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The Impact of Processing Methods on the Chemical Composition and Biological Activity of Foods

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Introduction

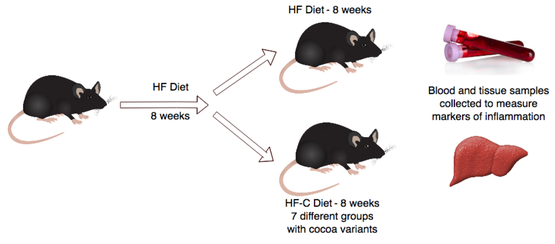
One potential mechanism to reduce the impact of chronic disease is the use of dietary phytochemicals. Specifically, polyphenols have been demonstrated to have several health benefits including anti-carcinogenic and anti-inflammatory effects. Epidemiological, in vitro, and in vivo studies have all suggested that foods with high polyphenol content have health benefits. Cocoa powder (*Theobroma cocao*) and coffee (*Coffea)* are rich in polyphenols and both undergo similar processing methods to produce a product that appeals to the consumer. The impact that these processing methods has on the total content and biological activity of polyphenols in the final product needs to be considered.

The processing of the cocoa beans prior to use in food potentially involves numerous steps including fermentation, roasting and alkalinization. These processing steps can affect both the total polyphenol content and the composition of the polyphenols in the final product. Previous in vitro studies have compared the effect of roasting and alkalinization of cocoa powder on the biological activity of the cocoa powder produced. The current study further pursues the impact of different methods of processing on the ability of cocoa to mediate inflammation.

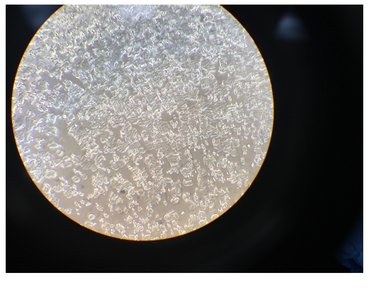
Methods

Cocoa: Cocoa beans were previously processed using seven different combinations of fermentation and roasting temperatures. These cocoa powders will be evaluated in both in vivo and in vitro studies to determine the effects of different processing methods on the anti-inflammatory action of the cocoa powder.

Mice fed a high fat (HF) diet (60% kcal from fat) for 8 weeks will be randomized into groups to either continue the HF diet or be placed on a HF diet supplemented with 8% cocoa powder (HF-C) for the remaining 8 weeks. Blood and tissue samples will be collected to evaluate the impact of the specific cocoa powder on inflammation.

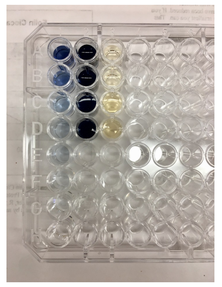


Black 6 mice used in the randomized control study



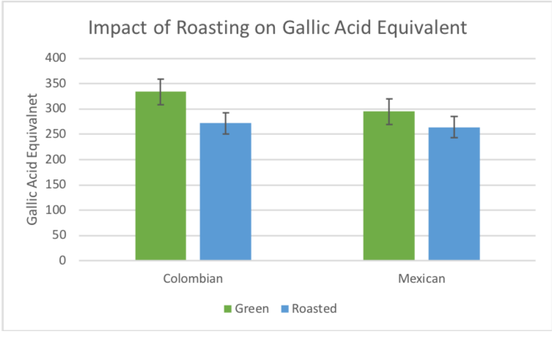
HT29 colon cancer cell cultures will be used to measure the impact of cocoa extracts on the production of inflammatory markers and enzyme activity.

Coffee: Coffee beans are processed in a similar manner as cocoa. To evaluate the effect that roasting has on the health benefits of coffee, two varieties of beans were obtained from a local roaster The roaster provided both unroasted and roasted Colombian and Mexican coffee beans.



Folin- Ciocalteu asssays were used to compare the gallic acid equivalent of the roasted and unroasted beans. The GAE approximates the total phenolic content of the extract.

Results



Statisitcal analysis shows no significant difference in the total phenolic content after roasting ($p=0.139$ for the Colombian beans and $p=0.125$ for the Mexican beans). Roasting beans improves flavor with no cost to health benefits.

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