The combination of CEA and γGT was particularly advantageous for separating pelvic or local recurrence from hepatic metastases. In the former there was a moderate rise of CEA but little increase of γGT whereas in hepatic metastases the γGT was elevated. These tests, when considered with relevant clinical history, can readily distinguish hepatic metastases from non-malignant disease of the liver. Approximately 10% of outpatients who were symptom free and without apparent recurrence showed a moderate elevation (40-100 units) of γGT without corresponding increase in CEA, when examined 3 months to 13 years after excision of the primary. The significance of this biochemical abnormality is, as yet, unknown.

**A COMPARISON OF PHOSPHATE BONE SCANNING AGENTS IN HUMAN MALIGNANT DISEASE, D. L. Citrin, R. Bessent, J. Tuohy, P. Cumlish, W. R. Greig and L. H. Blumgart, University Department of Medicine and Surgery, Departments of Nuclear Medicine and Radiology, Royal Infirmary, Glasgow, and Department of Clinical Physics and Bio-Engineering, Western Regional Hospital Board, Glasgow.**

Bone scanning is recognized to be more effective than radiology in the demonstration of skeletal metastases. The established bone scanning agents, strontium-87m and fluorine-18, are not entirely satisfactory. Recently, technetium labelled phosphate compounds—polyphosphate, pyrophosphate and ethane hydroxy diphosphonate—have become available for skeletal scanning. We have now performed over 200 consecutive studies in man and no toxic effects have been noted. A study of the relative efficacy of these agents in patients with metastatic disease, and in normal subjects, is described. Adequate visualization of the skeleton has been obtained and comparison of the scans and x-rays suggests that these compounds are of definite value in the investigation of malignant disease of the skeleton.

**THE RELATIONSHIP BETWEEN CELL SURVIVAL, CHROMOSOME ABERRATIONS AND DNA REPAIR IN TUMOUR CELL LINES OF DIFFERENTIAL SENSITIVITY TO X-RAYS AND SULPHUR MUSTARD, D. Scott, M. Fox and B. W. Fox, Paterson Laboratories, Christie Hospital, Manchester.**

Cultured Yoshida lymphosarcoma cells resistant (R) to treatment with sulphur mustard suffered much less chromosome damage than sensitive (S) cells in spite of equal alkylation of DNA, RNA and protein in R and S cells. The R and S cell lines were equally sensitive to x-rays and sustained the same amount of chromosome damage. DNA repair synthesis was equal in R and S cells after sulphur mustard or x-ray treatment.

Much less chromosome damage was found in L5178Y mouse lymphoma cells resistant to x-irradiation than in radiation-sensitive cells but the amount of DNA repair was similar.

Thus, drug and radiation resistance is accompanied by, and perhaps mediated through, a reduced amount of induced chromosome damage but is not quantitatively related to DNA repair capacity.

**MECHANISM OF ACTION STUDIES WITH IRCF 159: EFFECTS ON THE GROWTH AND MORPHOLOGY OF BHK-21S CELLS, T. C. Stephens and A. M. Creighton, Imperial Cancer Research Fund, London.**

The effects of IRCF 159 on macromolecular synthesis in cultured cells led to the suggestion of a possible radiomimetic action (Creighton and Birnie, *Int. J. Cancer, 1970, 5, 47*). We have found a dose-dependent inhibition of the growth (cell numbers) of BHK-21S cells approaching 100% at >100 μmol/l (27 μg/ml). Continuous exposure to a range of doses >5 μmol/l produced a hyperbolic decrease in survival (colony forming assay). Such a response is generally associated with antimetabolites but in this case the hyperbolic curve seems more likely to be caused by a protective effect which is seen with IRCF 159 at high doses (ca. 400 μmol/l).

Time lapse cinemicrography has shown that the increase in cell numbers is inhibited due to an interference with cytokinesis. However, the cells continue to grow and accumulate DNA, RNA and protein and many become multinucleate. Comparative studies indicate that this cell line is particularly sensitive in this respect. Cells with a similar multinucleate morphology were obtained following treatment with x-radiation...
or alkylating agents but not with a variety of other cytotoxic agents.

THE RESPONSE TO CHEMOTHERAPEUTIC AGENTS OF MOUSE TUMOUR CELLS IN THE EXPONENTIAL AND STATIONARY PHASES OF GROWTH, P. R. Twentyman and N. M. Bleehen, Academic Department of Radiotherapy, The Middlesex Hospital, London.

Cells growing in monolayer culture pass from a period of exponential growth into a stationary (or plateau) phase. This phase is characterized by a reduction in the tritiated thymidine labelling index, an increase in the cell cycle time and a large proportion of cells which are "out of cycle" (Hahn and Little, *Curr. Topics Radiat. Res.*, 1972, 8, 39). There is therefore a similarity between stationary phase cultures and solid tumours which also contain "non-cycling" cells.

Dose-response curves are presented for the effect of a number of chemotherapeutic agents on EMT6 mouse tumour cells in exponential and stationary phases of growth. The similarities and differences between our results and those of other workers are discussed.

EVIDENCE OF CLUSTERING IN CASES OF GASTROINTESTINAL TRACT MALIGNANCY, R. Bedwani, C. R. Gillis and J. A. H. Waterhouse, Regional Cancer Registry, Birmingham, and Department of Epidemiology and Preventive Medicine, University of Glasgow.

A recent study in Ayrshire (Gillis, McLean and Bedwani, 1973, in the press) has shown evidence of clustering of cases of gastrointestinal tract cancers compared with certain other sites. The county of Herefordshire in the Birmingham region was selected for a comparative study. The preliminary results of this investigation show, for the same measure of maximal separation within a cluster (200 metres), the degrees of clustering which are similar to those for Ayrshire. They are headed by the gastrointestinal tract sites at 92.2%, bronchus at 82.5%, female breasts at 77.0% to female genitalia at 66.0%. More detailed positional analyses have been made which will be assessed by computer randomization procedures.

*Meeting Announcements*

**BRITISH ASSOCIATION FOR CANCER RESEARCH**

15th Annual General Meeting

The 15th Annual General Meeting will be held in the University of Leeds from 8–10 April, 1974. One day of the meeting will be devoted to a symposium on "Predictive Tests in Cancer Management". The remaining sessions are for the presentation of original research communications on any aspect of clinical or experimental cancer research. Further details are obtainable from the Honorary Secretary, Dr C. R. Ball, Department of Cancer Research, The Medical School, Leeds LS2 9NL.

**2nd NATIONAL CONGRESS OF ONCOLOGY**

VARNA-DRUZHBA, BULGARIA

2 JUNE–5 JUNE 1974

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