

Prebiotin Structure/Function Claim: Supports Healthy Levels of Cholesterol and Triglycerides

Doc No.: VR004

Revision: 1

AUTHOR: Dr. Frank Jackson, MD

1. PURPOSE/SCOPE

The purpose of this document is to explain how Prebiotin plays a role in supporting a healthy cholesterol and triglyceride level and the clinical literature published in support of this structure/function claim.

This includes studies performed and an evaluation of the relevant scientific literature related to how prebiotin acts in promoting heart health by nourishing beneficial bacteria.

2. GENERAL DETAILS

2.1 Dietary Supplement Name

Proprietary Product Name:
Prebiotin

2.2 Manufacturer

Jackson GI Medical
1714 N. 2nd Street
Harrisburg, PA 17102
USA

2.3 Dietary Supplement Description

Oligofructose Enriched Inulin

3. BACKGROUND

Prebiotin, a Prebiotic Fiber Supplement offers a full-spectrum prebiotic (Oligofructose-Enriched-Inulin, or OEI). OEI is obtained by combining chicory long-chain inulin and oligofructose. Inulin and oligofructose belong to a class of carbohydrates known as fructans. Because of the beta-configuration of the anomeric C2 in their fructose monomers, inulin -type fructans resist hydrolysis by intestinal digestive enzymes, they classify as 'non-digestible' carbohydrates, and they are dietary fibers.

The main sources of inulin and oligofructose that are used in the food industry are chicory and Jerusalem artichoke. Inulin and oligofructose are considered as functional food ingredients since they affect the physiological and biochemical processes in rats and human beings, resulting in better health.

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Unlike ordinary prebiotics such as Inulin or FOS, OEI ensures that Prebiotin nourishes beneficial bacteria throughout the colon. OEI is also the most-researched prebiotic, used in many university and clinical studies.

A prebiotic has been defined as *'a non-digestible food ingredient that beneficially affects the host by selectively stimulating the growth and/or activity of one or a limited number of bacteria in the colon, and thus improves host health.* Inulin and oligofructose are the best-studied prebiotics so far. They are selectively fermented by the microflora in the human colon leading to a bacterial composition that is dominated by bifidobacteria, a perceived health-promoting genus.

The National Cancer Institute defines OEI as:

A substance that is used to improve the health of the digestive system and bones and is being studied in the prevention of colon cancer. Oligofructose-enriched inulin is made by combining two substances that occur naturally in many plants, including chicory root, wheat, bananas, onion, and garlic. Oligofructose-enriched inulin helps healthy bacteria grow in the intestines and helps the body absorb calcium and magnesium. OEI is also called Raftilose Synergy.

Source: (<http://www.cancer.gov/dictionary>)

The gut microbiome, meaning the vast collection of bacteria within the colon, is an intimate player in many of the metabolic disorders that occur in the body. They speak specifically to cardiovascular disease. What we eat makes a huge difference in the makeup of the gut bacteria factory. Likewise, prebiotics dramatically push this makeup in the correct way, encouraging the growth of bacterial groups that dramatically enhance cardiovascular welfare.

The major actors in the gut microbiome are called **short chain fatty acids (SCFA)**. The substances are made in large quantities in the colon when the right bacteria, the Bifidos and Lactos, are growing prodigously. One of these SCFAs is called propionate. This substance has been shown to reduce cholesterol. However, by far the star SCFA is butyrate. This is the substance that does many good things in the colon and beyond.

4. PUBLISHED LITERATURE

4.1 Literature Search

A literature search was conducted using PubMed and Medline to identify articles that contained studies on prebiotin (oligofructose enriched inulin) related to the beneficial heart healthy characteristics which support or assist in reducing cholesterol and triglyceride levels.

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The following articles support the function claim that a healthy microbiota provided by prebiotics in the diet supports heart health. The articles and/or studies listed in Table 1 are summarized individually.

Table 1 Clinical Literature

	Author	Source/Published	Title of Publication	Year of Publication
1	Goldsmith JR, Sartor RB.	J Gastroenterol. 2014 May;49(5):785-98. doi: 10.1007/s00535-014-0953-z.	The role of diet on intestinal microbiota metabolism: downstream impacts on host immune function and health, and therapeutic implications.	2014
2	Tuohy KM, Fava F, Viola R.	Proc Nutr Soc. 2014 May;73(2):172-85. doi: 10.1017/S0029665113003911.	'The way to a man's heart is through his gut microbiota'--dietary pro- and prebiotics for the management of cardiovascular risk.	2014
3	Wong JM, de Souza R, Kendall CW, Emam A, Jenkins DJ.	J Clin Gastroenterol. 2006 Mar;40(3):235-43	Colonic health: fermentation and short chain fatty acids.	2006
4	Balcázar-Muñoz BR, Martínez-Abundis E, González-Ortiz M.	Rev Med Chil. 2003 Jun;131(6):597-604.	Effect of oral inulin administration on lipid profile and insulin sensitivity in subjects with obesity and dyslipidemia.	2003
5	de Luis DA, de la Fuente B, Izaola O, Conde R, Gutiérrez S, Morillo M, Teba Torres C.	Nutr Hosp. 2010 Jan-Feb;25(1):53-9.	Randomized clinical trial with a inulin enriched cookie on risk cardiovascular factor in obese patients.	2010

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Article #1

The role of diet on intestinal microbiota metabolism: downstream impacts on host immune function and health, and therapeutic implications.

Goldsmith JR, Sartor RB.

Author information

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ABSTRACT

Dietary impacts on health may be one of the oldest concepts in medicine; however, only in recent years have technical advances in mass spectroscopy, gnotobiology, and bacterial sequencing enabled our understanding of human physiology to progress to the point where we can begin to understand how individual dietary components can affect specific illnesses. This review explores the current understanding of the complex interplay between dietary factors and the host microbiome, concentrating on the downstream implications on host immune function and the pathogenesis of disease. We discuss the influence of the gut microbiome on body habitus and explore the primary and secondary effects of diet on enteric microbial community structure. We address the impact of consumption of non-digestible polysaccharides (prebiotics and fiber), choline, carnitine, iron, and fats on host health as mediated by the enteric microbiome. Disease processes emphasized include non-alcoholic fatty liver disease/non-alcoholic steatohepatitis, IBD, and cardiovascular disease/atherosclerosis. The concepts presented in this review have important clinical implications, although more work needs to be done to develop fully and validate potential therapeutic approaches. Specific dietary interventions offer exciting potential for nontoxic, physiologic ways to alter enteric microbial structure and metabolism to benefit the natural history of many intestinal and systemic disorders.

<http://www.ncbi.nlm.nih.gov/pubmed/24652102>

Article #2

'The way to a man's heart is through his gut microbiota'--dietary pro- and prebiotics for the management of cardiovascular risk.

Tuohy KM, Fava F, Viola R.

Author information

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Nutrition and Nutrigenomics Group, Department of Food Quality and Nutrition, Research and Innovation Centre, Fondazione Edmund Mach, San Michele all'Adige, Trento 38010, Italy.

ABSTRACT

The human gut microbiota has been identified as a possible novel CVD risk factor. This review aims to summarize recent insights connecting human gut microbiome activities with CVD and how such activities may be modulated by diet. Aberrant gut microbiota profiles have been associated with obesity, type 1 and type 2 diabetes and non-alcoholic fatty liver disease. Transfer of microbiota from obese animals induces metabolic disease and obesity in germ-free animals. Conversely, transfer of pathogen-free microbiota from lean healthy human donors to patients with metabolic disease can increase insulin sensitivity. Not only are aberrant microbiota profiles associated with metabolic disease, but the flux of metabolites derived from gut microbial metabolism of choline, phosphatidylcholine and L-carnitine has been shown to contribute directly to CVD pathology, providing one explanation for increased disease risk of eating too much red meat. Diet, especially high intake of fermentable fibres and plant polyphenols, appears to regulate microbial activities within the gut, supporting regulatory guidelines encouraging increased consumption of whole-plant foods (fruit, vegetables and whole-grain cereals), and providing the scientific rationale for the design of efficacious prebiotics. Similarly, recent human studies with carefully selected probiotic strains show that ingestion of viable microorganisms with the ability to hydrolyse bile salts can lower blood cholesterol, a recognised risk factor in CVD. Taken together such observations raise the intriguing possibility that gut microbiome modulation by whole-plant foods, probiotics and prebiotics may be at the base of healthy eating pyramids advised by regulatory agencies across the globe. In conclusion, dietary strategies which modulate the gut microbiota or their metabolic activities are emerging as efficacious tools for reducing CVD risk and indicate that indeed, the way to a healthy heart may be through a healthy gut microbiota.

<http://www.ncbi.nlm.nih.gov/pubmed/24495527>

Article #3

Colonic health: fermentation and short chain fatty acids.

Wong JM, de Souza R, Kendall CW, Emam A, Jenkins DJ.

Author information

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ABSTRACT

Interest has been recently rekindled in short chain fatty acids (SCFAs) with the emergence of prebiotics and probiotics aimed at improving colonic and systemic health. Dietary carbohydrates, specifically resistant starches and dietary fiber, are substrates for fermentation that produce SCFAs, primarily acetate, propionate, and butyrate, as end products. The rate and amount of SCFA production depends on the species and amounts of microflora present in the colon, the substrate source and gut transit time. SCFAs are readily absorbed. Butyrate is the major energy source for colonocytes. Propionate is largely taken up by the liver. Acetate enters the peripheral circulation to be metabolized by peripheral tissues. Specific SCFA may reduce the risk of developing gastrointestinal disorders, cancer, and cardiovascular disease. Acetate is the principal SCFA in the colon, and after absorption it has been shown to increase cholesterol synthesis. However, propionate, a gluconeogenerator, has been shown to inhibit cholesterol synthesis. Therefore, substrates that can decrease the acetate: propionate ratio may reduce serum lipids and possibly cardiovascular disease risk. Butyrate has been studied for its role in nourishing the colonic mucosa and in the prevention of cancer of the colon, by promoting cell differentiation, cell-cycle arrest and apoptosis of transformed colonocytes; inhibiting the enzyme histone deacetylase and decreasing the transformation of primary to secondary bile acids as a result of colonic acidification. Therefore, a greater increase in SCFA production and potentially a greater delivery of SCFA, specifically butyrate, to the distal colon may result in a protective effect. Butyrate irrigation (enema) has also been suggested in the treatment of colitis. More human studies are now needed, especially, given the diverse nature of carbohydrate substrates and the SCFA patterns resulting from their fermentation. Short-term and long-term human studies are particularly required on SCFAs in relation to markers of cancer risk. These studies will be key to the success of dietary recommendations to maximize colonic disease prevention.

<http://www.ncbi.nlm.nih.gov/pubmed/16633129>

Article #4

Effect of oral inulin administration on lipid profile and insulin sensitivity in subjects with obesity and dyslipidemia.

Balcázar-Muñoz BR, Martínez-Abundis E, González-Ortiz M.

Author information

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ABSTRACT

BACKGROUND:

Inulin is a non absorbable polysaccharide with prebiotic effects, whose influence on blood lipids or insulin sensitivity is not well known:

AIM:

To assess the effect of oral administration of inulin on lipid profile and insulin sensitivity in dyslipidemic obese subjects.

MATERIAL AND METHODS:

A clinical trial, double blind, randomized with placebo was carried out in 12 obese, hypertrygliceridemic and hypercholesterolemic subjects between 19 and 32 years old. The subjects were randomized to receive 7 g/day of inulin or placebo in the morning, during 4 weeks. Biochemical and metabolic profiles and euglycemic-hyperinsulinemic clamp technique for assessing insulin sensitivity, before and after pharmacological intervention were performed.

RESULTS:

After inulin administration, there was a significant reduction of total cholesterol (248.7 +/- 30.5 and 194.3 +/- 39.8 mg/dL; p = 0.028), low density lipoprotein (LDL), cholesterol (136.0 +/- 27.8 and 113.0 +/- 36.2 mg/dL; p = 0.028), very low density lipoproteins (VLDL) (45.9 +/- 18.5 and 31.6 +/- 7.2 mg/dL; p = 0.046) and trygliceride concentrations (235.5 +/- 85.9 and 171.1 +/- 37.9 mg/dL; p = 0.046). No effect of inulin on insulin sensitivity was observed.

CONCLUSIONS:

The oral inulin administration reduced total cholesterol, LDL cholesterol, VLDL and trygliceride levels in dyslipidemic and obese subjects, without modifications in the insulin sensitivity.

<http://www.ncbi.nlm.nih.gov/pubmed/12942586>

Article #5

Randomized clinical trial with a inulin enriched cookie on risk cardiovascular factor in obese patients.

de Luis DA, de la Fuente B, Izaola O, Conde R, Gutiérrez S, Morillo M, Teba Torres C.

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ABSTRACT

INTRODUCTION:

Inulin is a prebiotic with potential benefit in cardiovascular risk factors. The aim of our work is to evaluate in obese patients the effect of a inulin enriched cookie on cardiovascular risk factors.

MATERIAL AND METHODS:

34 patients were randomized in both branches: group I (inulin enriched cookie) Gullon SL(R) and group II (control cookie). Previous and after 1 month of the treatment, a nutritional and biochemical study was realized.

RESULTS:

15 patients finished the protocol in each group. In group I, an increase in soluble fiber intake (inulin) was detected. In this group a significant decrease of total cholesterol (223.1 +/- 45.3 mg/dl vs 208.8 +/- 33.1 mg/dl; $p < 0.05$) and LDL cholesterol (142.9 +/- 39.2 mg/dl vs 131.4 +/- 28.6 mg/dl; $p < 0.05$) was reached. A non significant improvement in insulin levels and HOMA was detected in inulin-enriched cookie group, too. Anthropometric parameters did not change in both groups. The increase in soluble fiber intake did not produce any gastrointestinal adverse effect.

CONCLUSION:

The increase of fiber intake (3 g of inulin) from an enriched cookie reduced LDL cholesterol levels in obese patients.

<http://www.ncbi.nlm.nih.gov/pubmed/20204256>

5. DATA SUMMARY – CLINICAL LITERATURE

Based on the clinical literature and research presented, prebiotin, oligofructose-enriched inulin has been shown to have a role in heart health through nourishing beneficial bacteria throughout the colon. Based on studies and literature, prebiotic properties have been shown to have been shown to reduce cholesterol and triglyceride levels.

6. ATTACHMENTS

6.1 Clinical Literature referenced is maintained in the Structure/Function Technical File for Healthy Levels of Cholesterol and Triglyceride Levels.

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APPROVALS:

CEO: _____ Date _____

COO: _____ Date _____

QUALITY/REGULATORY: _____ Date _____