Medical Hypotheses (1996) **46**, 503–504

The Paradoxical Role of Lipid Peroxidation on Carcinogenesis and Tumor Growth: A Commentary

M. J. GONZÁLEZ* and N. H. RIORDAN†

**University of Puerto Rico, Medical Sciences Campus, School of Public Health, Nutrition Program, San Juan, Puerto Rico; †The Center for the Improvement of Human Functioning International Inc. RECNAC Project, Wichita, Kansas, USA*

Abstract — Lipid peroxidation has been shown to both enhance carcinogenesis and to have an anticarcinogenic effect. This paradox is of great relevance to the fields of free radical biology, biochemistry, pathology, nutrition and oncology among others and needs to be addressed. A proper understanding of this issue can be a key to more effective treatment of malignant tumors in the near future.

Introduction

Cancer can be considered a multistep, multievent, polygenic process. This complex pathological process is divided into phases, in order to facilitate its study. The induction phase is composed of two major steps, initiation and promotion. At the initiation step, a genetic change occurs that deregulates the normal division pathways of the cell. Most of these transformed cells acquire the capacity to proliferate without control – in this way, cells are 'initiated' into malignancy. This occurs after a mutation, amplification or translocation of a cellular oncogene and/or loss of a repressor gene, also initiation appears to be irreversible. Chemical or physical initiators (carcinogens) can produce potent free radicals (1). Active oxygen species such as superoxide radicals and hydrogen peroxide have been associated with the induction of cancer (2). It has also been documented that patients with known genetic defects in their deoxyribonucleic acid (DNA) repair system (e.g. Xeroderma pigmentosum, Franconi's syndrome and Bloom's syndrome) are highly predisposed to the development of cancer (3). We should mention that most of the damage in the DNA suffered by these patients is due to free radicals. This can suggest indirect evidence that protection against cancer initiation can be provided by antioxidant supplementation. In addition, more direct evidence of antioxidant inhibition of carcinogenesis is available in studies by Wattenberg (4), Shamberger (5) and Shklar (6).

Discussion

Oxygen radicals and related species may also be involved in the following step of carcinogenesis: promotion. Promotion involves the selection and clonal amplification of initiated cells. This process seems reversible and accounts for a large proportion of the

Date received 24 October 1995
Date accepted 27 November 1995