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RESEARCH IN THE BASIC SCIENCES IN THE SERVICE OF  
THE FIGHT AGAINST CANCER

Note prepared by Unesco Secretariat

Any international action aiming to coordinate the general strategy of the fight against cancer should, in order to be more efficient, develop along two distinct lines.

In the first of these, cancer is considered as a human disease. Studies and research are undertaken at three levels: the descriptive level, including standardization of the nomenclature, the adoption of common methods in the histological classification of tumours, the development of new means of early diagnosis and their testing on a large scale, secondly the explanatory level includes among other matters, epidemiological enquiries, aiming to bring to light etiological factors of the malignant growth, either of a genetic nature or resulting from environmental causes, and finally, the experimental level, which includes animal experiments for a systematic large-scale study of carcinogens and haemotherapeutic agents. This category of research must be performed by medical staff in hospitals and cancer research centres.

The second line of action has as its aim the comprehension of the basic mechanism of the malignant growth. This pathological process cannot be understood without a knowledge of the mechanisms of cell division, differentiation and control processes of the cell in general. Biophysics, biochemistry, molecular biology, immunology, virology, cytology, embryology and endocrinology must all contribute to the formation of a consistent picture of the vital phenomena which are explored by these research activities. It is impossible to foresee which one of these various sciences will take the decisive step towards the final explanation, but those disciplines whose contribution is indispensable to the solution are easy to define.

The first line of action is adequately covered by the preliminary studies of the World Health Organization. Its plan clearly outlines the methods of international action aiming to concentrate the means and raise the potential along a well-defined line of attack; but many of the scientists and physicians involved in cancer research are convinced that final victory will doubtless only be obtained through a combined effort of basic

research, according to the second line of action. Therefore, it seems essential that this line of research be thoroughly considered through a concerted effort on an international level.

Fundamental research is basically free, so the guiding principle of a concerted effort must be in the distribution in material and human resources rather than in the orientation of the research itself. Such a distribution necessitates a thoroughly organized strategy. It should ensure the best possible utilization of funds, and maintain an equilibrium between the various disciplines according to their potential importance in the fight against cancer. It should allow for the emergence and development of new orientations and should counter-act the limiting factors which keep down the efficiency of research at present. The establishment of such a strategy should result from a common bond between the sciences in the numerous interested fields.

Consultative bodies should be established within the following scientific disciplines: (i) Biochemistry; (ii) Structure and functions of nucleic acids; (iii) Structure, synthesis and functions of proteins; (iv) Control processes; (v) Virology and genetics; (vi) Cytology and biophysics; (vii) Embryology, morphogenesis and cell differentiation, and tissue and organ culture; (viii) Immunology and graft studies; (ix) Hormonal and neuro regulations. Such a list is by no means exhaustive, and the sub-divisions presented here are purely tentative. In the preliminary stage and before consultative bodies can be established, the consultation of representatives of international scientific organizations should be envisaged.

In connection with its programme of research in cell biology, Unesco draws upon the consultative services of the International Cell Research Organization (ICRO) in which specialised working panels cover most of the above-mentioned disciplines. A synthesis of the specialist viewpoints is made by a Council composed of delegates from the working panels and from competent scientific unions.

Integration of the fragmentary data into a consistent is of paramount importance. This should comprise the exchange of information between different disciplines and the common assessment of results achieved within each. It should also stimulate the diversion of scientists from one discipline to another. The opposition of different methods and concepts

can lead to an exceptional renewal of hypotheses, as is shown by the achievement of nuclear physicists, who are concerned with molecular biology.

A multi-disciplinary body, whose members are mandated by the specialist scientific consultative bodies, should devote its attention to improving and stimulating the interpenetration of disciplines. It is also at the level of such a directorate, that the necessary contact and coordination could be ensured between the scientists involved in basic research and those devoted to clinical or applied research in the narrower field of cancerology

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In the field of basic research, the overall plan of action results directly from the needs of existing institutions, particularly in European countries, where those needs have been repeatedly emphasized by private or official bodies within the last few years. An overall inventory has not as yet been established, but priorities have been defined in each discipline, as well as the needs in equipment, in such a way that a new financial effort could cause an immediate increase in the efficiency of scientists working in existing laboratories.

In the first stage, and without changing the institutional basis of existing research centres, their standard should be raised by lending them funds for equipment, running costs, and personnel to the level reached in the wealthiest countries and laboratories. This could be done by the creation of a subsidizing donor organization, financing on a large scale all basic research in biology wherever it may be undertaken. The scope of the subsidized scientific disciplines should be broad, and in this respect, the experience gained by the United States National Institutes of Health could serve as an example.

Within the framework of an international fund for the fight against cancer, with donations covering several years in advance, an approximate sum of \$5 million per year could be usefully spent on subsidies classified into three categories:-

- Contracts for a research programme to permit the allocation of research teams working on subjects likely to contribute to the solution of the problem of cancer, including running expenses, current supply of chemicals, apparatus, laboratory animals, and heavy equipment and construction of specialized services such as breeding units, sterilization units and

radioactive units. (70% of the total).

- Fellowships and travel expenses in order to increase considerably the exchange of scientists from one laboratory to another and from one country to another (20% of the total)
- Grants for the purpose of organizing training courses at the highest scientific level intended to teach trained scientists a new field, closely related but distinct from their own, and for the organization of inter-disciplinary meetings (10%).

At a later stage, the opportunity of finding and building new laboratories could be considered. This should be preferably specialized and regional. However, before such action could be undertaken, a preliminary effort of recruiting and training a sufficient number of scientists should be made as soon as possible, and this implies powerful financial means and the rapid establishment of an organization.