Comparison of data on LI_{fo} measured for irradiated and unirradiated tumours indicated that clonogenic Q cells were more abundant among the fraction of clonogenic cells which survived 800 rad of X-rays. These results may also be important in explaining the delay of the rapid repopulation by clonogenic cells observed in R-1 tumours after acute irradiation with 2000 rad of X-rays, namely by assuming that this repopulation results from surviving hypoxic clonogenic Q cells.

Comparison of DNA histograms of cultured cells and corresponding solid tumours and their relation to data from autoradiographic analysis

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In the studies presented, a comparison is made between G_1, S, G_2+M fractions of a R-1 cell population in culture as derived from DNA histograms and from pulse-labelled mitosis curves. The same comparison is made for R-1 cells grown in solid sarcomas, which develop on injection of these cells into rats. In addition to fractions of cells in the various phases of the cell-cycle, fractions of cycling (P) and non-cycling (Q) cells are determined by both methods and compared.

A good correlation cannot always be shown between cell proliferation parameters of the solid tumour as determined by autoradiography and flow cytofluorimetry. Comparison with *in vitro* measurements does not satisfactorily clarify these discrepancies. The use of drugs, e.g. vinblastine, offers perspectives for the analysis of cell proliferation kinetics.

Tumour cell survival *in vivo* and *in vitro*; implications of recovery from potentially lethal damage

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The response of a transplantable mouse tumour to radiation has been measured in terms of the probability of local tumour control and of tumour cell survival *in vitro* after irradiation *in vivo*. The two methods of assay lead to apparently contradictory conclusions as regards the hypoxic proportion of cells in the tumour and the TCD_{50}, the dose of radiation to cure 50 per cent of a population of mice of their tumours. The hypoxic fraction and TCD_{50} measured using tumour control probability as the end-point were approximately 100 per cent and 78 Gy, respectively, whereas the values deduced from the (*in vitro*) cell survival curves were 5 per cent and approximately 50 Gy. The naturally hypoxic cells of this tumour are capable of recovery from potentially lethal damage (p.l.d.). This recovery reaches a maximum by about four hours after irradiation, the effect being to increase the D_0 of the survival curve for the hypoxic cells by a factor of 1·3 to 1·4. This recovery from p.l.d. can, in part, explain the discrepancies in the estimates of the hypoxic fraction and TCD_{50}.

The implications of recovery from p.l.d. on *in situ* assays of tumour cell response to radiation were discussed, with particular reference to measurements of re-oxygenation.

Measurement of cell surviving fraction following chemotherapy of the EMT6 mouse tumour—the problem of 'potentially lethal damage'

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The response of the EMT6 mouse tumour to a range of cytotoxic drugs has been determined using both serial measurements of tumour volume and *in vitro* assay for surviving fraction. For cyclophosphamide and BCNU, the cell survival measured 2 hours