concluded with a highly interactive round table session on how to deal with information on cancer prevention.

Dr Koop set the tone for the conference in his remarks. "We cannot provide health information to the public without putting the risk into perspective. The public has to understand the difference between real risk and hazards, and the scientific community has a responsibility to help guide the public to understand the use the wealth of information provided by the media".

The first session of the conference was devoted to tobacco and smoking and the well known correlation between smoking and lung cancer, as well as other tobacco-related cancers. Conference speakers launched a stinging attack on the "tobacco cartel" for "exporting death" to third world countries and for "targeting advertising and promotional efforts to youth, minorities and the poor".

Dr Judith MacKay, director of the Asian Consultancy on Tobacco Control in Hong Kong, said that just one of the effects of USA tobacco exports to third world countries is that "one half billion people alive today will be killed by tobacco", and that "fifty million Chinese children alive today will die of a tobacco-related disease". The statistics show that global tobacco-related mortality will rise from the current 2.5 million per year to over 10 million annually by the year 2050.

Other facts about cancer causation include the risks of over-exposure to sunlight, excessive exposure to radiation, certain occupational exposures (usually long-term and high-dose), and alcohol abuse, particularly in conjunction with cigarette smoking.

A second important area for research on cancer prevention includes the role of nutrition and diet. This represents the maybes. While it may be true that excess fat in diet can cause or produce the likelihood of breast cancer in women, there is a need for increased and responsible research. It is important to determine the link between diet and specific cancers, as it is estimated that diet and nutrition play a role in 35% of cancer deaths. We need to understand what changes in our national diet might have the most effect in preventing certain cancers, particularly those of the colon, breast, uterus and prostate.

And the rumours: not only do they undermine the usefulness of the facts but they encourage a kind of mass hysteria and frenzy that can result in cancer phobia. It is clear that far too often the results from animal testing have been reported as applicable to human beings. A case in point was the concern about the use of Alar on apples. We have often fed chemicals to rats in doses more than 100 times greater than those given to humans and then called these substances toxic.

It is detrimental to all our efforts to overlook the known and proven causes of cancer and concentrate on these rumours. Each of us has a responsibility to assess the wealth of health information and assess risk.

Although the USA is a country obsessed with questions of health, it is important for all of us in Europe to look more carefully at what can be done in the area of cancer prevention.

ICCCR will be organising a second prevention conference for the autumn of 1992 in London.

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Treating Cancer: the Potential Role of Stem Cell Inhibitors

SUBSTANTIAL ADVANCES have been made in the development and use of antineoplastic drugs and several cancers can now be cured by chemotherapy. Many, however, are still refractory to current treatments. Most chemotherapeutic agents are cytotoxic to cells in cycle and therefore will not only kill a significant portion of tumour cells but will also kill any normal cells which are in cycle. Thus in many cases, the doses of chemotherapeutic agents are limited by the effects of the drugs on normal cycling cells, particularly those of the haemopoietic and epithelial lineages. Recent progress in our knowledge of the growth factors which induce proliferation and differentiation in the haemopoietic system has led to the use of haemopoietic growth factors such as G-CSF and GM-CSF (granulocyte and granulocyte–macrophage colony-stimulating factors, respectively) to boost the haemopoietic system after chemotherapy, in order to shorten the time during which patients are at a severe risk of infections due to the drug-induced ablation of the myeloid cells in peripheral blood. Since many chemotherapeutic regimens involve serial treatments over periods of weeks, the drug treatment leads in many cases to a severe reduction in marrow functions. Thus, if the most primitive cells in the marrow could be temporarily protected by agents which maintain normal cells out of cycle during chemotherapy, significant progress in improving the efficacy of chemotherapeutic regimes should result [1].

In normal unstressed bone marrow, the majority of haemopoietic stem cells are quiescent, with only about 10% being in active cell cycle at any one time. This percentage can, however, rise dramatically following damage to the more mature components of the system, allowing replenishment by differentiation of these cells. Once a normal bone marrow cellularity is attained, the stem cells return to quiescence. It is clear from these observations that the stem cell compartment within the haemopoietic system is under tight proliferative control.

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We (in collaboration with colleagues at the Genetics Institute, Cambridge, USA) have recently described a cytokine (SCI, stem cell inhibitor) which we have identified as macrophage inflammatory protein 1α (MIP-1α) which is functionally and antigenically identical to an activity which was described many years ago to be present in normal bone marrow [2]. Our analysis of the *in vitro* biological activities of SCI/MIP-1α indicate that it is capable of reversibly inhibiting the proliferation of a significant proportion of the stem cell compartment. We have also been able to demonstrate, in preclinical studies, the ability of SCI/MIP-1α to inhibit stem cell proliferation in mice (Dunlop *et al.*, unpublished). These studies are now being extended to models in which the effect of SCI/MIP-1α in protecting against myelotoxicity is being tested. Clearly, inhibitory molecules which are reversible and specific have exciting potential in the clinical setting. It would also be envisaged that more rapid regeneration of the bone marrow subsequent to treatment with inhibitors would be effected by treatment with stimulators of stem cell proliferation, and a candidate activity present in regenerating bone marrow has been described [3]. Experiments are underway to characterise this activity. It should be emphasised, however, that SCI/MIP-1α is one of a number of putative stem cell regulators which include a tetrapeptide, a pentapeptide and transforming growth factor β and which are reviewed in detail elsewhere [4, 5].

A further clinical use for inhibitors such as SCI/MIP-1α can be envisaged in the treatment of leukaemia. In chronic myeloid leukaemia, for example, it appears that part of the genetic lesions in the multistage process of leukaemogenesis could be the loss of sensitivity to inhibitors of primitive cell proliferation by the leukaemic cell [6]. Should this prove to be the case, then it should be possible to consider drug purging of the leukaemic cells *in vitro* in the presence of specific inhibitors.

There is much to be elucidated on the control of stem cell proliferation and characterisation of regulators of this compartment is an important aspect of the progress required. However, the possible implications for cancer therapy are clear and it is very likely that more regulators of the heterogenous stem cell compartment will be discovered. Studies of this nature will allow a better understanding of the mechanisms behind cancer development and may allow more effective treatment of such cancers, a challenging and exciting prospect.

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