Impact of Coffee Containing Medium-Chain Triglyceride Oil and Ghee on Markers of Cellular Inflammation in Young Healthy Humans

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Objectives: Low-carbohydrate, high-fat "ketogenic" food supplements have become increasingly popular in recent years with claims of improving body composition and cognition, while reducing hunger. However, acute consumption of high-fat foods has been shown to promote dietary endotoxemia; the release of bacterial lipopolysaccharide from the gut into the blood, which is linked to proinflammatory responses through activating toll like receptor (TLR) 4 on circulating monocytes. Bulletproof Coffee is a popular high-fat beverage consisting of coffee, medium chain triglyceride (MCT) oil, and grass-fed ghee. The purpose of this study is to determine whether consuming this high-fat coffee beverage would impact cellular inflammation assessed by increases in the number of circulating monocytes and monocyte surface TLR4 expression. We hypothesize that consuming one high-fat "Bulletproof Coffee" will elevate concentrations of circulating monocytes and increase TLR4 expression when compared to a black coffee comparator drink.

Methods: This study is a single-blind (researcher), randomized crossover design wherein participants consume either a freshly prepared coffee (1 pod with 12oz water; ∼1 kcal), or high-fat bulletproof coffee (1 pod with 12 oz water containing 1 tbsp MCT oil and 1 tbsp ghee; 27 g fat; ∼250 kcal) separated by ∼7 days. Participants provided blood samples in the fasted state and at 60- and 180-minutes following beverage consumption. Blood samples were analyzed by flow cytometry.

Results: Six healthy adults ($n = 5$ females) aged 25 ± 8 years who consume coffee regularly have completed both conditions. Preliminary statistical analysis using a linear mixed model has shown no significant time x condition interaction ($P = 0.184$) or main effect of time ($P = 0.211$) for the concentration of circulating monocytes. Similarly, no interaction ($P = 0.675$) or main effects of time ($P = 0.337$) were observed for monocyte surface TLR4 expression.

Conclusions: Preliminary data suggests that consuming a single high-fat bulletproof coffee does not appear to increase circulating monocyte concentrations or monocyte TLR4 expression. Further research will be required to determine whether acute consumption of a high-fat coffee beverage impacts inflammation in humans.

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