patients' lymphocytes is manifest both during and for some time following the treatment period by a depressed response of the population to mitogenic stimulation and by the appearance of cytogenetic injury in those cells still capable of reaching the first metaphase in culture.

It is hoped that this dual approach to the assessment of damage sustained by circulating small lymphocytes may find application in clinical situations where a balance has to be struck between effective radiation dosage to tumour cells and the maintenance of adequate lymphocyte function.

CHROMOSOME STRUCTURE - NATURE OF SUBUNITS

by

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We have attempted to use chromosome aberrations, both spontaneous and induced, to examine some basic properties of chromosome structure. Specifically we have examined the postulate that a Eucaryotic chromosome is composed of one interrupted DNA molecule. If this were so then in the production of a chromosome aberration one would expect rejoining patterns to reflect the directional difference in polarity of the two strands of the DNA double helix. Our experimental analysis has utilised ring chromosomes. We have produced ring chromosomes in Chinese hamster cultures, synchronised in G_1 at the time of irradiation, and we have irradiated an already existing ring in human peripheral blood cells.

The data from the Chinese hamster experiments show an excess of induced dicentric rings over monocentric rings. However, approximately 1/3rd of the dicentric rings can be shown to be produced by reverse sister union events. The resultant equal frequencies of the two ring types are only in accord with a single DNA molecule per chromosome if a large number of sister chromatid exchanges occurs during or after DNA replication. The data are also compatible with two other models of chromosome structure - (i) that there are two subunits lacking polarity and (ii) that the chromosome consists of a tandem array of DNA molecules connected such that there are multiple reverses of polarity.

Our experiments with the human stable ring should enable us to discriminate between these alternatives.