Division or Inhibition? The Effect of Antioxidants on Cell Division and Differentiation

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Antioxidants are known to play an important role in the protection of cells. Laboratory experiments using C-Fern spore cells were conducted to investigate the effect of antioxidants on spore germination, differentiation, and morphogenesis. Garlic and turmeric were used as sources of antioxidants. Varying concentrations of garlic solutions were added to beakers containing growth medium and plated in petri dishes. These dishes were then inoculated with spores, kept in a culture dome, and observed for the next 4 weeks. This process was repeated for turmeric as well. After germination initiated, observations were made using a stereomicroscope for the development of gametophytes. Garlic and turmeric solutions clearly stimulated spore germination and differentiation in both the control group and the lowest concentration studied, .25 mL. In these dishes, relatively large percentages of spores developed into heart-shaped gametophytes. In 0.50 mL – 1.25 mL garlic solutions, the spore population showed an inhibition of germination with no gametophytes observed. At 2.00 mL concentration in garlic, 48% of very well differentiated gametophytes appeared. The turmeric solution replicated the results as the garlic except at 2.00 mL. Turmeric growth dishes showed propensity of apoptosis in concentrations of 0.50 mL to 1.00 mL which was absent in garlic. This experiment proves that there are both stimulatory and inhibitory effects on cell division at various threshold concentrations. C-Fern spore cell results from this experiment are in agreement with the research performed on the effect of higher doses of antioxidants on tumor cells in animals.

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