



## Fifty years of cancer research

*9th Quadrennial International Cancer Congress, Tokyo, October 1966 (Dr Kunio Oota, Secretary General, Cancer Institute, Nishi-sugamo 2 Chome, Toshima-ku, Tokyo)*

Every four years cancer research workers and clinicians specializing in the treatment of cancer congregate to discuss their subject. The venue of the 9th International Cancer Congress was Tokyo, where some 4000 participants from 63 different countries assembled for the seven day meeting which ended on October 29.

In an effort to fulfil the layman's need for good news about cancer, the popular press is frequently guilty of presenting newly discovered facts in a way that suggests that a breakthrough is imminent—or has been achieved. Experience gained during the past 15 years shows that little is to be hoped for purely empirical approaches to cancer treatment: no agents of more than palliative value for the common types of cancer have been discovered as the result of the gigantic cancer chemotherapy screening programme carried out mainly in the United States. The argument that if one searches the beach long enough one is bound to find a pebble with the perfect art form is based on the assumption that perfection in art is an absolute quality and not something which varies with the eye of the beholder.

It is now certain that cancer is a collection of many different diseases and that many different factors and mechanisms are involved in its causation and progression. It is not surprising, therefore, that the best attended panel discussions and congress lectures were those dealing with basic biological studies in relation to cancer. Even clinical investigators tended to desert section meetings dealing with diagnostic techniques and results of treatment—fields in which no more than slight advances are to be expected—in favour of sessions concerned with our rapidly increasing knowledge of viruses and immune mechanisms in relation to cancer. This illustrates the important point that the main function of large congresses is not to provide a forum for the presentation of new facts, but to enable the dissemination of information from the expert in one field to those in others.

Notable at the recent congress were lectures by George Klein (Sweden) and Renato Dulbecco (California) in which the vast array of new facts relating to the role of viruses and tumour antigens in the cancerous process were assembled into forms comprehensible to workers in

related fields. The relationship between viruses and cancer is clearly not as simple as was once thought. Some, but not all, viruses induce cancer after becoming incorporated in the genome of the mammalian cell. Many instances are now recorded where the induction of cancer by a virus is dependent on the presence of a second, so-called 'helper' virus. The need for this may not at first be apparent if a state of latent infection with the helper virus exists before exposure to the test virus. In other instances (for example, the mouse leukaemia viruses) it is easy to mistake a helper virus for a true cancer producing virus.

Normal mammalian cells grown in tissue culture proliferate to form thin layers with a definite pattern. When cells touch each other they form binding contacts which inhibit both movement and subsequent proliferation. If a cancer virus is introduced into such cultures some cells begin to behave differently: they form cell-to-cell contacts less readily and move over each other more freely. Colonies of these so-called 'transformed' cells appear as thick clumps. Some workers claim that exposure to chemical carcinogens may bring about the same type of transformation, but others have not yet been able to confirm this.

It is tempting to assume that this easily demonstrated cellular transformation constitutes the cancerous change, particularly as the implantation of relatively small numbers of transformed cells into experimental animals may, under some circumstances, lead to the local development of cancer. One current theory of carcinogenesis is that an induced alteration in the genetic material of cells leads to the production of abnormal proteins which appear as antigens on the cell surface. This in turn interferes with mechanisms by which cells 'recognize' each other and respond to factors which control their movement and proliferation.

However, some experts in the field regard the integrity of the cell surface as only one of the factors involved in the control of cellular proliferation. Thus, M. Stoker (Glasgow) spoke of a diffusible growth regulatory substance, anomin, which is present in normal cells but deficient in transformed cells. More hopeful perhaps from the point of view of chemotherapy is a factor, dispersin, isolated by K. Olsen (Denmark) from certain normal tissues—spleen, thymus, lymph nodes and gastric mucosa—which inhibits the growth

of a type of transplantable leukaemia in mice.

There is still no direct evidence that viruses are involved in the causation of human cancer, but this may be because of the impossibility of using in the investigation of human cancers methods—for example, the deliberate introduction of virus into newborn animals of the same species—by which the role of tumour viruses was discovered in laboratory animals.

Of course, many other aspects of cancer research were discussed at the congress and it is not possible here to give more than a bird's eye view of the proceedings. However, two fields must be mentioned: geographical pathology and environmental carcinogenesis. Because of variation between countries in diagnostic standards and pathological classification, and because in many countries, including Britain, post-mortem examination is the exception rather than the rule, it is often very difficult to compare the state of affairs with regard to cancer in different areas of the world. During the past few years, however, deliberate attempts to overcome these difficulties have been made and a clear picture is emerging. Harold Stewart, in the closing session of the congress, referred to the wide differences between countries in the incidence of cancer of different parts of the gastro-intestinal tract. The extent of these differences and studies on persons who migrate from one area to another strongly suggest that many different environmental factors are involved in the causation of such cancers. A knowledge of these factors may well lead to the possibility of preventing the disease.

Those who were fortunate enough to attend this superbly organized congress will return to their laboratories and clinics well informed of recent advances and much stimulated by what they heard. They will also be not a little moved by the fact that the congress was held in the city where just over 50 years ago two Japanese workers, Katsusaburo Yamagiwa and Koichi Ichikawa, first showed that cancer could be induced experimentally in animals by a chemical agent.

FRANCIS ROE

### The industrialization of 'hydrospace'

*Symposium on Oceanography and Exhibition of Oceanographic Equipment, Frankfurt, November (The US Trade Center, Frankfurt, West Germany)*

International Developments in Oceanography was the all embracing title of a lecture given by Captain Jacques-Yves Cousteau at this first symposium exhibition of oceanography sponsored by the United States outside America.

In Cousteau's opinion ocean going research vessels are becoming obsolete, except for a few specific tasks in the sphere of marine biology and food research, and their part could best be taken over by the