

The in vitro effects of artificial and natural sweeteners on the immune system using whole blood culture assays

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Abstract

This article investigates the effects of commercially available artificial (aspartame, saccharin, sucralose) and natural sweeteners (brown sugar, white sugar, molasses) on the immune system. Human whole blood cultures were incubated with various sweeteners and stimulated in vitro with either phytohemagglutinin or endotoxin. Harvested supernatants were screened for cytotoxicity and cytokine release. Results showed that none of the artificial or natural sweeteners proved to be cytotoxic, indicating that no cell death was induced in vitro. The natural sweetener, sugar cane molasses (10 ug=mL), enhanced levels of the inflammatory biomarker IL-6 while all artificial sweeteners (10 ug=mL) revealed a suppressive effect on IL-6 secretion ($P < 0.001$). Exposure of blood cells to sucralose-containing sweeteners under stimulatory conditions reduced levels of the biomarker of humoral immunity, Interleukin-10 ($P < 0.001$). The cumulative suppression of Interleukin-6 and Interleukin-10 levels induced by sucralose may contribute to the inability in mounting an effective humoral response when posed with an exogenous threat.

Introduction

The desire for sweet tasting food is inherent and characteristic of the human population. Prehistoric man satisfied his need for sweet taste through the intake of certain fruits and vegetables. Years later, through the advancement in food technology, refined sugar was made accessible to people at low cost. This sparked an increase in the use of sugar worldwide.^[1]

Today, there is an extensive choice of sweeteners available to the consumer. These sweeteners can be categorised into either nutritive (natural sweeteners) or non-nutritive sweeteners (artificially manufactured sweeteners). Sugar cane molasses is an example of a popular, natural sweetener rich in sucrose and is the by-product of the sugar refinement process.^[2] Dating back to the 19th century, molasses has been used widely in livestock and poultry feeds.^[3] Today, molasses is increasingly being used as a flavor enhancer, has been substituted as a sweetener, and used as a preservative in jams and jellies.^[4] Anecdotal reports also suggest that molasses may be used as a supplement in the human diet to improve conditions such as anaemia, colds, coughs, earaches,

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