



REPORT ON AN INTERNATIONAL SYMPOSIUM , VIENNA,
22-26 NOVEMBER 1976

The symposium was attended by 150 participants from 31 countries and 3 international organizations. Fifty-five papers were presented in 10 sessions.

Radiobiological Research Needed for the Improvement of Radiotherapy

The use of radiation in therapy of cancer and diagnosis of other diseases has been practised since the discovery of X-ray. Radiotherapy of cancer was founded on the simple observation that radiations can kill tumour cells. As the science of radiobiology developed, some of its concepts were slowly incorporated in the therapeutic use of radiations, and this led to improve patient treatment. However, although radiobiology continued to progress, a communication gap built up between practising clinicians and radiobiologists. The purpose of this symposium was to help bridge the gap and to encourage co-operation between radiotherapists and radiobiologists.

Fractionated dose regimes for external cobalt or X-ray therapy were extensively discussed. Of particular concern was whether acute dose rates which could reduce treatment time per patient would be favourable from the point of view of side effects on normal tissues such as skin, spinal cord, lungs, kidneys and other organs. Also discussed was whether high doses followed by small dose fractionation would lead to a therapeutic gain. New information was presented that during the fractionation period, normal cells may have better recovery potential than the tumour cells, and in view of this new information, the present practice of radiotherapy using fractionated doses may be further improved.

The failures of radiotherapy are mainly due to the radioresistant hypoxic cells which escape radiation damage. These could be destroyed with the use of high LET radiations, superfractionated dose schedules or radiosensitisers specifically active towards hypoxic cells.

Chemical radiosensitisers have now become available and have proved as effective as neutrons in their therapeutic gains. Clinical trials are underway in the UK and Romania on these radiosensitisers. One that deserves special mention is a nitroimidazole derivative, RO-07-0582, which has had extensive *in vitro* and *in vivo* studies, and clinical trials with human patients.

Hyperthermia appears to be a promising way of treating various types of cancer either alone or in combination with radiation. Although the mechanisms of action of hyperthermia on tumour and normal cells is obscure at the moment, it has increased the radiation sensitivity of many types of tumours. Hyperthermia also increases cytotoxic effects of conventional chemotherapeutic agents and may therefore prove useful in combination with chemotherapy.

The chemotherapy drugs extensively used in cancer treatment can be classified as alkylating agents, antimetabolites, mitotic inhibitors, anti-tumour antibiotics, and miscellaneous

other chemicals whose mechanism of action has not been understood. Combination of radiation therapy with chemotherapy has proved to be the best mode of cancer treatment. During the discussions it became evident that radiation effects on cells are understood to a greater extent than are the effects of chemotherapeutic agents. It was therefore emphasized that more basic research ought to be done on the mechanism of action of chemotherapeutic drugs.

Use of heavily ionizing radiations, such as neutrons, π -mesons and stripped nuclei, has been advocated for treatment of certain tumours. Intensive research is underway on the effects of such radiations in the USA, Canada and Western Europe.

In a panel discussion on future radiobiological research needs for radiotherapy, it was pointed out that radiobiologists and radiotherapists have so far worked on different platforms. Whereas the radiotherapist has been overburdened with treatment of patients, radiobiologists have mainly concentrated their efforts on *in vitro* systems which may or may not be of use in patient treatment. It was therefore emphasized that radiotherapy clinics must have consultant radiobiologists, and that radiobiologists ought to be familiar with the clinical problems in hospitals. In the UK and USA such arrangements have been mutually profitable.