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The Program of Cancer Research in the University

D. M. Greenberg
Chairman, University-Wide Cancer
Coordinating Committee

President and Regents of the University:

At the kind invitation of President Sproul, I am gratified to have this opportunity to present a brief review of cancer research, particularly as it relates to the investigations now under way in the University on this most baffling problem and to the plans of certain of the Divisions of the University for the development of programs of far-reaching scope and effectiveness.

May start by mentioning that we here in this room should be particularly interested in cancer research because virtually all of us are in the age group at which cancer is most apt to strike. We have recently been informed that cancer now stands second in the frequency of the cause of death in the United States. To my mind, this should no more be the case than, say, for tuberculosis. I think that cancer can be looked upon as an internally generated fatal affliction. Most of the victims are otherwise of sound constitution, who would have had many years of useful life ahead of them. Since, with all our present knowledge on the cause and prevention of tuberculosis, it still has not been eradicated, we may anticipate that the conquest of cancer, of whose genesis we know next to nothing, will be an enormously greater task.

The ultimate goal of cancer research can be stated in simple and direct terms and is just what you would anticipate, namely, to discover the means for the prevention and cure of cancer. However, the pathway to this goal appears to be as difficult and obscure as understanding life itself.

It has been well stated that cancer research is not a discipline separate unto itself. It depends upon the simultaneous and frequently coordinated

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activity of such independent scientific disciplines as clinical medicine, surgery, pathology, radiology, genetics, immunology, biophysics, and biochemistry. Like all applied science, cancer research is nourished, sustained, and invigorated by fundamental advances and discoveries in the basic sciences.

At present, cancer investigation must approach the problem from all its aspects and be satisfied with small advances in understanding and minor improvements in the control of cancer. I would list the outstanding subjects of cancer research as follows:

1. Study of the differences between the biochemical and biophysical properties of normal and cancerous cells.
2. Investigation of the basic causes for the development of cancers and the factors that determine their growth and spread.
3. The relation of hereditary factors to the susceptibility to cancer.
4. The relation of environmental factors such as nutrition, living habits, work, and climatic conditions to cancer.
5. Investigation of methods for the treatment and cure of cancer.
6. The medical and surgical care of the cancer patient.
7. The sociological problem of cancer.

Essential elements for an adequate cancer research program are a broad scope and continuity of support and effort. The attack on cancer must be carried out along all fronts, for no one can predict which field of activity will supply the clue that will lead to the solution of the problem, or, more probably, every one of the independent disciplines will contribute something vital to the final solution. Because of its great complexity, the cancer problem offers no hope of

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a quick and easy solution, and continuity of support and effort are necessary to insure any hope of substantial results.

It is clear from the above that a program of cancer research worthy of our University is a serious undertaking that will involve a great organization, major commitments, and the expenditure of large sums of money.

Because of the magnitude of the problem, President Sproul called together an All-University Conference on Cancer Research last June, and upon its recommendation, has established several interlocking committees to advise him in policy making for the conduct of cancer research. These committees consist of a Northern section cancer research committee, a Southern section committee, and a University-wide cancer research coordinating committee. In the words of President Sproul: "The committees will function in an advisory capacity to the President for the purpose of coordinating and stimulating initiative and freedom of inquiry by individuals and research agencies of the University into the origin, prevention and cure of cancer."

As I see it, it is the duty of the committees to chart a program of cancer research in the University that will encompass all the important phases of the subject and that will be well coordinated and integrated in its functioning. It will be the obligation of the several schools, colleges, and departments concerned to carry on the specific activities that are involved.

Under the general policies recommended by the cancer committees and approved by the President, there are expected to be established a number of specific Cancer Research Institutes. Plans for the first of these have already been formulated in the Medical School in San Francisco. Another one will be developed in the Medical School at Los Angeles as rapidly as circumstances permit. While no specific cancer research institute, as such, is contemplated for the Berkeley campus, most of the research of the Medical Physics Division of the Radiation

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Laboratory and a considerable part of the research of the Divisions of Biochemistry and Physiology, of Veterinary Science and of other departments, is now concerned with cancer.

It is also logical to expect that there will be a natural division of effort among the different groups. Research on human aspects of the subject will be concentrated in the two medical schools and in the affiliate of the Medical School in San Francisco, the Laboratory of Experimental Oncology of the U. S. Public Health Service. Investigation of the basic biological, genetic, chemical, and physical aspects of cancer will naturally gravitate to the appropriate academic divisions on the Berkeley, Los Angeles, and Davis campuses.

I shall conclude with a brief description of the cancer research activities now under way in the different segments of the University.

The cancer research activities of the University are far flung and extend to most of the campuses. A survey made for the All-University Cancer Conference yielded a list of 65 titles of investigations that were under way.

San Francisco

The San Francisco campus is far in the lead in this field. Important investigations are being carried out in the Medical School, the College of Dentistry, the College of Pharmacy, and in the Laboratory of Experimental Oncology. The research activities of the Medical School are mainly concerned with statistical evaluation, diagnosis, therapy, and medical care of the cancer patient.

Let me list a few titles for purpose of illustration:

1. Early diagnosis of cancer by smear preparations (Dr. H. F. Traut).
2. Radiiodine in the diagnosis and treatment of cancer of the thyroid (Dr. Seley).
3. Evaluation of neutrons in the treatment of cancer. (Dr. Stone).
4. A comparison of 1,000 and 300 kilo volt X-ray therapy (Dr. Stone).

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5. Value of Radioactive phosphorus in the treatment of a variety of blood diseases (Dr. John Lawrence, Dr. Low-Beer and associates).

6. Nutritional aspects of malignant diseases (Dr. Rinehart and associates).

7. Hormonal factors in cancer (Dr. Biskind, Dr. Trout).

It should be mentioned that the important work of the Medical School is being carried out with most inadequate facilities. There are now no beds in the University Hospital specifically allocated for cancer work, and the space and facilities for experimental laboratories are totally inadequate. The hopes of the Medical School in cancer research mainly lie in the future. Only upon the realization of the proposed Cancer Research Institute can the organization and facilities of the scope necessary for optimum results be attained.

A very important unit of the present and future cancer research activities on the San Francisco campus is the Laboratory for Experimental Oncology under the directorship of Dr. Michal Sliackin. The major source of support of this laboratory is the U. S. Public Health Service. The director informs me that the budget allocated for the current year is around \$175,000. The objective of the Laboratory of Experimental Oncology is clinical research in cancer with the patient as the focal point. Ambitious programs have been formulated for the study of the physiological, biochemical, and clinical reactions of cancer patients. The goal is better methods of diagnosis and therapy. It is envisioned that when the Cancer Research Institute is a reality, the Laboratory for Experimental Oncology will have its quarters there and will become an integral part of it.

An immediate objective of the Medical School is the improvement of the teaching of cancer. As an aid to this, a grant of \$25,000 has been made by the U. S. Public Health Service. This fund will be used to assemble pathological material, bring in appropriate patients, and improve teaching in a variety of ways.

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Berkeley Campus

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On the Berkeley campus, cancer activities are mainly concerned with the study of the basic biological, biochemical, and biophysical aspects of the subject. Genetic problems of cancer are being investigated by Dr. DeOme of the College of Agriculture. In the Radiation Laboratory, studies are under way on the biological effects of radiation, and the application of radioactive isotopes. One of the goals of this group is to find methods of specifically introducing radioactive compounds into cancers so that they can thus be selectively irradiated and destroyed.

In the Divisions of Biochemistry and Physiology, research is in progress on the culturing of isolated normal and neoplastic tissues, on the metabolism of tumors, particularly the protein metabolism, and on the biochemical constitution of the cancer cell.

Los Angeles

Cancer research has been more restricted on the Los Angeles campus, but it may be anticipated that it will develop rapidly in the near future. This will particularly be the case as the Medical School grows and the plans of Dean Stafford Warren unfold.

The Department of Zoology has particularly been interested in the immunological approach under the direction of Dr. Penn and Dr. Bellamy. Dr. Krichesky has been carrying out valuable work on the relation between the sex hormones and their decomposition products and cancer. Problems of the significance of certain enzymes to cancer are being studied in the Departments of Agriculture and Chemistry.

I hope I have made it clear to you that the problems of cancer are obscure, baffling, complex, and manifold. Optimistic hopes cannot be held out for easy success and quick cures. The pathway to the final goal is long and difficult. In spite of this, I feel that we should not despair but should tackle the problem with vigor and courage. I might aptly express my own feelings with a slogan used in the war: "Give us the tools and we will finish the job".

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