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Protection of polyphenol-rich potato extracts and polyphenol metabolites against pulmonary inflammation caused by ozone exposure

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Ozone exposure linked with air pollution represents a significant contributor to cardiopulmonary morbidity and mortality which is closely related to pro-inflammatory events. As dietary polyphenols are associated with anti-inflammatory effects, we tested the efficacy of a polyphenol rich potato extract (PRPE) supplement to affect lung inflammation in ozone-exposed male and female C57BL/6 mice. Male and female mice were fed ad libitum either a 100% PRPE [chlorogenic acid (200 mg/kg diet) and ferulic acid (6 mg/kg diet)] or 20% PRPE [chlorogenic acid (40 mg/kg diet) and ferulic acid (1.2 mg/kg diet)]. After 4 weeks of dietary adaptation, animals were exposed to 0.8 ppm ozone or air in a stainless steel chamber for 4 hour and euthanized 24 hours post exposure. Dietary supplementation with PRPE protected against ozone-induced pulmonary inflammation/injury in both sexes as demonstrated by decreased protein concentration (100% and 20% PRPE) and lowered alveolar macrophage cell and neutrophil cell counts (100% PRPE) in bronchoalveolar lavage fluid. To identify for possible bioactive components, colonic digesta obtained from digestion of PRPE in a human simulated gastrointestinal model underwent metabolism via CaCo-2/HepG2 co-culture which mimics human intestinal and hepatic first pass metabolism. 3-Phenylpropionic acid (PPA) which is a microbial-generated metabolite of chlorogenic acid was detectable by electrospray time-of-flight mass spectrometry after CaCo-2/HepG2 co-culture of PRPE digesta. At physiological concentrations PPA showed protective anti-inflammatory action against H₂O₂-induced inflammation in human Calu-3 respiratory epithelial cells. Overall, these studies indicate PRPE exerts anti-inflammatory pulmonary protection against ozone exposure which may be partly mediated by PPA.

Biography

Stan Kubow is an Associate Professor at Dietetics and Human Nutrition at McGill University. He has over 95 peer-reviewed research publications in clinical and human population studies, animal models and cell culture examining the impact of foods, nutrients and phytochemicals on a variety of disease outcomes. He is on the Editorial Board of Nutrition and Medicine, *Journal of Nutrition and Metabolism*, *Journal of Lipids* and 10 PhD and 29 MSc students have graduated under his supervision. His current research activity is to study the impact of nutritional interventions against the metabolic syndrome, gut and lung inflammatory diseases and environmental toxicants.

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