

Radiation Carcinogenesis: Epidemiology And Biological Significance

genes that are thought to be the sites of oncogenic somatic mutations. Over the past decade, research on the mechanisms of carcinogenesis has focused on such genes, of which two broad classes are now known to exist: (1) protooncogenes and (2) tumor-suppressor genes, or antioncogenes (Kn85).

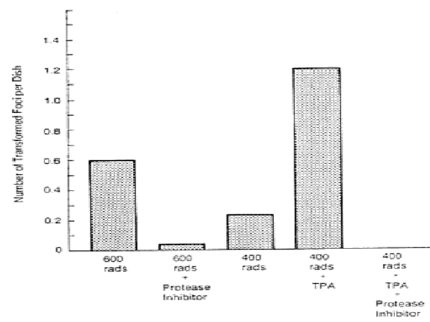


FIGURE 3-6
Suppressive effect of a protease inhibitor (antipain) on radiation transformation in vitro, both with and without promotion by TPA (Ke88).

Protooncogenes

Protooncogenes, which may give rise to oncogenes, seem to be important in the origin of at least some forms of human cancer. The list of such genes has grown apace with new means for identifying them. Alterations of the *ras* protooncogene have now been observed in several different types of radiation-induced tumors, including murine lymphomas (Gu84a, b), plutonium-induced malignancies (Pr86b), and radiation-induced rat skin tumors (Sa87, Ga88, Ga86). Radiation has also been shown to activate other oncogenes presumed to be involved in carcinogenesis, including *c-myc* (Sa87, Ga86, Ga88) and oncogenes that are not members of the *ras*

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