6-Gingerol, but Not Whole Ginger Juice, Specifically Inhibits Growth of Colon Cancer Cells in Culture

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Objectives: Colon cancer is affluent among many people, and having cancer greatly impacts their lives. Ginger is a common food, particularly in Asian cuisine. However, the health benefits of ginger and 6-gingerol, as its bioactive component in the prevention of colon cancer, have not been fully addressed. This experiment investigated the effects of ginger juice and 6-gingerol on colon cancer cell growth and death.

Methods: Colon cancer SW480 cells and CCD-18Co normal colon epithelial cells were purchased from ATCC.SW480 cells were grown in DMEM with 4.5 g/L glucose supplemented with 10% fetal bovine serum (FBS), penicillin, and streptomycin, and normal colon CCD-18Co cells were maintained in EMEM with 4.5 g/L glucose and glutamine with 10% FBS. 6-gingerol was dissolved in DMSO in a stock of 100 mmol/L. Ginger roots were homogenized and the juice was collected through 3 layers of cheesecloth filtering, followed by centrifugation and 0.2 μm filter sterilization. About 5000 cells were seeded in a 24-well plate and treated with various amounts of ginger juice and/or 6-gingerol for up to 72 hours. Cell growth was examined using Trypan blue stain, and cell cycle arrest was determined by immunoblotting using antibodies against key proteins in cell cycles. Data were analyzed by two-way ANOVA with a Tukey posthoc test and statistical significance was set at $P < 0.05$.

Results: Time course and dosage curve experiments showed that 6-gingerol significantly inhibited SW480 cell numbers starting at 0.5 μM ($P < 0.005$). More than 1 μM 6-gingerol did not give more power to inhibit SW480 cell growth. The results also showed that CCD-18Co cell numbers were not changed after 6-gingerol treatments ($P > 0.1$). Low dosages of ginger juice (2,000 x- to 100 x- fold dilutions) didn't affect the growth of both cell types. Immunoblotting results revealed that the elevation of pSer10-CDC2 levels and decreases in p21 Wafl/Cip1 and pSer642-Wee1 only occurred in SW480 but not CCD-18Co cells when treated with 1 μM 6-gingerol for 40 hrs.

Conclusions: Through this experiment, it can be concluded that 6-gingerol can kill SW480 cancer cells without killing normal CCD-18Co cells through cell cycle arrest. Further experiments could be run to discover more properties of 6-gingerol, how it works, and how it could be used in the medical world.

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