The Effect of Diet on Lifespan, Tumor Burden and Wnt Signaling Activation in a Drosophila Apc1/Apc2-RasV12 Model of Colorectal Cancer

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Early-onset colorectal cancer (EOCRC) in patients under 50 now accounts for 10% of new diagnoses. While unexplained, trends in EOCRC may be related to diet, which is associated with 29% of all colorectal cancer cases and can affect cancer signaling pathways, including Wnt/Wingless signaling. This study compares the impact of high-fat and high-fiber diets on lifespan, tumor burden, and Wnt signaling in a transgenic Apc1/Apc2-RasV12 Drosophila melanogaster model of colorectal cancer. It was anticipated that flies on high-fat diets would have shorter lifespans, more tumors, and increased Wnt signaling, while flies on high-fiber diets would have the opposite results. Tumor-bearing flies were placed onto Formula 4-24 standard medium supplemented with 10% coconut oil or 10% psyllium husk. Tumor burden was measured by fluorescence microscopy of GFP-labeled tumor clone cells in dissected midguts. Wnt signaling activity was assessed by immunostaining for Armadillo (Arm), a cofactor for Wnt target gene transcription. Data suggests that both high-fat and high-fiber diets were associated with a lower survival probability over time, compared to the control ($p < 0.05$). High-fat samples appeared to have more tumors than the control, while high-fiber appeared to have less. Some colocalization between Arm immunostaining and GFP expression was observed. These results support a role for diet in rising EOCRC rates, and provide evidence to support dietary intervention in CRC patients.

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