

Chapter 6

Nutraceutical Intervention of Phytosterols in Cardiovascular Aging

Charu Gupta

Amity University, India

Dhan Prakash

Amity University, India

Sneh Gupta

RGPG College, India

ABSTRACT

Phytosterols and phytostanols are a large group of compounds that are found exclusively in plants. They are structurally and functionally related to cholesterol but differ from cholesterol in the structure of the side chain. Phytosterols lower total and low-density lipoprotein (LDL) blood cholesterol by preventing cholesterol absorption from the intestine, so they have been known as blood cholesterol-lowering agents. Phytosterols are naturally found in fruits, vegetables, nuts, and mainly oils. Dietary phytosterol intakes normally range from 160-400 mg/day with variations depending on food culture and major food sources. Dairy foods remain a food of choice for use as delivery vehicle for many functional ingredients including phytosterols and there are many dairy products available in the global markets which are enriched with phytosterols. The use of phytosterols in commonly consumed dairy products may soon provide an effective tool against CVD and its introduction to our food products is worth anticipating in the near future as nutraceuticals for healthy ageing.

DOI: 10.4018/978-1-5225-3267-5.ch006

INTRODUCTION

Cardiovascular diseases were collectively the number one cause of death in the United States in 2007, accounting for one third of deaths (Xu, Kochanek, Murphy, & Tejada-Vera, 2010). Most of these deaths were attributable to ischemic heart diseases, in which a portion of the muscle in the heart does not receive adequate blood flow. A major cause of ischemia is atherosclerosis, which is characterized by inflammation and lipid accumulation in the lumen of arteries, which decreases blood flow by narrowing the artery and can eventually lead to thrombosis, thereby completely blocking the artery with a blood clot. The Framingham Heart Study is often credited with being the first to systematically investigate the links between blood cholesterol concentrations as a risk factor for cardiovascular diseases, and particularly the effects of low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), and total cholesterol (Castelli, 1988). The Framingham Heart Study, a long-term observational study, is now observing the third generation of participants from residents in Framingham, MA. The data from this study have allowed a number of prediction models of cardiovascular disease risk associated with a variety of risk factors, and has worked to separate environmental, genetic, and other effects through epidemiological modeling. In one such model, cholesterol concentrations were determined to be such a significant risk factor for coronary heart disease that all other risk factors, such as diabetes, smoking, and blood pressure, were converted into either cholesterol or LDL-C risk points, which were then compared to categories on a risk chart (Wilson, D'Agostino, Levy, Belanger, Silbershatz, & Kannel, 1998). Clearly, LDL-C concentrations are an important risk factor for heart disease.

Cholesterol in the body mainly comes from two sources- endogenous synthesis and dietary consumption. Dietary cholesterol contributes a relatively minor proportion of the cholesterol in the system, with an average of only 276 mg of cholesterol consumed per day (Agricultural Research Service USDA, 2010). In addition, dietary cholesterol minimally affects blood cholesterol, with estimates of only a 0.022-0.027 mg/dL difference in blood cholesterol for every 1 mg of dietary cholesterol consumed (McNamara, 2000). To put this into perspective, an individual with high cholesterol (>240 mg/dL) would need to consume an additional 100 mg of cholesterol per 6 day to increase their blood cholesterol by about 1%. Although dietary cholesterol alone seems to have little effect on blood cholesterol, dietary cholesterol is not the only source of cholesterol in the intestinal lumen. The gall-bladder secretes approximately 1000 mg of cholesterol per day into the small intestine. Of the total cholesterol in the intestinal lumen, approximately 50% is absorbed, making inhibition of intestinal cholesterol absorption, not just decreasing dietary cholesterol, an important target for lowering blood cholesterol concentrations (McNamara, 2000).

23 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/nutraceutical-intervention-of-phytosterols-in-cardiovascular-aging/207973

Related Content

Autism Spectrum Disorder, Fear Response, and Environmental Exposures

Theoharis C. Theoharides, Jaanvi Santand Maria-Eleni Giota (2019). *Environmental Exposures and Human Health Challenges* (pp. 30-51).

www.irma-international.org/chapter/autism-spectrum-disorder-fear-response-and-environmental-exposures/225866

TiO₂ Nanotubes Transformation Into 4nm Anatase Nanoparticles: Anodizing Industrial Recycled Titanium for Photocatalytic Water Remediation

Celeste Yunueth Torres López, Jose de Jesus Perez Bueno, Ildefonso Zamudio Torres, Maria Luisa Mendoza López, Abel Hurtado Maciasand José Eleazar Urbina Álvarez (2019). *International Journal of Applied Nanotechnology Research* (pp. 26-44).

www.irma-international.org/article/tio2-nanotubes-transformation-into-4nm-anatase-nanoparticles/258909

Technology Impact on New Adult Behavior about Health Information

Lesley Farmer (2014). *Handbook of Research on Adult and Community Health Education: Tools, Trends, and Methodologies* (pp. 68-81).

www.irma-international.org/chapter/technology-impact-on-new-adult-behavior-about-health-information/113614

Market-Based Governance in Public Healthcare Delivery

(2020). *The NHS and Contemporary Health Challenges From a Multilevel Perspective* (pp. 1-35).

www.irma-international.org/chapter/market-based-governance-in-public-healthcare-delivery/258433

African Burial Practices as Havens That Promote the Spread of Cholera in Zimbabwe

Simbarashe Munamatiand Menard Musendekwa (2022). *International Journal of Applied Research on Public Health Management* (pp. 1-10).

www.irma-international.org/article/african-burial-practices-as-havens-that-promote-the-spread-of-cholera-in-zimbabwe/282743