

PUBLIC HEALTH SIGNIFICANCE OF CANCER*

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It is always a pleasure to attend this meeting. Since 1941, when we began with little more than an idea for a Mexico-United States organization in the field of public health, a great deal of constructive work has been accomplished. Advances have been made particularly in the control of communicable diseases.

Now I think that the emphasis in public health must begin to shift to cancer and the chronic and degenerative diseases. As control measures have become increasingly effective against the communicable diseases, cancer and heart disease have replaced them as major health problems.

In 1940, cancer mortality alone was greater in the United States than the combined mortality from tuberculosis, pneumonia, and intestinal infections. Only 40 years earlier, the combined mortality from these three diseases was eight times that of cancer. While the communicable diseases as a group were going down, cancer mortality practically doubled.

In a recent review of principal causes of death in New York City, it was pointed out that cancer is responsible for a greater loss of working lifetime among women than any other disease.

Thus far, cancer does not seem to be as pressing a problem in Mexico as it is in the United States, though it is definitely on the increase. According to official records, it ranked ninth among the disease causes of death here in 1943 and 1944. It is significant, however, that it is the only disease which caused a markedly larger number of deaths in 1944 than in 1943. The record for the other eight diseases either showed reductions from one year to the next, or remained essentially stationary. Reported deaths from cancer, on the other hand, rose over five percent. This increase may portend an increasing seriousness of cancer as a medical problem in Mexico.

In both countries cancer is not only a medical problem but a public health problem. This is true because cancer control requires the best efforts not only of the individual physician, but of a number of co-workers in other health professions, and the active support of appropriate Federal, State and local agencies.

Public health activities in cancer control have two objectives:

First, to find means to compress the dangerous time intervals between onset of the disease and diagnosis, and between diagnosis and initiation of treatment.

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Second, to improve the level of cancer diagnosis and management.

Toward these objectives the National Cancer Institute has developed what I believe to be a well-rounded program of action, both within the Institute and through grants to state health agencies, hospitals, medical schools and other cooperating institutions. This program has special implications for public health officers and for practicing physicians. I shall try to develop some of these implications in the course of my talk.

All those who are active in the direction of cancer control are faced with difficult decisions on the best use of available resources. Cancer is not an illness that can be controlled by the same techniques which are successfully applied to diseases like syphilis or tuberculosis. The whole concept of "control" is different in cancer from the concept in most of the communicable diseases. We have no reliable mass screening technique for cancer, and its diagnosis and management ordinarily call for the services not of a single physician, but for a highly qualified team. Moreover, the cancer case is ordinarily seen first by a general practitioner, who as a rule has had no particular training in recognizing cancer in its diverse manifestations.

A chief point of emphasis in a cancer control program must therefore be professional education. I am using the term here in its broadest sense, to include undergraduate, graduate, and postgraduate education, not only within the medical profession but also in associated professions in the health field. The function of the Institute in helping to finance the improvement of professional cancer education is of prime importance. Until recently, most medical school curricula did not provide an effective and integrated presentation of this important subject. Our National Advisory Cancer Council, on the basis of a study made early in 1946, recommended that the Institute provide financial assistance, for the improvement of undergraduate cancer teaching. The Council suggested that schools should properly correlate the presentation of cancer by the various departments and provide opportunities for clinical observation of benign and malignant conditions. At present, over ninety percent of the medical and dental schools in the United States receive specific funds from the Institute to aid in financing their cancer teaching programs.

Running parallel with the grants to medical schools are grants to three schools of public health—at Harvard, Yale, and the University of Michigan. Through the efforts of a cancer coordinator at each of these institutions, cancer is emphasized throughout the curricula, so that sanitary engineers, nurses, and other professions may relate cancer to their own fields.

One of the most effective of our national control efforts is a program of fellowships for young graduate physicians to encourage them to undertake clinical training in specialized fields related to cancer. At the present time, we have 106 trainees. Since 1946, the greatest relative increase has been in pathology. This has been a very gratifying trend,

since medical standards in a community are greatly influenced by pathologists. This is particularly true in cancer, where the pathologist plays an indispensable role in diagnosis.

While activities of this kind help the newer generations of physicians and dentists, they do not reach the older practitioner who finds the number of cancer patients in his practice rising. The backbone of medicine is the family physician whose responsibility it is to consider every kind of symptom and deal with every kind of illness. Through our grant-in-aid program to the States, short, intensive refresher courses and seminars are being provided at strategically-located hospitals and medical centers. General practitioners and specialists alike may attend these courses to learn the latest and most effective methods of cancer case-finding, diagnosis and treatment.

The National Cancer Institute believes in cancer education through all effective media. With the American Cancer Society, we have undertaken joint production of a series of films depicting the early diagnosis of cancer. The first of these—a general film to introduce the series—was released a year ago, and has been very well received.

The second, dealing with the diagnosis of breast cancer, had its premiere last December. In conjunction with this film, we are now producing a non-professional companion piece—a movie to show women the basic facts about breast cancer, the signs and symptoms to look for, and so on. This new film on breast self-examination, which should be released early this summer, has the primary purpose of leading women to seek consultation with their physicians at an earlier date, thereby desirably compressing the usual time interval between the appearance of a small breast mass and diagnosis.

The third film in the professional series, "Gastrointestinal Cancer: The Problem of Early Diagnosis," is now in production. It will be released in mid-summer, with an intended international premiere at the Fifth International Cancer Congress in Paris.

Another film—"Challenge: Science Against Cancer"—has just been jointly produced with our Canadian neighbors in the Department of National Health and Welfare. This film is a semipopular documentary on the highlights of cancer research and, as its primary purpose, will attempt to stimulate interest in a research career among students in high schools and colleges.

Slide transparencies showing different types of tumor tissue and lesions have been made for distribution to qualified institutions. A nursing manual has been issued, and a handbook on cancer for public health officers is in preparation, jointly with New York State. A supply will be available for distribution.

A year-long program of cancer information for pharmacists and pharmacy patrons was conducted jointly by the Public Health Service and the American Pharmaceutical Association. More than 12,000 pharma-

cies displayed counterboards to the public, and in their prescription rooms posted bulletins giving detailed information on the signs and symptoms of early cancer at various sites.

It is still unfortunately true that physician coverage in many areas is far from adequate, and all too frequently the pharmacist functions as the primary adviser on health matters. Over a year's time, in the United States, there are more than five billion visits to pharmacies. Thus, the pharmacist sees virtually the entire ambulatory population, and if he is trained to suspect signs of disease, he can be very useful in directing possible cancer cases to the physician.

I might say that cancer was the first of the categorical programs to recognize the importance of bringing the pharmacist into active participation in the control program, and that other categorical disease programs are now conducting or planning similar campaigns.

Our program of the past year represents only a beginning, and should be extended and maintained at State and local levels. We have recognized that schools of pharmacy should be encouraged to survey their teaching programs, with a view toward raising the index of cancer suspicion among future pharmacists. And in this connection we are asking State health agencies to assist the schools to develop suitable programs, and negotiate with the dean of faculty to include several curricular hours on cancer. In several States, there are pharmacy schools in which senior students are given an opportunity to see cancer at various sites and stages. I have no doubt that pharmacists should be apprised of their potential in the control of many other diseases.

Effective cancer control also requires an active educational program for public health nurses and other registered nurses. Our own Nursing Section has assisted a number of States in conducting nursing institutes, largely to train new teachers in cancer control techniques. Cancer interests in the nursing profession are centered around case-finding, follow-up services, and bedside nursing care.

If the nurse has knowledge of the disease, if she is alert to signs and symptoms of early cancer, she is one of the best case-finders that we have. Moreover, nearly all patients who have received care or have been discharged need nursing help in order to make the transition from hospital to home. The adjustment is not only financial but emotional, and visits by the nurse help not only the patient but the whole family.

The nurse may also prove valuable in keeping the patient ambulatory. Radical surgery and deep radiation have resulted in greatly improved prognosis, but the physician is not always aware that in many instances the improved treatment eliminates the need for narcotics. I know of many instances in which the nurse was the first to suggest aspirin—with very good results.

These informational programs, which have the effect of bringing

physician and patient closer together, point up the fact that the physician needs special services in order to do the most effective job. Public health assistance is needed in the development of such services, including provision of consultant services, tissue diagnosis, diagnostic and cancer clinics, case-reporting, follow-up services, and nursing services needed by cancer patients.

In the early part of my talk I mentioned that one of the two major objectives of cancer control is to find means to shorten the time interval between onset of cancer and diagnosis. To find early cases today, the best we can recommend is the general physical examination, but this method is expensive and time-consuming; and even if all persons of so-called cancer age could be persuaded to seek periodic examination, there are simply not enough trained hands in the country to do the job. Unlike tuberculosis and syphilis, for which mass screening techniques have been developed to a high level of simplicity and reliability, early cancer is not yet discoverable by such means. There is urgent need, therefore, for a type of test which can be applied on a mass basis at reasonable cost and with sufficient specificity that it will identify a high percentage of cancer cases in an early stage.

For a great many years laboratory investigators, as well as practicing physicians, have been looking for differences between persons with early cancer and cancer-free people—subtle differences in the blood, sputum, urine, and various body chemicals. Diagnostic tests are based on the belief that these differences are specific and measurable.

None of the tests affords a definite diagnosis of cancer, but only an indication that a high percentage of cancers should be found among the group with positive reactions. For a diagnosis of cancer, a thorough physical examination would still be necessary, and if a tumor is found, its malignant nature would have to be confirmed. The point is that a good diagnostic test would provide a mass screening technique, by which the great majority of people could be ruled out of the cancer picture without an exhaustive physical examination, and examinations could be confined to the relatively small group that reacts to the test. It would definitely pay to examine this group thoroughly, since a good many early cancers would thereby be discovered in time for treatment and cure. The goal is to find the test or battery of tests that would make this possible.

The demand for a cancer diagnostic test is so great that every new procedure is in danger of premature exploitation. One recently proposed procedure that may have some merit as a cancer test was given unwarranted lay and professional publicity before its clinical validity could be determined. The result has been a widespread public and professional demand for its immediate application, and consequently in its commercial exploitation, without the consent of the original investigators. Under

these circumstances, tragic misinterpretations of the test results are inevitable.

More than a year ago the National Cancer Institute set out to organize a program for making a critical unbiased evaluation of the various tests. The organization stage is now complete, and shapes up as follows. The initial work of evaluation is being divided up among teams of investigators at various universities, assisted by special cancer control grants. We have established a group of investigators, a "colony," working at the University of Washington in Seattle, to refine existing tests and possibly to develop new ones. Tests that show promise will be referred for field trials to our cancer investigation unit at the Public Health Service Medical Center at Hot Springs, Arkansas.

It might be appropriate at this time to attempt to clear up some of the misconceptions as to what a diagnostic test is supposed to do. Some of the confusion is due to the term itself: "diagnostic" test is a misnomer. It is hardly conceivable that any mass screening test can be devised that will actually diagnose cancer. All it can do is quickly separate a large group of examinees into two categories—one consisting of those whose reaction to the test is negative, and the other consisting of a relatively small number of persons whose reactions are positive and who are therefore cancer suspects. Thus, the thorough and time-consuming examination, including biopsy, required for actual cancer diagnosis could be narrowed down and confined to this small group of positives.

We have found it necessary to draw up certain criteria, by which to decide whether a test is acceptable or unacceptable. Obviously, a test that misses a high percentage of early, localized cancer will be unacceptable. Persons found negative in such a test would have a false sense of security, with inevitably tragic consequences.

Even if a test were to succeed in obtaining positive results for all persons with early cancer, it would still be unacceptable if it also obtains positive results for too many examinees who actually do not have cancer, since this would involve the examining physicians in the impractical task of separating the few genuine cancer cases from a great number of false positives.

An example may make this clearer. In a community of 100,000 people, approximately 40,000 would be age 35 or over. If this group were screened annually, a perfect test would pick up about 250 new cancer cases. A test that obtained positive results on this group of true positives, but in addition obtained only 10 percent false positives, would produce a group of 4,225 with positive reactions—and the task of identifying the 250 true cases among this large group would be inordinately heavy. I might mention that many of the tests so far reported give even higher percentages of false positives.

Our standard of acceptability, therefore, is that a test must be posi-

tive in at least 90 percent of early, localized cancer cases, and give false positive reactions in no more than 5 percent of examinees who are actually cancer free. These criteria would produce a group in which approximately one person in ten would have cancer. The diagnostic problem would still be heavy, but not beyond practical limits.

These criteria for the laboratory evaluation are by no means stringent, but it would be a mistake to underestimate the difficulties of securing a test that will meet them. The majority of tests that have been described in medical literature were tried out largely on experimental animals, or on hospitalized, advanced cancer cases; their value in discovering early cancer is problematical. Moreover, the group of so-called "normal" persons used as controls has usually not been adequately examined for cancer and other diseases, and, so far as we can determine, has not necessarily been in the same age range as the cancer group. Without scientific control of these variable factors, of course, the value of any test is impossible to predict.

Despite the many thorny problems, we feel that the outlook is encouraging. While it would be premature to assume that the program will result in a test or battery of tests effective for mass screening, we believe that an orderly sifting of the welter of claims and an intensive study of the mechanism of possible tests cannot fail to have useful results. The fund of knowledge accumulated should have great value in establishing criteria, improving evaluation methodology, and facilitating, if not accomplishing, the development of practical mass screening techniques.

In closing, I want to touch upon one aspect of cancer control that appears likely to increase greatly in importance.

Effective cancer control requires current information on the extent and nature of the cancer problem. Primarily, this means knowledge of the amount of cancer illness, by sex, primary site, age, and a number of other aspects. For a long time, the only valid data on cancer illness in the United States dated back to 1937-1939, when the National Cancer Institute surveyed ten metropolitan areas. To obtain up-to-date information from this base-line as to cancer trends, these same ten areas have recently been resurveyed, and the results will be published in the near future. Reports were obtained on virtually all living persons with diagnosed cancer in Atlanta, New Orleans, Birmingham, Dallas, San Francisco, Denver, Chicago, Detroit, Pittsburgh, and Philadelphia. We will have answers to such questions as: How many people have cancer? What parts of the body are most frequently involved? To what extent are age and race associated with cancer of specific sites? How does climate affect cancer? And since these are repeat surveys, the present series should be useful in determining what changes, if any, have occurred during the ten-year interim.

Our second general objective in epidemiology is to extend our knowl-

edge of environmental cancer, which is of special interest not only because it sheds light on the cancer process but because, as we learn more about it, it should be feasible to bring it under effective control. Such control is already possible in a number of areas where cancer is associated with particular occupational hazards.

The first essential in controlling environmental cancer is to determine the extent of the problem, in terms of specific industries and areas. Through cancer survey studies, cooperating State agencies are analyzing cancer deaths and relating them to type and length of employment. This information is being correlated with surveys of local industries.

We are engaged in studies of the occurrence of known cancerogens in selected industrial areas of the nation. It is known, for example, that certain products and by-products of coal and petroleum, arsenic and some other inorganic chemicals, and radioactive substances and rays, will induce cancer in people who have been exposed to them for periods of time. As environmental sources of cancerization are demonstrated, they should be corrected by standard public health methods.

Certain cancerogens are also known to exist in Mexico. Arsenic is commonly found as a constituent of copper and silver ores, and represents a hazard in the smelters of northern Mexico. Some carcinogenic petroleum by-products may be produced in Mexico's oil industry along both the Atlantic and Pacific coasts. But no one knows whether these substances are causing cancer in Mexican workers who have been in prolonged contact with them, for no studies have been made of the problem. Indeed, we are only beginning to make such studies on an extensive scale in the United States. I believe they could be profitably undertaken in Mexico as well, so that effective controls over human exposures to the dangerous substances could be put into effect.

Anyone who reviews the public health aspects of cancer must be struck by the scope and complexity of this problem. As I have pointed out in the course of this talk, the problem is not only one of establishing control measures, but also one of continued research in the development of improved control methods. Cancer control is relatively still in its infancy. The disease itself has only recently been regarded as a public health problem. In the light of these considerations, however, I am continually impressed by the progress being made. With our present knowledge and by further extension of our efforts, we can go far in the control of this disease. We have many valuable control tools at hand; we must make them available to the physician, and others and thus increase their ability to find more cases in the earlier stages when the opportunities for successful treatment are most favorable.

IMPORTANCIA DEL CÁNCER EN LA SALUBRIDAD (*Sumario*)

En su discurso ante la Sección de Enfermedades Transmisibles de la Reunión Anual de la Asociación Fronteriza Mexicana-Estadounidense de Salubridad, el A., al expresar su satisfacción por la labor efectuada por dicha organización desde 1941 en el control de las enfermedades transmisibles, expresó su opinión de que el énfasis sanitario debe desviarse hacia el problema del cáncer y las enfermedades crónicas y degenerativas.

En los Estados Unidos el coeficiente de mortalidad por cáncer ha aumentado extraordinariamente. En México, el cáncer no representa un problema apremiante por ahora, pero el aumento de defunciones por cáncer ocurrido de 1943 a 1944 indica que puede convertirse en problema grave. En ambos países, el problema es esencialmente sanitario.

Las actividades sanitarias para su control tienen dos objetivos primarios: (1) Reducir el lapso peligroso que existe entre el comienzo de la enfermedad, su diagnóstico y el comienzo del tratamiento; y (2) mejorar el nivel de diagnóstico y tratamiento del cáncer.

El Instituto Nacional del Cáncer del Servicio de Sanidad Pública de los Estados Unidos, ha formulado un programa de acción para el control del cáncer que posee interés especial para el médico sanitario, y para todo médico general. El objetivo principal del programa es la educación profesional; y la función más importante del Instituto es la de prestar ayuda económica para incrementar los conocimientos profesionales al respecto. Hasta la fecha, más del 90% de las escuelas de medicina y de odontología de Estados Unidos han recibido fondos del Instituto para programas educativos relacionados con esta enfermedad, y al mismo tiempo tres escuelas de salubridad—Harvard, Yale, y la Universidad de Michigan han recibido subvenciones para el mismo fin.

Uno de los métodos más eficaces para realizar los propósitos del Instituto es el programa de becas para médicos recién graduados. El objeto de las becas es estimularlos a que efectúen estudios clínicos especializados en ramas específicas relacionadas con el cáncer. Hasta la fecha hay 106 becarios adiestrándose en esta forma. Desde 1946, el mayor aumento relativo ha sido en patología. Esta tendencia es muy satisfactoria ya que los patólogos tienen gran influencia sobre las normas médicas de una colectividad; especialmente con respecto al cáncer.

Los programas de subvención a los diferentes Estados, permiten que los médicos y especialistas asistan a clases para conocer los métodos más recientes y eficaces para el diagnóstico y tratamiento de cáncer.

En estos cursos de enseñanza, el Instituto utiliza todos los medios posibles, entre los cuales se halla el de películas descriptivas del diagnóstico, y otras documentarias sobre estudios de investigación de la enfermedad. Además, ha preparado un manual de enfermería y otro para funcionarios de sanidad, el cual se halla en proceso de preparación.

El programa del año pasado representa sólo un principio y éste deberá ser ampliado para satisfacer las necesidades tanto estatales como locales.

Otra rama que merece ser incorporada en el programa es la de enfermería, por hallarse sus servicios profesionales tan estrechamente aliados a la asistencia o cuidado del paciente, pues una enfermera que ha cursado estudios específicos sobre cáncer, puede descubrir síntomas en las primeras etapas de la enfermedad.

El control del cáncer está aun en su infancia y sólo recientemente se ha considerado esta enfermedad como problema sanitario.