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Dietary fiber pectin from papaya fruit (Carica papaya) modulates gut microbiota in a mouse model of colon carcinogenesis

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Abstract

Introduction: Growing evidence suggests that the gut microbiota, mainly modulated by diet, is involved in CRC development. Pectins, a class of highly fermentable dietary fibers, can modulate the gut microbiota which depends upon the ripening stages of the fruit.
Objective: This work aimed to investigate the differential effects of ripe and unripe papaya pectins on gut microbiota composition in a mouse model of colon carcinogenesis.
Methods: Male Wistar rats were divided into 4 groups fed ripe and unripe papaya pectins and subjected to AOM injections. Animals were euthanized after 10 weeks. Aberrant crypt focus (ACF) and SCFA production were analyzed in the colon. Metagenomic sequencing was done using Nanopore sequencing technology. The AOM model is known to increase the infiltration of neutrophils and M2 macrophages in the tumor microenvironment, as well as decrease the cytotoxicity of CD8+T cells and increase the Tregs in the tumor microenvironment, contributing to tumor growth.
Results: Ripe papaya pectin intake reduced the number of ACF with 1 and 2 crypts. Acetate production was higher in animals fed ripe and unripe papaya pectin. Ripe papaya pectin increased richness in microbiota alpha diversity. The ripe papaya pectin group and the negative control group shared a similar bacterial profile. The intake of ripe papaya pectin increased the abundance of *Lactobacillus* and *Limosilactobacillus* while the intake of ripe papaya pectins increased the abundance of *Rombutsia*. The AOM experimental group had an increase in the abundance of *Mediterraneibacter*. The lactobacillus especially is known to interat
Conclusion: These results suggest that the intake of ripe papaya pectin had a potential preventive effect on colon carcinogenesis development by decreasing the number of ACF, increasing SCFA production, and increasing the abundance of *Lactobacillus*, a well-known probiotic strain that promotes health benefits to the host. This could be beneficial in future preventive measures to reduce CRC development using a natural component of the diet rich in dietary fiber.
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CRC: colorectal cancer, AOM: azoxymethane, SCFA: short chain fatty acids, ACF: aberrant crypt focus.