

# Antioxidant Levels and Inhibition of Cancer Cell Proliferation in Vitro by Extracts from Organically and Conventionally Cultivated Strawberries

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## Abstract

The effects of extracts from five cultivars of strawberries on the proliferation of colon cancer cells HT29 and breast cancer cells MCF-7 were investigated, and possible correlations with the levels of several antioxidants were analyzed. In addition, the effects of organic cultivation compared to conventional cultivation on the content of antioxidants in the strawberries and strawberry extracts on the cancer cell proliferation were investigated. The ratio of ascorbate to dehydroascorbate was significantly higher in the organically cultivated strawberries. The strawberry extracts decreased the proliferation of both HT29 cells and MCF-7 cells in a dose-dependent way. The inhibitory effect for the highest concentration of the extracts was in the range of 41–63% (average 53%) inhibition compared to controls for the HT29 cells and 26–56% (average 43%) for MCF-7 cells. The extracts from organically grown strawberries had a higher antiproliferative activity for both cell types at the highest concentration than the conventionally grown, and this might indicate a higher content of secondary metabolites with anticarcinogenic properties in the organically grown strawberries. For HT29 cells, there was a negative correlation at the highest extract concentration between the content of ascorbate or vitamin C and cancer cell proliferation, whereas for MCF-7 cells, a high ratio of ascorbate to dehydroascorbate correlated with a higher inhibition of cell proliferation at the second highest concentration. The significance of the effect of ascorbate on cancer cell proliferation might lie in a synergistic action with other compounds.

**Keywords:** Ascorbate; dehydroascorbate; phenolics; hydroxycinnamic acids; ellagic acid; flavonol; anthocyanin; cancer cell proliferation; correlation