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THE EFFECT OF CARCINOGENS AND SMOKE ON HUMAN LYMPHOCYTE CHROMOSOMES

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SUMMARY AND CONCLUSIONS

An unsuccessful attempt has been made to establish a short term in vitro test for carcinogenesis, based on published observations that mutagens can produce measurable chromosome damage in human lymphocytes. Under the conditions of the test, neither known carcinogens nor smoke induced any visible chromosome damage. Work in this area will be discontinued.

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INTRODUCTION

The object of the work described in this report has been to attempt to establish a short-term test for carcinogenesis.

The fundamental change in cells which results in carcinogenesis is believed by some (1) to be a mutation. A mutation is a sudden change in chromosomal material, such that the effect of the material on the physiology of the cell is altered. Thus it follows that any effect of smoke on chromosomes would be of considerable interest.

A quantitative assessment of chromosome damage caused by a mutagenic agent (sucrose irradiated with a Cobalt 60 source) has been made by Shaw and Hayes (2), using human lymphocytes in vitro. These authors recorded the number of chromosome breaks resulting from treatment over a wide range of concentrations. They also tested the effects of treatment for 24 and 72 hours, and found that the 24 hour treatment was more satisfactory.

Using a 24 hour treatment period, it was decided to find out if any of the following substances would induce similar chromosome damage:

- (i) Benzo[a]pyrene and benzo[e]pyrene, as examples of carcinogenic and non-carcinogenic polycyclic hydrocarbons.
- (ii) β -Propiolactone, which is a carcinogen known to break chromosomes (3).
- (iii) Maleic hydrazide, which is believed to be carcinogenic and which is known to have a strong chromosome breaking effect in plant cells (4).
- (iv) Cytosine arabinoside, which has been reported to damage lymphocyte chromosomes (5).
- (v) Whole cigarette smoke.
- (vi) Neutral fraction from cigarette smoke.

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