

LAY ABSTRACT

Colon cancer is the second leading cause of cancer death in the United States. The American Cancer Society estimated that 112,340 new cases would occur and more than 52,000 individuals would eventually die of the disease in 2007. It is a disease strongly influenced by environmental factors including smoking, diet, infection, exercise, pollution, etc. Among the environmental factors, dietary factors play the most important role in colon cancer development. Cocoa and chocolate products have been used for the purposes of medicinal remedies, symbols of luxury and as palatable sweets for hundreds of years. Cocoa and some chocolate products have among the highest antioxidant concentrations in relation to other antioxidant food sources (i.e. fruits, vegetables, tea and red wine). An increasing body of epidemiologic evidence supports the concept that diets rich in antioxidants promote health and attenuate or delay the onset of various diseases, including cancer and cardiovascular disease. We have previously shown that chocolates improve risk factors for coronary heart disease by decreasing blood lipid and cholesterol. However, we do not know if the beneficial effect of chocolates can be extended to decreased risk of colon cancer development. There is very little study of potential anti-cancer capacity of chocolate on colon cancer. Furthermore the potential mechanism is not clear. Therefore, the primary goal of this study is to examine if chocolate protects against colon cancer development by reduction of precancerous lesions called aberrant crypt foci and to determine the underlying mechanism(s) involved. Chocolate is very sensitive to temperature and humidity. Chocolate blooming (surface decolorization with white staining) occurs during melting due to exposure to high temperatures (i.e. hot weather or cooking) and subsequent cooling. Although chocolate that has undergone this phenomenon is known to be safe for human consumption, it is not known if the biological function of chocolate, particularly related to its antioxidant capacity, remains unchanged. Therefore, the second goal is to determine if heat manipulation attenuates the antioxidant capacity of chocolate and its effects on colon carcinogenesis. To achieve the research goals, an animal model for colon cancer will be fed in a 3 diets (no chocolate, regular chocolate or heated chocolate) with saline or carcinogen administration. The antioxidant capacities of regular and heat-manipulated chocolates will be measured and trained human panelists will also evaluate if heat-manipulated chocolate changes flavor, texture, taste and overall preference. Americans eat about 12 pounds of chocolate per year, and cocoa and chocolate products are considered the most favorably rated sweet worldwide. Therefore, the results of the proposed study should impact a large percentage of the population which has important public health implications. This study will allow researchers the ability to understand the beneficial roles of chocolate in colon cancer development and its use as a potential novel therapeutic nutritional approach for colon cancer prevention. This study may also provide some suggestions to the public for optimal proper storage of chocolate with relation to prevention of colon cancer.