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Metabolic implications of trans-fatty acids from ruminant and industrial source on Coronary Heart Disease (CHD) risk: Experimental and observational evidence

High intake of trans-fatty acids (TFA) has been related with several adverse metabolic effects. Clinical and epidemiological findings have supported that high intake of Industrial TFA (I-TFA) has a negative impact on the plasma lipid profile and other cardiovascular disease (CVD) risk markers. Human and animal studies have shown that dietary TFA are highly incorporated in liver, adipose tissue, platelets, aorta and nearly all tissues. Most likely, through this incorporation, I-TFA lead to numerous alterations such as inhibition of n-3 and n-6 PUFA biosynthesis, changes in eicosanoids production and modifications of composition and biological properties of membranes. Additionally, I-TFA raise plasma LDL-Cholesterol, Lp(a) and triacylglycerol levels, lower HDL-Cholesterol concentrations and increase systemic markers of inflammation and endothelial dysfunction. Studies with Ruminant TFA (R-TFA) are scarce and have yielded conflicting results, however most epidemiological studies demonstrated no positive correlation between R-TFA and CVD. In a controlled nutritional study a very high intake of R-TFA showed a negative impact on serum lipoproteins but this effect was not observed at achievable intakes of these natural isomers. Results from our laboratory and others clearly showed that trans-vaccenic acid (TVA, the main R-TFA) has a higher metabolism rate compared to elaidic acid and, in addition, it is converted to Rumenic Acid (RA: c9,t11-Conjugated Linoleic Acid). Since RA might improve the lipid and glucose metabolism and reduce the inflammatory response, it is recognized as a functional FA. In conclusion, I-TFA clearly have a negative impact on CVD, whereas achievable consumption of R-TFA has not. However, the specific impact of R-TFA requires further investigation to establish the effects on CHD risk and potential health benefits.

Biography

Claudio Adrian Bernal has completed his PhD from University of Litoral, Argentina and his Postdoctoral studies from University of Pittsburgh, USA. He is currently the Head of Food Science and Nutrition at the University of Litoral. He has published more than 40 manuscripts, directed national and international research projects and received several Scientific Awards in the field of nutrition. He was the President of Argentine Chapter of the Latino American Society of Nutrition. His research focuses on the impact of dietary fats and functional compounds on experimental animals. In addition, he is working in food analysis, infant formulas and functional foods.

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