance, and reduced symptom severity (–20%) and duration (–25%) were observed. Anti-viral responses, viral clearance and symptom scores at 1.5 g/d were in between those of 0 and 0.3 g/d, suggesting a negative feedback loop preventing excessive interferon responses. Dietary intake of cRG-I accelerated innate immune and antiviral responses, and reduced symptoms of an acute respiratory viral infection.

Effects of Dietary Supplementation with Carrot-Derived Rhamnogalacturonan-I (cRG-I) on Accelerated Protective Immune Responses and Quality of Life in Healthy Volunteers

Challenged with Rhinovirus in a Randomized Trial

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Abstract

An adequate and balanced supply of nutrients is essential for maintaining health, and an optimal immune response is fast, contained and properly controlled, curbing infections quickly while minimizing damage. Several micronutrients contribute to normal immune function and certain dietary fibers, for example pectic polysaccharides, can play an important role in educating and regulating immune cell responses. The aim of this paper is to elaborate on our initial findings that dietary supplementation with carrot-derived rhamnogalacturonan-I (cRG-I) accelerates and augments local innate immune and anti-viral interferon response to a rhinovirus-16 (RV16) infection and reduces the severity and duration of symptoms in humans. Dietary intake of cRG-I also enhanced immune responses to this respiratory viral infection as measured by ex vivo stimulation of whole blood with the Toll-like receptor 3 (TLR3) ligand polyinosinic:polycytidylic acid and NK cell function. Consumption of cRG-I also reduced the negative effects of this common cold infection on quality of life as assessed by individual symptom scores. RG-I from carrot is a safe, sustainable, and economically viable solution that could easily be integrated into food products and dietary supplements aiming to support immune fitness and wellbeing.

Consistent Prebiotic Effects of Carrot RG-I on the Gut Microbiota of Four Human Adult Donors in the SHIME®

Model despite Baseline Individual Variability

Pieter Van den Abbeele 1,2, Cindy Duysburgh 1, Ilse Cleenwerck 3, Ruud Albers 4, Massimo Marzorati 1,5 and Annick Mercenier 4,* Citation: Van den Abbeele, P.;Duysburgh, C.; Cleenwerck, I.; Albers,R.; Marzorati, M.; Mercenier, A. Academic Editor: Garry X. Shen

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Abstract

The human gut microbiome is currently recognized to play a vital role in human biology and development, with diet as a major modulator. Therefore, novel indigestible polysaccharides that confer a health benefit upon their fermentation by the microbiome are under investigation. Based on the recently demonstrated prebiotic potential of a carrot-derived pectin extract enriched for rhamnogalacturonan I (cRG-I), the current study aimed to assess the impact of cRG-I upon repeated administration using the M-SHIME technology (3 weeks at 3g cRG-I/d). Consistent effects across four simulated adult donors included enhanced levels of acetate (+21.1 mM), propionate (+17.6 mM), and to a lesser extent butyrate (+4.1 mM), coinciding with a marked increase of OTUs related to Bacteroides dorei and Prevotella species with versatile enzymatic potential likely allowing them to serve as primary degraders of cRG-I. These Bacteroidetes members are able to produce succinate, explaining the consistent increase of an OTU related to the succinate-converting Phascolarctobacterium faecium (+0.47 log10(cells/mL)). While the Bifidobacteriaceae family remained unaffected, a specific OTU related to Bifidobacterium longum increased significantly upon cRG-I treatment (+1.32 log10(cells/mL)). Additional monoculture experiments suggested that Bifidobacterium species are unable to ferment cRG-I structures as such and that B. longum probably feeds on arabinan and galactan side chains of cRG-I, released by aforementioned Bacteroidetes members. Overall, this study confirms the prebiotic potential of cRG-I and additionally highlights the marked consistency of the microbial changes observed across simulated subjects, suggesting the involvement of a specialized consortium in cRG-I fermentation by the human gut microbiome.

Development of an Affordable, Sustainable and Efficacious Plant-Based Immunomodulatory Food Ingredient Based on Bell Pepper or Carrot RG-I Pectic Polysaccharides

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Abstract

The prevalence of acute respiratory infections and their impact on quality of life underlies the need for efficacious solutions that are safe, sustainable and economically viable. Polysaccharides in several (traditional) plant extracts have been shown to be immunostimulatory, and some studies suggest beneficial effects against respiratory infections. The aim of this study was to (i) identify the active polysaccharide constituents from affordable and renewable crops (bell pepper and carrot) using activity-guided fractionation, (ii) evaluate in vitro effects on innate immune responses (phagocytosis and cytokine secretion), microbiota modulation and production of short chain fatty acids, followed by (iii) the evaluation of effects of a bell pepper extract enriched for the active component in a human proof of concept study. We identified rhamnogalacturonan-I (RG-I) as the nutricophore responsible for the immunostimulatory activity with substantial structural and functional equivalence between bell pepper (bp) and carrot (c). The in vitro studies showed that bpRG-I and cRG-I comprise similar immune- and microbiota modulatory potential and the human study demonstrated that bpRG-I was well tolerated and enhanced innate immune responsiveness in vivo. This is an important step towards testing the efficacy of RG-I from bpRG-I or cRG-I in an infection trial in humans.

ThermoGP Studies

Daily ingestion of grains of paradise (Aframomum melegueta) extract increases whole-body energy expenditure and decreases visceral fat in humans

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We reported previously that a single ingestion of an alcohol extract of grains of paradise (GP, Aframomum melegueta), a species of the ginger family, increases energy expenditure (EE) through the activation of brown adipose tissue, a site of sympathetically mediated metabolic theromogenesis. The present study aimed to examine a daily ingestion of GP extract on whole-body EE and body fat in humans. Whole-body EE and body fat content were measured before and after daily oral ingestion of GP extract (30 mg/d) for 4 wk in 19 non-obese female volunteers aged 20-22 y in a single-blind, randomized, placebo-controlled, crossover design. Four-week daily ingestion of GP and a placebo decreased and increased slightly the visceral fat area at the umbilicus level, respectively. The GP-induced change was significantly different from that induced by the placebo ($p<0.05$), and negatively correlated with the initial visceral fat area ($r=-0.64$, $p<0.01$). Neither GP nor placebo ingestion affected subcutaneous or total fat. The daily ingestion of GP, but not the placebo, increased whole-body EE ($p<0.05$). These results suggest that GP extract may be an effective and safe tool for reducing body fat, mainly by preventing visceral fat accumulation.

Grains of paradise (Aframomum melegueta) extract activates brown adipose tissue and increases whole-body energy expenditure in men

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Abstract

Brown adipose tissue (BAT) is responsible for cold- and diet-induced thermogenesis, and thereby contributes to the control of whole-body energy expenditure (EE) and body fat content. BAT activity can be assessed by fluoro-2-deoxyglucose (FDG)-positron emission tomography (PET) in human subjects. Grains of paradise (GP, Aframomum melegueta), a species of the ginger family, contain pungent, aromatic ketones such as 6-paradol, 6-gingerol and 6-shogaol. An alcohol extract of GP seeds and 6-paradol are known to activate BAT thermogenesis in small rodents. The present study aimed to examine the effects of the GP extract on whole-body EE and to analyse its relation to BAT activity in men. A total of nineteen healthy male volunteers aged 20-32 years underwent FDG-PET after 2 h of

exposure to cold at 19°C with light clothing. A total of twelve subjects showed marked FDG uptake into the adipose tissue of the supraclavicular and paraspinal regions (BAT positive). The remaining seven showed no detectable uptake (BAT negative). Within 4 weeks after the FDG-PET examination, whole-body EE was measured at 27°C before and after oral ingestion of GP extract (40 mg) in a single-blind, randomised, placebo-controlled, crossover design. The resting EE of the BAT-positive group did not differ from that of the BAT-negative group. After GP extract ingestion, the EE of the BAT-positive group increased within 2 h to a significantly greater (P<0·01) level than that of the BAT-negative group. Placebo ingestion produced no significant change in EE. These results suggest that oral ingestion of GP extract increases whole-body EE through the activation of BAT in human subjects.

Prolonged Treatment with Grains of Paradise (Aframomum melegueta) Extract Recruits Adaptive Thermogenesis and Reduces Body Fat in Humans with Low Brown Fat Activity

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Free article

Abstract

Increasing adaptive thermogenesis through the activation of brown adipose tissue (BAT) is a promising practical strategy for preventing obesity and related disorders. Ingestion of a single dose of 40 mg of an extract of Grains of Paradise (GP), a ginger family species, reportedly triggers BAT thermogenesis in individuals with high but not in those with low BAT activity. We hypothesized that prolonged treatment with GP might revive BAT in individuals who have lost active BAT. In the present study, we recruited 9 healthy young male volunteers with reduced BAT that was assessed by fluorodeoxyglucose positron emission tomography and computed tomography (FDG-PET/CT) following 2-h cold exposure at 19ºC. The subjects ingested GP extract (40 mg/d) or placebo every day for 5 wk. Before and after the treatment with either GP or placebo, their body composition and BAT-dependent cold-induced thermogenesis (CIT)-a non-invasive index of BAT-were measured in a single-blinded, randomized, placebo-controlled cross-over design. Their whole-body resting energy expenditure at a thermoneutral condition remained unchanged following GP treatment. However, CIT after treatment was significantly higher in GP-treated individuals than in placebo-treated individuals. Body weight and fat-free mass did not change significantly following GP or placebo treatment. Notably, body fat percentage slightly but significantly decreased after GP treatment but not after placebo treatment. These results suggest that repeated ingestion of GP elevates adaptive thermogenesis through the re-activation of BAT, thereby reducing body fat in individuals with low BAT activity.

Aframomum melegueta Seed Extract with Standardized Content of 6-Paradol Reduces Visceral Fat and Enhances Energy Expenditure in Overweight Adults - A Randomized Double-Blind, Placebo-Controlled Clinical Study

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Free PMC article

Abstract

Purpose: Aframomum melegueta (grains of paradise) seeds have been demonstrated to possess thermogenic potential. However, it is necessary to validate the functional attributes of A. melegueta seed extract in human subjects.

Methods: In a double-blind, placebo-controlled clinical trial design, we have examined the thermogenic effects of a standardized A. melegueta seed extract (AfperFit). A total of 70 overweight male and female subjects (BMI ≥25.0 to ≤30.0 kg/m2) aged 20-50 years were enrolled and administered with either 250 mg of AfperFit or placebo in capsule form twice daily for 12 weeks. The primary efficacy endpoints included energy expenditure (indirect calorimetry), body composition (dual-energy X-ray absorptiometry (DEXA)) and fat distribution (computed tomography (CT scan)), analyzed at baseline and after 12 weeks of treatment. The effect of intervention on the quality of life was examined using SF-12 questionnaire.

Results: Consumption of AfperFit significantly increased the energy expenditure ($p<0.01$), visceral fat area ($p<0.001$) and visceral to subcutaneous fat ratio ($p<0.01$) compared to placebo group. Consequently, there was significant body weight loss and reduction in BMI of subjects in AfperFit group compared to placebo ($p<0.01$). The safety evaluation showed that biochemical and hematological parameters were in the normal range. Supplementation of AfperFit was well tolerated during the study and no adverse effects were observed.

Conclusion: Overall, this study validates the health benefits of A. melegueta seed extract as fat burner and recommends its use as a functional ingredient to improve the quality of life and general health.

BCAA 2:1:1 Studies

The effects of oral BCAAs and leucine supplementation combined with an acute lower-body resistance exercise on mTOR and 4E-BP1 activation in humans: preliminary findings

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Background: A randomized, double-blind, placebo-controlled study was performed to evaluate the effects of oral BCAA and leucine supplementation combined with an acute bout of lower extremity resistance exercise (RE) on the phosphorylation/activation states of mTOR and 4EBP1.

Methods: 30 fasted, recreationally trained males (22.5 yrs; 83.1 kg; 178.4 cm) consumed 120 mg/kg/bw of BCAA, 60 mg/kg/bw of leucine, or a placebo. The supplements were consumed in three equal doses at 30 minutes before RE, immediately prior to RE, and immediately post RE. The participants completed 4 sets of both leg press and knee extension at 80% of their 1 RM to failure (~8–12 reps). Rest periods of 2.5 minutes were given between both sets and exercises. Percutaneous muscle biopsies of the vastus lateralis were obtained at: baseline, and 30 minutes, 2 hours, and 6 hours post RE. The phosphorylated states of both mTOR and 4E-BP1 were assessed through the use of an ELISA with a primary antibody specific to phosphorylated mTOR [pS2448] and a phosphoELISA kit for phosphorylated 4E-BP1 [pT46], respectively. Other serum and muscle variables were analyzed as part of a greater, overall study, but only the phosphorylated mTOR and 4E-BP1 are reported in this abstract. Delta values of mTOR and 4E-BP1 were analyzed using a 3 (group) × 4 (time) repeated measures MANOVA. Separate ANOVAs for each criterion variable were utilized as follow-up tests. Significant main effects were determined Bonferroni post-hoc tests. Significant interactions discovered in the ANOVAs were assessed by independent samples T-tests. SPSS version 15.0 was utilized throughout this analysis.

Results: There was no main effect for group, time or group × time interaction for phosphorylated mTOR. In regards to phosphorylated 4E-BP1, no main effect for time was observed. However, a significant group main effect for 4E-BP1 was observed ($p = 0.002$). Bonferroni post-hoc analysis demonstrated that both the BCAA group ($p = 0.002$) and the leucine group ($p = .037$) were significantly greater than the placebo group in regards to phosphorylated 4E-BP1. Additionally, a group × time interaction for 4E-BP1 was also observed. Activated 4E-BP1 was significantly greater in the BCAA group ($p = 0.001$) and leucine group ($p = .037$) at 2 hours post RE as compared to the placebo. At 6 hours post RE, 4E-BP1 activation was greater in the BCAA group as compared to both the placebo ($p = 0.022$) and leucine groups ($p = 0.041$).

Conclusion: Both leucine and BCAA supplementation, combined with an acute bout of lower extremity RE, led to greater levels of phosphorylated 4E-BP1, as compared to a placebo, 2 hours following RE. Furthermore, BCAA group led to significantly greater levels of activated 4E-BP1 when compared to both the placebo and leucine at 6 hours post RE. These findings suggest that the other two BCAAs (isoleucine and valine) may contribute to greater activation states of 4E-BP1 above and beyond that of leucine alone. Lastly, in the current study, neither BCAA nor leucine supplementation did not have a

significant effect on the phosphorylation state of the cell signaling protein, mTOR.

The effects of branched-chain amino acid granules on the accumulation of tissue triglycerides and uncoupling proteins in diet-induced obese mice

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Free article

Abstract

It has been demonstrated the involvement of branched-chain amino acids (BCAA) on obesity and related metabolic disorder. We investigated the effects of branched-chain amino acids (BCAA) on obesity and on glucose/fat homeostasis in mice fed on a high-fat (45%) diet. BCAA was dissolved in 0.5% methylcellulose and added to the drinking water (BCAA-treated group). A high-fat diet was provided for 6 weeks and BCAA was given for 2 weeks. The BCAA-treated group gained almost 7% less body weight and had less epididymal adipose tissue (WAT) mass than the control group ($p<0.05$). BCAA supplementation also reduced the hepatic and skeletal muscle triglyceride (TG) concentrations ($p<0.05$). The hepatic levels of PPAR-alpha and uncoupling protein (UCP) 2, and the level of PPAR-alpha and UCP3 in the skeletal muscle were greater in the BCAA-treated group than in the control mice ($p<0.05$). These results demonstrate that the liver and muscle TG concentration are less in BCAA-treated group. BCAA affects PPAR-alpha and UCP expression in muscle and liver tissue.

Effect of BCAA intake during endurance exercises on fatigue substances, muscle damage substances, and energy metabolism substances

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Free PMC article

Abstract

The increase rate of utilization of branched-chain amino acids (BCAA) by muscle is reduced to its plasma concentration during prolonged exercise leading to glycogen. BCAA supplementation would reduce the serum activities of intramuscular enzymes associated with muscle damage. To examine the effects of BCAA administration on fatigue substances (serotonin, ammonia and lactate), muscle damage substances (CK and LDH) and energy metabolism substances (FFA and glucose) after endurance exercise. Subjects (n = 26, college-aged males) were randomly divided into an experimental (n = 13, EXP) and a placebo (n = 13, CON) group. Subjects both EXP and CON performed a bout of cycle

training (70% VO2max intensity) to exhaustion. Subject in the EXP were administrated BCAA (78ml/kg·w) prior to the bout of cycle exercise. Fatigue substances, muscle damage substances and energy metabolism substances were measured before ingesting BCAAs and placebos, 10 min before exercise, 30 min into exercise, immediately after exercise, and 30 min after exercise. Data were analyzed by two-way repeated measure ANCOVA, correlation and statistical significance was set at $p < 0.05$. The following results were obtained from this study; 1. In the change of fatigue substances : Serotonin in the EXP tended to decreased at the 10 min before exercise, 30 min into exercise, post exercise, and recovery 30 min. Serotonin in the CON was significantly greater than the EXP at the10 min before exercise and recovery 30. Ammonia in the EXP was increased at the 10 min before exercise, 30 min into exercise, and post exercise, but significantly decreased at the recovery 30min ($p < 0.05$). Ammonia in the CON was significantly lower than the EXP at the 10 min before exercise, 30 min into exercise, and post exercise ($p < 0.05$). Lactate in the EXP was significantly increased at the 30 min into exercise and significantly decreased at the post exercise and recovery 30 min. Lactate in the CON was significantly lower than the EXP at the post exercise ($p < 0.05$). 2. In the change of muscle damage substances : CK in the EXP was decreased at the 10 min before exercise and increased at the 30 min into exercise and then decreased at the post exercise and recovery 30 min. CK in the CON was greater than the EXP. LDH in the EXP was decreased at the 10 min before exercise and increased at the 30 min into exercise and then decreased at the post exercise and recovery 30 min. LDH in the CON was higher than the EXP. 3. In the change of energy metabolism substances :Glucose in the EXP tended to decrease at the 10 min before exercise, 30 min into exercise, post exercise and recovery 30 min. Glucose in the CON was significantly greater than the EXP at the recovery 30 min ($p < .05$). FFA in both EXP and CON was increased at the post exercise and recovery 30 min. % increase for FFA in the EXP was greater than the CON at the post exercise and recovery 30 min. 4. The relationship of the fatigue substances, muscle damage substances and energy metabolism substances after endurance exercise indicated strongly a positive relationship between LDH and ammonia and a negative relationship between LDH and FFA in the EXP. Also, there were a strong negative relationship between glucose and FFA and a positive relationship between glucose and serotonin in the EXP. There was a strong positive relationship between CK and LDH and a strong negative relationship between FFA and glucose in the CON. These results indicate that supplementary BCAA decreased serum concentrations of the intramuscular enzymes as CK and LDH following exhaustive exercise. This observation suggests that BCAA supplementation may reduce the muscle damage associated with endurance exercise.

Keywords: BCAA; energy metabolism substances; fatigue substances; muscle damage substances.

Optimal ratio of individual branched-chain amino acids in total parenteral nutrition of injured rats

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Abstract

In this study, we investigated the optimal ratio of individual branched-chain amino acids (BCAA) in a balanced amino acid infusion in laparotomized rats. The total BCAA contents of four amino acid infusions were fixed at 31% of total amino acids. The weight ratios of individual BCAA (isoleucine:leucine:valine) in the solutions were 1:0.5:1, 1:1:1, 1:2:1, and 1:4:1, respectively. The laparotomized rats were infused with about 140 mg (experiment 1) and 100 mg (experiment 2) of nitrogen and 10 g of glucose daily for 7 days. In both experiments, no marked difference was observed in the mean cumulative 7-day nitrogen balance and the urinary 3-methyl-histidine levels of all the groups. The BCAA concentrations and the molar ratios of individual BCAA in plasma were disarranged by the infusion of the 1:0.5:1 and 1:4:1 solutions. The infusion of the 1:1:1 and 1:2:1 solutions tended, however, to allow the values to approach the preinfusion values. These results suggest that the optimal ratio of individual BCAA in an amino acid infusion lies between 1:1:1 and 1:2:1 for this injured rat model in total parenteral nutrition.

Consuming a supplement containing branched-chain amino acids during a resistance-training program increases lean mass, muscle strength and fat loss

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Background: A randomized, double-blind study was performed to evaluate the efficacy of consuming a supplement containing branched-chain amino acids (BCAAs) during an eight-week resistance-training program.

Methods: Thirty-six strength-trained males with a minimum of two years resistance-training experience (25.5 yrs, 177.7 cm, 85.2 kg and 9.3% body fat) were randomly assigned to receive either 14 grams of BCAAs (n = 12), 28 grams of whey protein (n = 12), or 28 grams of carbohydrates from a sports drink (n = 12) while performing an eight-week resistance-training program. Participants followed a periodized, whole-body training program that involved training all major muscle groups once per week using a four-day training split. Subjects body weight, body composition, and 10-rep max on the bench press and squat were determined before and after the eight-week training program. Subjects followed a standardized diet while following the program.

Results: All groups had a 100% compliance with the study protocol. The BCAA group experienced a significantly greater gain in body weight than the whey group (2 ± 1 kg vs. 1 ± 1 kg; $p < 0.02$) and the carbohydrate group (2 ± 1 kg vs. 1 ± 1 kg; $p < 0.01$). For lean mass, the BCAA group gained significantly greater lean mass than the whey group (4 ± 1 kg vs. 2 ± 1 kg; $p < 0.01$) and the carbohydrate group (4 ± 1 kg vs. 1 ± 1 kg; $p < 0.01$). The whey group also gained significantly more lean mass than the carbohydrate group (2 ± 1 kg vs. 1 ± 1 kg; $p < 0.02$). BCAA group decreased their percent body fat significantly more than the whey group (2 ± 1% vs. 1 ± 1%; $p = 0.039$) and the carbohydrate group (2 ± 1% vs. 1 ± 1%; $p < 0.01$). Muscular strength was significantly greater in the BCAA group on the 10-RM bench press than the whey group (6 ± 3 kg vs. 3 ± 2 kg; $p < 0.01$) and the carbohydrate group (6 ± 3 kg vs. 2 ± 2 kg; $p < 0.01$). For the squat, the BCAA group gained significantly more strength on their 10-RM than the whey group (11 ± 5 kg vs. 5 ± 3 kg; $p < 0.01$) and the carbohydrate group (11 ± 5 kg vs. 3 ± 2

kg; $p < 0.01$).

Conclusion: Ingestion of a supplement containing BCAAs while following an 8-week resistance training program resulted in a greater decrease in percent body fat, an increase in lean mass, and 10-RM strength gains on the bench press and squat vs. ingestion of a whey supplement or a sports drink. In addition, the ingestion of a whey protein supplement resulted in greater lean mass gains than ingestion of a sports drink.

Branched-chain amino acid supplementation and indicators of muscle damage after endurance exercise

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Abstract

The purpose of this study was to determine whether branched-chain amino acid (BCAA) supplementation attenuates indirect indicators of muscle damage during endurance exercise as compared with an isocaloric, carbohydrate (CHO) beverage or a noncaloric placebo (PLAC) beverage. Nine untrained men performed three 90 min cycling bouts at 55% VO 2peak. Subjects, blinded to beverage selection, ingested a total of 200 kcal of energy via the CHO or BCAA beverage before and at 60 min of exercise, or they drank the PLAC beverage. Creatine kinase (CK), lactate dehydrogenase (LDH), isokinetic leg-extension and -flexion torque, and muscle soreness were assessed before and immediately, 4 h, 24 h, and 48 h postexercise. The trials were separated by 8 wk. CK activities were significantly lower after the BCAA trial than in the PLAC trial at 4, 24, and 48 h postexercise, as well as lower than the CHO beverage at 24 h postexercise. CK was lower in the CHO trial at the 24- and 48-h time points than in the PLAC trial. LDH activities were lower in the BCAA trial at 4 h than in the PLAC trial. As compared with the CHO and PLAC trials, ratings of perceived soreness were lower at 24 h postexercise, and leg-flexion torque was higher at the 48-h time point after the BCAA trial. The present data suggest that BCAA supplementation attenuates muscle damage during prolonged endurance exercise in untrained college-age men. CHO ingestion attenuates CK activities at 24 and 48 h postexercise as compared with a placebo beverage.