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CANCER AND THE PUBLIC HEALTH[1]

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WITH parts or all of every continent at war, it is difficult even for neutrals to retain that dispassionate concentration upon *science* which is necessary for a fruitful discussion of the problems confronting this Third International Cancer Congress.

Devoting our lives, as we are, to the saving, the conservation of human life, it is inescapable that our first reaction to mass killing is one of frustration, of futility. How puny are our efforts to save compared with the effect of war. Four years of the World War nullified, wiped out, the results of probably forty years of medical progress. The lifetime of a hundred laboratories, a thousand scientists, tens, yes, hundreds of thousands of doctors and nurses gone for naught.

All of you, I am sure, share with me the fervent hope that we and our children will be spared the material, the physical, the mental, and above all the spiritual losses which follow a major conflict at arms.

Whether you thank or blame *science,* in these days no nation ever wins a war or profits by it—whether as a combatant or a neutral. Whatever its duration or costs, however, there is some consolation in the fact that every war is followed by peace.

Instead of becoming amateur strategists—as we are tempted to do—each of us must look forward even now to that peace, and consider in the meantime what we individually, in our chosen sector, can do to neutralize, to make up the losses which war entails.

Not counting other losses, if the material costs of the World War and the armament costs since then could have been spent to satisfy the basic needs of the people for peaceful living, the world to-day would be experiencing a standard of living beyond anything ever dreamed of. To attain a higher standard of national

[1] Address before the Third International Cancer Congress, Atlantic City, N. J., September 13, 1939.

health is an urgent need in this country—whether the future brings us continued peace or war.

In either event the nation can not afford the continued luxury of unnecessary disease, disablement and death. The public in this country is beginning to demand that its doctors and health organizations join hands to put their knowledge to work effectively—to prevent sickness, to improve health, to promote physical fitness, and to restore the sick to health.

The people have accepted the idea that a disease which takes a sweeping toll of lives each year from the productive ages of our population; a disease which knows no state or county boundaries; a disease which is so costly in its diagnosis and treatment that but few of its victims can pay the costs unaided—is a public health problem. Cancer is such a disease.

Each year more than 140,000 deaths from cancer occur in the United States—more than twice as many as live in Atlantic City. Irrefutable evidence indicates that skilled medical care is available only to a small proportion of the half million or more cancer sufferers in the United States to-day. Cancer death rates are highest among industrial workers and among the underprivileged economic groups.

There was a time when public health activities were limited to the control of epidemic diseases and basic measures to improve the sanitation of the environment. Health activities of to-day, however, are concerned with the prevention, alleviation, and cure of all of the major causes of disablement and death. Prompt restoration of the patient to health is equally important with the prevention of disease.

It is the realization among medical men of the *possibility* of *cure* for the cancer sufferer that motivates our modern cancer control activities. Some twenty-five years ago, professional groups and interested citizens joined to launch in the United States a movement which had as its objective the educating of physicians and the public to an effective understanding of the primary importance of early diagnosis and prompt expert treatment of cancer. This required a change in the traditional thinking of doctors. As has so frequently been the case in the advancement of health in this country, the private voluntary agency led the way to national action against cancer. The movement, initiated by the American Society for the Control of Cancer, has succeeded beyond expectations. Its future exceeds any of our present concepts.

Experience during the past twenty-five years, however, has clearly indicated that education alone is not enough to stem the mortality from cancer. We must know better how to prevent and cure it. Also, the advance of scientific knowledge and the improvement of technical skills and tools have placed cancer in the category of high-cost diseases. Organized services, special equipment and physicians highly trained in tumor pathology, radiology and surgery are the *sine qua non* of modern cancer therapy. For these reasons and because so many of the patients are unable to meet the costs of diagnosis and treatment, cancer has become one of our major health problems. Cancer deaths are increasing, and because of the aging of the population will continue to cause an increasing number of deaths if the present age-specific rates persist. Prior to 1937 only five states in the United States had recognized the importance of cancer as a public health problem, and had taken steps for the more wide-spread application of scientific knowledge of cancer. These states were: Massachusetts, New York, Connecticut, New Hampshire and Georgia.

An event possibly of great future significance in the growing anti-cancer movement in the United States was the passage by the Seventy-fifth Congress of the National Cancer Institute Act in August, 1937. Senator Homer T. Bone, who introduced the bill in the Senate, said at the laying of the cornerstone of the institute on June 24 of this year (1939): "Ninety-six members of the United States Senate attached their names to the bill creating this great institution. Never in the history of this Republic had the entire membership of either body of Congress sponsored a piece of legislation. Such an action reflected a great outpouring of sentiment and evidenced a grim determination to stamp out a disease that was threatening every home in America."

Two basic concepts underlie the Act: Research to develop more effective methods for the prevention and cure of cancer; and the better application of existing knowledge for the benefit of present cancer patients.

Experiments and investigations relating to the cause, diagnosis, and treatment of cancer are being conducted extensively. It is the function of the institute also to assist and foster approved research activities by other institutions, both public and private, by the distribution of funds and through cooperation.

Under the provisions of the National Cancer Institute Act, a National Advisory Cancer Council is created consisting of six members, selected from the ranks of leading medical or scientific authorities, who are outstanding in the study, diagnosis, or treatment of cancer in the United States.

This is a new venture in government policy. Never before has Congress authorized the distribution of tax funds to private institutions and individuals for medical research. We have been fortunate in the caliber of the members who thus far have served us on this council. Since so many scientific disciplines are important in the whole field of cancer research and treatment, it has not been possible to have representation of all of these disciplines on the council at any one time. We hope to seek advice and guidance broadly, however, from the various specialties concerned with

any aspect of this problem through the appointment of special committees of the council.

The council is in effect a policy-making body. Specifically it is authorized: (a) to review research projects or programs submitted to or initiated by it; (b) to collect, coordinate, and then disseminate the information with regard to cancer which is available or which will come to light as research and investigation progress; (c) to review applications from any university, hospital laboratory or other institution, whether public or private, or from individuals for grants-in-aid for research projects relating to cancer and certify its approval of grants-in-aid in such projects as show promise, and (d) to recommend the acceptance of conditional gifts to the National Cancer Institute.

To date, upon the certification of the council, grants-in-aid in excess of $180,000 for research projects have been made to various institutions throughout the country. Thus, in augmenting research and supporting worthwhile and promising cancer studies already being carried on by other agencies, the National Cancer Institute has taken its place in the world-wide attack on the cancer problem.

Two other important functions of the National Cancer Institute are provided in the Act, both of which have a direct relationship with the application of existing knowledge of cancer in the saving of lives: namely, the loan of radium and the training of professional personnel.

Under the provisions of the National Cancer Act, the Public Health Service is authorized to purchase radium and to make it available on loan to institutions, including hospitals, for cancer research or for the actual treatment of cancer. In 1938 nine and one-half grams of radium, costing $200,000, were purchased by the National Cancer Institute. The entire amount has already been allocated to various hospitals and cancer clinics. As funds become available, more radium will be purchased. It should be understood, however, that radium is *not* loaned *unless* an institution can meet certain requirements as to qualifications of the personnel, equipment and organization. The importance of this function of the institute can readily be appreciated when we consider the statements of experts when the Act was passed, that the United States possessed only about 50 per cent. of the radium needed for research and treatment of cancer.

Availability of competent personnel is also of great significance in the fight against cancer. Under the National Cancer Act, young physicians who are interested in cancer as a specialty and who have had previous training may apply to the National Cancer Institute for financial assistance in obtaining special training offered by designated training centers in tumor pathology, radiology and surgery.

Physicians eligible for training must be graduated from an approved medical school, must have completed at least one year of internship in an approved hospital, and must be less than 40 years of age. These fellowship appointments are made for one year, and are subject to renewal if the trainee's work is satisfactory. During the past year and a half, 36 physicians have received appointments.

Twenty-three institutions in the United States have been designated as centers where training and instruction may be given under a National Cancer Institute "traineeship," in all technical matters relating to the diagnosis and treatment of cancer. These institutions include nineteen leading schools of medicine and four outstanding hospitals devoted exclusively to tumor and cancer patients.

In compliance with another provision of the Act, the institute has endeavored through cooperative activities, to stimulate the interest of state health agencies in the promotion of cancer prevention and control. At the present time nine states—New Hampshire, Massachusetts, New York, Connecticut, Georgia, Missouri, Vermont, Pennsylvania and South Carolina—have cancer control laws. The cancer programs in Massachusetts, New York, New Hampshire, and Connecticut have been in operation for a number of years; those in Georgia, Missouri, Vermont, Pennsylvania and South Carolina are of more recent establishment, having been initiated during the past three years.

As a basis for cooperative services to other states, the National Cancer Institute has made an analysis of the effective cancer legislation in these nine states. The institute is now able to advise, upon request, as to the principles which should be considered in framing cancer legislation. In fact, upon the recommendation of the State and Territorial Health Officers at their annual conference with the Public Health Service, April, 1938, the National Cancer Institute has prepared a model bill for the guidance of the states. Upon request from state medical societies and state boards of health, the institute is prepared to give technical advice in regard to cancer control legislation. Among other urgent needs for future advances in cancer research is an improvement in diagnosis and therapy, and a clarification of the present state of confusion surrounding cancer nomenclature and classification. The same unsatisfactory condition exists in regard to cancer record forms. To meet the need for uniformity of nomenclature and cancer case records, the National Advisory Cancer Council recommended the creation of a special committee to study these problems and to develop uniform nomenclature and uniform case records, including records of therapy and follow-up. Subcommittees have been formed. Organizations which are participating in the detailed study of these problems include: American College of Surgeons, American Board of Surgery, American Board

of Radiology, American Society for the Control of Cancer, Memorial Hospital in New York City and the Massachusetts Health Department.

It is probable that many months will have to be devoted to the solution of the problem engaging the interest of these experts. That the most advanced thought and the ablest advice will be brought to bear upon the questions under study goes without saying. Regardless of the time spent, we may confidently expect a satisfactory clarification of the perplexities connected with terminology and clinical records in the cancer field.

That the health of the people is a responsibility of government is no longer a question. Educators, statesmen and business men realize *now* that our greatest national assets are the human resources of the nation. Again and again, health departments, insurance companies and private agencies have demonstrated that no investment yields surer returns than expenditures for the prevention of disease and the care of the sick. For example, the Metropolitan Life Insurance Company has spent over a period of 30 years, 120 million dollars in health education, in nursing the sick and in the general prevention of disease. "We who are used to actuarial methods," says Dr. Louis I. Dublin, vice-president of the company, "are entirely satisfied with our investment. Year in and year out we have increased our investments in the preservation of health because we felt that these investments paid."

What the National Cancer Institute will eventually mean to the nation in the saving of lives may only be conjectured at this time. This will depend upon the extent to which it merits the confidence and cooperation of the scientific institutions, the medical profession and the people themselves. It is hoped that the benefits to the people, however, will be both direct and indirect; not limited to the present, but promising much for the future. The provision of a more adequate supply of radium for the treatment of present and future sufferers from cancer; the training of personnel for the correct diagnosis and appropriate treatment of the disease in its early stages are the more tangible and immediate benefits.

We have not the slightest doubt that some day, maybe soon, the cancer problem will be solved. There is no reason to be pessimistic about cancer research. It is not likely that any individual worker will single-handedly conquer cancer. Scientific knowledge has increased and become so complex, that only through close coordination of research in the biological sciences with other disciplines can future advances in our knowledge of cancer be made. The National Cancer Institute of the Public Health Service hopes to demonstrate by the soundness of its policies, the extent of its cooperation and help, that it can attain an important place in this concerted warfare against the disease.

What we are discussing is no academic problem; cancer represents one important sector of a people's fight for life. You are engaged in a long-time struggle against one of mankind's oldest and most resourceful enemies; malignant growth of cells. If from this congress with its clashes of intellect and ideas, there should be generated the spark of understanding as to a means of ridding the world of the cancer menace, your contribution to humanity—to its happiness and future prosperity—might equal or even exceed the human losses of another world war.

On behalf of our government, therefore, I welcome your presence here. I wish you success in your deliberations. The one in ten of us in this country who, under the present rates, is doomed to die of cancer, pray that at least a beginning may be made toward unravelling the tangled skein, toward eradicating the menace of cancer.

A NEW REACTION IN ORGANIC CHEMISTRY: THE REDISTRIBUTION REACTION

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THE chief difference between typical organic and inorganic compounds is the complete sharing of pairs of electrons in the bonds of the former, in contrast to the presence of electrostatic bonds in the latter. This results in profound differences in the behavior of these compounds. Electrostatic or ionic bonds are readily loosened in a suitable dielectric medium, such as water, for instance, and solutions result in which the two ions of opposite signs are in mass equilibrium with one another but where any one ion does not remain paired with one individual ion of the opposite sign. As a result, when two or more kinds of positive ions are introduced in a solution with two or more negative ions, separation of the salts from the solution will not necessarily yield back the particular salts which were originally introduced: the pairing of anions with cations will be governed primarily by solubility relationships, and appropriate manipulations of the conditions, primarily concentrations and temperatures, will effect predictable changes in the composition of these