INTRODUCTION

The investigations of vitamin E and cancer have been stimulated by an unreproducible finding of Rowntree et al. (1) that crude wheat germ oil induced sarcomas in rats. Wheat germ oil is naturally enriched with vitamin E. To date, more than 20 reports have appeared in the literature demonstrating that animals fed with vitamin E, mostly in ester form, have a reduced incidence or a delayed appearance of tumor after the administration of a carcinogen or UV radiation. There are also a few reports against the efficacy of vitamin E as a cancer preventive agent (2-4).

Along with the animal experimentations, the effect of α-tocopherol or α-tocopheryl quinone in the differentiation and growth of tumor cell or cell lines in culture has been investigated (5-7). For instance, Takenaga et al. (5) observed that α-tocopherol inhibited the differentiation of mouse myeloid leukemia cells. Prasad and Prasad (6) reported that α-tocopheryl succinate induced growth inhibition of melanoma cells in culture. Furthermore, the efficacy of dietary vitamin E on the reduction of human fecal mutagenicity has also been suggested (8,9).
Vitamin E or \( \alpha \)-tocopherol has three major biochemical functions relevant to this discussion. The mechanism and action of the vitamin have been extensively reviewed in recent years (10-12).

1. \( \alpha \)-Tocopherol is a physiologic antioxidant that not only protects the cellular membrane from oxidation, it also maintains some cellular enzyme and protein in a reduced active state. These include cytochrome-P-450 and phosphoenolpyruvate carboxykinase (13). \( \alpha \)-Tocopherol appears to have a specific effect on the architecture of the membrane phospholipids by maintaining the profiles of membrane unsaturated fatty acid components (14). It also can directly interact with nitrosating agents and neutralize its toxicity.

Recently, Burton et al. (15) reported that \( \alpha \)-tocopherol is the major, and probably the only, lipid soluble, chain-breaking antioxidant in human plasma as well as erythrocyte ghost membrane. They also theorized that \( \alpha \)-tocopherol functions as a far more efficient inhibitor of lipid peroxidation \textit{in vivo} than \textit{in vitro} because of a stereo electronic mechanism (16).

2. \( \alpha \)-Tocopherol maintains the integrity of the macromolecular structure of the cell and can effectively reduce the binding of a number of carcinogens to cellular DNA (17-19).

3. \( \alpha \)-Tocopherol may act as a regulator of gene activity. There is sufficient evidence to indicate that \( \alpha \)-tocopherol suppresses the cellular biosynthesis of xanthine oxidase and, likely, creatinine kinase (20).

THERAPY-INDUCED CANCER

Antineoplastic agents have been known as carcinogens for a number of years, (21) and second malignancies in cancer patients treated with single-drug or multidrug chemotherapeutic agents have also been documented (22,23). The multimodal therapy mainly due