Dietary Cocoa Modulates Eicosanoid Metabolism in Adipose Tissue of Obese Mice

Abstract

Obesity is associated with many metabolic diseases and inflammation represents the important link between obesity and its co-morbidities. The metabolism of eicosanoids, a class of bioactive lipid mediators, has emerged as one of the factors that triggers the inflammation in obese adipose tissue (AT). Cocoa (*Theobroma cacao*) is a rich source of polyphenols and has received considerable attention due to its antioxidant and anti-inflammatory activities. Previous studies from our lab have shown that cocoa extract is a potent inhibitor of eicosanoid-generating enzymes *in vitro*, and can suppress the production of inflammatory eicosanoid metabolites by stimulated macrophages. However, there is little research has been done to support the role of cocoa in modulating eicosanoid metabolism in obese subjects. Preliminary data from our mouse feeding study have shown that dietary cocoa supplementation can decrease pro-inflammatory gene expression in AT of high-fat-diet fed obese mice. In the proposed study, we will extend our previous enzyme and cell culture studies to an *in vivo* model, and investigate the effect of cocoa supplementation on eicosanoid metabolism in the AT of obese mice using immunoassay and chromatographic approaches. The proposed study will provide mechanistic insights into the effects of cocoa on obesity-related inflammation and is significant in public health, pharmacology and food industry.

Abbreviations used:
AA, arachidonic acid; AdPLA, adipose-specific phospholipase A_2; AT, adipose tissue; COX, cyclooxygenase; FAME, fatty acid methyl ester; GC, Gas Chromatography; HFD, high-fat diet; LOX, lipoxygenase; LPS, lipopolysaccharide; LT, leukotriene; NAFLD, nonalcoholic fatty liver disease; PG, prostaglandin; PLA_2, phospholipase A_2; PUFA, polyunsaturated fatty acid; RP-HPLC, Reverse Phase-High Performance Liquid Chromatography.