PART I: INTERACTION OF RADIATION WITH DRUGS. ABSTRACTS OF SYMPOSIUM PAPERS
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TEMPORAL ASPECTS OF DNA REPAIR PROCESSES AFTER DRUGS AND RADIATION. B. W. Fox, Paterson Laboratories, Christie Hospital and Holt Radium Institute, Manchester.

Before considering the ultimate effect of drug and radiation in combination on biological end points such as cell cycle phase parameter changes, mutation frequency and eventually survival, it is desirable to know what sequence of changes may be expected following the drug or radiation treatment alone. The timing of events within the cell attempting to overcome damage to its DNA will depend on (a) the nature and multiplicity of the lesions produced on the DNA, (b) the genetic competence of the cell to undertake the different types of repair required by such lesions, (c) the conditions under which the cell is growing which may favour or hinder different repair mechanisms and (d) the efficiency of each repair event in restoring the full competence of the original DNA in its transcriptional and replicative roles. Difficulties experienced during these events may determine the subsequent fate of the cell. These difficulties result from a subtle interplay of dose–time relationships of the characteristic biochemical disturbances exerted by each agent. An attempt has been made to understand the interplay of some of these events using alkylating agents such as methyl methane sulphonate and methyl-nitro-nitrosoguanidine and comparing them with both x-rays and ionizing radiation. The present status of such studies designed to rationalize combination treatment could not be considered to do more than influence to a small extent an otherwise empirical approach to combination treatment.

EFFECTS OF DAUNOMYCIN, BLEOMYCIN, CYTOSINE ARABINOSIDE, ACRONYCINE AND IONIZING RADIATION ON THE CELL CYCLE *IN VITRO* AND *IN VIVO*. W. A. Linden, S. B. Reddy and F. Zywietz, Institut für Biophysik und Strahlenbiologie der Universität Hamburg.

Four chemotherapeutic agents without, or in combination with, 200 kV x-rays were examined for their influence on cell cycle progression and viability of mouse L-cells. The action of daunomycin and ionizing radiation was also tested on the Walker carcinoma *in vivo*. The cell kinetics after different treatments were studied using the technique of pulse cytophotometry. By this method, DNA distribution patterns (DNA histograms) of the cells were obtained. The mathematical analysis of the DNA histograms yields the fractions of cells in G_1, S and G_2 or M. Cytosine arabinoside predominantly blocked the cells in S phase while daunomycin, bleomycin and acronycine accumulated the cells in $(G_2 + M)$-phase. These results vary in combination with irradiation.

EFFECTS OF INTERACTIONS OF CELL CYCLE-SPECIFIC CYTOTOXIC DRUGS AND X-RADIATION ON SURVIVAL OF CELL REPRODUCTIVE CAPACITY. R. J. Berry, MRC Radiobiology Unit, Harwell.

Cells of murine leukaemia P-388 *in vivo* and HeLa cells *in vitro* have been used for several years to study interactions between effects of cytotoxic chemotherapeutic agents, including halopyrimidines and folic acid antagonists, and subsequent survival of cell reproductive capacity after x-irradiation. Using these latter classes of drugs as specific examples, combination of information on drug radiation interactions with even our limited knowledge of cell proliferation kinetics in tumours and dose limiting normal tissues allows some predictions to be made about effects of the sequential and concomitant use of cytotoxic drugs with conventional and unorthodox dose fractionation in radiotherapy.

EFFECTIVENESS OF COMBINED TREATMENTS OF VARIOUS TYPES OF TRANSPLANTABLE RAT TUMOUR WITH IONIZING RADIATION AND DRUGS. G. W. Barendsen, A. F. Hermens and H. C. Janse, Radiobiological Institute TNO, Rijswijk.

Many tumours in animals and man contain, in addition to proliferating (P) cells,