

PANEL DISCUSSION

OUTLOOK FOR MEDICAL PROGRESS IN THIS DECADE—  
A DISCUSSION OF THE PROBABLE EFFECTS OF  
MEDICAL ADVANCES ON LONGEVITY

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A CONSIDERATION OF GENERAL PROBLEMS AND PROGRESS

NORVIN C. KIEFER, M.D.:

It has been written that:

Hope, like the gleaming taper's light  
Adorns and cheers our way.<sup>1</sup>

One great part—sometimes obscured but always fundamental—of man's hope for the future is his faith in his continuing ability to conquer disease and postpone death because, as Thomas Mann stated:

All interest in disease and death is only another expression of interest in life.<sup>2</sup>

As medical science has unfolded new vistas of well-being, of health instead of disease, of long life and deferment of death, innumerable newspaper and magazine articles, as well as books, on these subjects are devoured by the public, quite regardless of the validity of a treatment championed or of the fact that a new biological theory still may be the merest embryo. All too frequently, these writings are accepted on faith, faith based not on sober evaluation but on yearning credence.

H. L. Mencken once defined faith as "an illogical belief in the occurrence of the improbable."<sup>3</sup>

I do not say that such faith is undesirable. But I am convinced that among certain groups, for a variety of reasons, a hard, realistic evaluation of where we are and where we may reasonably expect to go is essential to

<sup>1</sup> Goldsmith, Oliver: *The Captivity, an Oratorio*, Chapter II.

<sup>2</sup> Mann, Thomas: *The Magic Mountain*.

<sup>3</sup> Mencken, Henry L.: *Prejudices. Third Series*.

continuation of progress. These groups include, prominently, physicians and actuaries.

Your three physician panelists, today, have no great crystal ball in whose depths you might gaze at the future. Our purpose, I believe, is to describe to you our concept of the current status of some of our major health problems and then share with you some thoughts about the coming few years, not predictions of what *might* happen—you can dream just as well as we can—but of what seems likely to happen, or, even if it is unpleasant news, what seems unlikely.

Through the ages, man has attempted to restore his youth, or at least prolong his life, with elixirs, enchanted waters, special diets and a multitude of other practices. In recent years, there has been increasing publication of optimistic conjectures concerning man's potential life span. At the 1960 National Health Forum,<sup>4</sup> some of the gerontological experts present expressed their belief that man has a potential life span of nearly 150 years, and that our immediate goal should be 120 years.

To me, these are wistful sophistries, without credible substantiation either by interpretation of current knowledge of biological processes or by extrapolation of current mortality rates.

Apparently you agree with me—at least, I haven't seen any actuaries for annuities fall from their seats, in shock!

In the first six decades of this century, life expectancy at birth increased by twenty years;<sup>5</sup> but at age 65 it increased by about two years,<sup>6</sup> a notable achievement but certainly not enough to substantiate the optimism that I have reported.

To reach the current average life expectancy at birth required an average increase in this expectancy of nearly four-tenths of a year during every year of the century. Even if this rate could be maintained throughout the entire century, the average life expectancy at birth in 2000 A.D. would at best be about 85 years, and this would take more than the equivalent of eliminating cardiovascular-renal deaths combined.<sup>7</sup> Actually, the rate of increase slowed to less than two-tenths of a year annually from 1949-53, and has shown even less yearly increase since then.

<sup>4</sup> National Health Forum, sponsored by the National Health Council, Miami Beach, Florida, March 1960. Subject of the 1960 Forum was the health of older people.

<sup>5</sup> Average life expectancy at birth in 1900 was 47.3 years, in 1959 about 69.5.

<sup>6</sup> Average life expectancy at age 65, for 1900-02, was 12.2 years; for 1958, 14.1 years.

<sup>7</sup> Estimated increase in average life expectancy at birth from elimination of these diseases: 10.7 years for white males; 10.3 years for white females. From "Prospects for Further Increase in Average Longevity," B. Woodhall and S. Jabon; *Geriatrics*, 12:587-91, October, 1957.

In a governmental actuarial study,<sup>8</sup> the most favorable estimates of life expectancy at birth in A.D. 2000 were 74 years for males and 79 years for females.

Man is not hurtling toward an "average life span" of 150 years—or 120—or even 100 in this century.

The decrease in mortality rates that has been responsible for the lengthening of life expectancy at every decade of life has been caused chiefly by the decline in infectious diseases and a precipitous drop in deaths during infancy.

In my remarks, today, I am going to make a distinction between "Prevention of Occurrence" and "Prevention of Progression" of disease, terms used by Hilleboe and Larimore.<sup>9</sup> Much of our recent great progress has been in medical diagnosis and treatment—in "prevention of progression" of disease. In a sense, our concern over treatment is an admission of failure in the more fundamental task of "prevention of occurrence" of disease.

Infectious diseases were for thousands of years among man's most mortal enemies. Plague, for example, is believed to have killed one-fourth of the entire population of Europe in the fourteenth century.

In the twentieth century, influenza killed over 20 million people in 1918-19. In the second World War, one-half million American soldiers were hospitalized by malaria at some time.

Today, *in the United States*, infectious diseases are not the most important causes of death and many of them have become rare.

This would seem to be a medical accomplishment of gigantic dimensions. It must be recognized, however, that deaths from infectious diseases began to decrease before the use of control measures arising from the germ theory of disease—and a century before antibiotics.

The greatest progress in health improvement has been in reduction of diseases that responded to social and economic reform. The great microbial epidemics of the past were brought under control not as much by

<sup>8</sup> Illustrative United States Population Estimates, Actuarial Projections, *Actuarial Study No. 46*, U.S. Department of Health, Education and Welfare (Social Security Administration, Division of the Actuary, May, 1957). Typical estimates, using "a definitely optimistic view as to the future course of mortality rates": life expectancy in 2000 A.D., males at birth, 73.97, compared with 65.47 in 1949-51; at age 65, 14.50 compared with 12.74; for females at birth, 78.87, compared with 70.96 in 1949-51; and at age 65, 18.39 compared with 14.95. When a "pessimistic view, particularly with regard to the possibility of reduction in death rates for the diseases of old age" was used, the life expectancy in 2000 A.D. was 3-5 years less at birth and about two years less at age 65 than when the "low mortality" estimates were used.

<sup>9</sup> Hilleboe, Herman E. and Larimore, Granville W.: *Preventive Medicine—Principles in the Occurrence and Prevention of Disease*, W. B. Saunders Company, 1959.

treatment with drugs as by sanitation, general raising of living standards and widespread immunization—prevention of occurrence of disease.

I caution you not to conclude that microbial diseases have been conquered as important potential causes of death or as causes of human suffering and economic loss.

The amazing drop in our tuberculosis mortality rate—per 100,000, from 194 to 6 in this century—has persuaded many Americans that this disease now is of little importance. The mycobacterium tuberculosis, thousands of years old, and an unrelenting infectious agent, does not bother to read the statistical score against itself. Some of its family already have learned to live comfortably, prosper and reproduce in an antibiotic environment. Unless we drop our complacency and determine to eradicate this disease, our recent remarkable advances in its treatment and in reduction of its prevalence and fatality rates may be forfeited.

Early in 1957, an influenza virus was born or revived in southern China. This infamous event went unreported for two months until, in April, Hong Kong was struck by an epidemic. The virus soon was found to be a type A variant to which apparently no one was immune.

It spread throughout the world, and attained epidemic dimensions in the United States in September, before the many steps in developing and mass-producing a vaccine could be completed. For most Americans, vaccine became available only after the epidemic had passed its peak.

A second epidemic struck in 1960. The two epidemics were followed in this country by 80,000 deaths in excess of mortality trends of recent years.<sup>10</sup> I am sure that this was reflected in your own company mortality ratios, just as it was in the Equitable's. There is ample justification to assume that most of these excess deaths were an immediate and, more particularly, latent result of influenza.

In spite of our great advances in epidemiology and virus culture, influenza has not been conquered.

The cost to industry, in absenteeism, of the common cold probably distinguishes this disease as industry's foremost morbidity problem. It has been estimated<sup>11</sup> that among "usually working" persons, aged 17 or over, in the United States, in one year<sup>12</sup> upper respiratory conditions alone cause the loss of 40 million work-days.

<sup>10</sup> Published Proceedings, International Conference on Asian Influenza, Bethesda, Maryland, 1960, sponsored by the University of Southern California School of Medicine, and the Institute of Allergy and Infectious Diseases of the National Institutes of Health.

<sup>11</sup> Health Statistics from the United States National Health Survey (Series B—No. 18), U.S. Department of Health, Education and Welfare; Public Health Service, Washington, D.C., 1960.

<sup>12</sup> July 1958–June 1959.

Vaccines that would greatly reduce the incidence of colds are a real possibility of this decade. It therefore seems incongruous that the Common Cold Foundation, started and supported by American industry, was closed about two and one-half years ago, because of lack of adequate support. Fortunately, and commendably, its work now has been resumed by the National Tuberculosis Association.

A more ominous problem is the current increase of certain types of staphylococcus that are real killers. The reduction or elimination of sensitive organisms by antibiotic treatment has permitted the antibiotic-resistant ones to persist, multiply and spread.

Enormous strides have been made, through social, economic and health progress, against infectious diseases. But they definitely are not completely under control.

As DuBos has said, when the tide is running out, it is easy to have the illusion that one can empty the ocean with pails of water.<sup>13</sup>

Nevertheless, degenerative and metabolic diseases—heart and blood vessel disease, cancer, diabetes, hepatic cirrhosis, and others—have replaced infectious diseases as our greatest causes of death and serious illness. The lack of progress against these diseases has, in fact, been emphasized by progress against infectious diseases because the reduction in infectious diseases has spared many people to live long enough to develop degenerative diseases.

Progress against many infectious diseases is self-accelerating. The more people who become immune, through either an attack of a disease or artificial immunization, the less chance there is for the infectious agent to find susceptible people, new victims.

This advantage in no way applies to progress against degenerative diseases.

Furthermore, in infectious diseases, the weakest or most susceptible human stock gradually tends to die out because primarily these are diseases of prereproductive years. The degenerative diseases chiefly occur late in or after the reproductive years, thus allowing hereditary predisposition to these diseases to be passed down, generation after generation.

Today, one frequently hears that if we were willing to spend enough money, we could solve most of our degenerative disease problems within a decade.

Without doubt, continued progress does demand and richly merits expenditure of increasing, huge amounts of money and time on medical research, both to support the needed research and to train more research

<sup>13</sup> DuBos, Rene: *Mirage of Health—Utopias, Progress and Biological Change*, Harper and Brothers, 1959.

workers. But to proclaim that vast financial outpourings will assure quick results is to misunderstand the nature of such research, if not to speak utter nonsense.

In the first place, there is no research that is so complex as that applied to biological processes.

Man has substituted machinery for muscles; he travels faster than sound and sends communications with the speed of light; he is probing outer space; he has both split and fused the atom. But he still knows little of the most elemental principles of living animal tissue, and even less of its derangements.

Furthermore, what may seem to be the simplest degenerative disease probably has no single cause but rather arises from a constellation of deviations from what we presume to be normal—which we can't define.

In the second place, financial support can not eliminate the tedious, time-consuming monotony of countless repetitions of experimental observations, most of which are destined to end in negative, although perhaps informative, results. Cultures in chick embryos, or even in ordinary media, passage of disease through successive generations of experimental animals, or long-term follow-up studies of treatment of human beings are requisite to modern research and all are biological processes which mere dollars cannot speed or otherwise alter.

With respect to the degenerative diseases, of which the two most important will be discussed later in this panel, great advances have been made in early diagnosis and medical, surgical or radiation treatment. But these praiseworthy accomplishments have seldom prevented the occurrence of a disease. They constitute enlightened, expert management, often with substantial success for at least a limited period, but against a catastrophe that already has occurred.

Although we doubtless will witness further dramatic progress in treatment, and great strides toward fuller understanding of causation, the problem of prevention of occurrence of degenerative diseases will in large measure still be with us at this decade's end, and longer.

Now I am going to turn to another great category of hazards to life or health that are environmental or ecological, rather than infectious or degenerative in nature.

Although man has a relatively poor capacity, among animals, to adapt himself to his environment, he has vastly superior ability to shape his environment to his own needs and purposes. Unfortunately, in doing so he is inclined to pay grossly inadequate attention to some of the fearsome by-products he has simultaneously created, and to neglect developing effective measures to control them.

For example, he accepts with complacency the risk of accidental death or injury over which he has far more control than he has over biological processes and derangements.

Let us look at some pertinent accident facts or estimates for the United States:

- (1) There were 93,000 accidental deaths in 1960.<sup>14</sup>
- (2) There are 50 million activity-restricting or medically-attended accidents annually.<sup>15</sup>
- (3) The total cost is over 13½ billion dollars yearly.<sup>16</sup>
- (4) Of special significance to this audience, accidents not only rank fourth among all causes of death at all ages but from the age of 1 to 36 they are *the* leading cause. In the age group 15–24, they caused 52 percent of all deaths, a higher percentage than heart and vascular diseases combined caused among all ages.<sup>14</sup>
- (5) Among industrial workers, since World War II accidental deaths have decreased 16 percent on-the-job, but only 3 percent off-the-job. In 1960, off-the-job accidents caused 68 percent of accidental deaths among workers.<sup>14</sup>
- (6) In one recent year, injuries to “usually working” persons resulted in 87 million work-loss days.<sup>17</sup>
- (7) Large manufacturing industries usually have good safety programs and commonly establish records of one or more million continuous man-hours of work without a loss-of-time accident. The poorest records among large companies usually are found in those with chiefly office-worker operations, insurance companies not excepted.
- (8) Last year, over 38,000 people—twenty percent of them pedestrians—lost their lives because of motor vehicle accidents. Among vehicle occupants, 5,000 lives, or about 16 percent of the total killed, might have been saved if seat belts were installed and used in all motor vehicles.<sup>18</sup> The number of seat belt installations is steadily increasing but still is distressingly small.
- (9) In over half to three-fourths of driver deaths and in over one-half of pedestrian deaths, the victim had consumed measurable amounts of alco-

<sup>14</sup> *Accident Facts—1961*, National Safety Council, Chicago, Illinois, 1961.

<sup>15</sup> Estimate based on: Health Statistics from the United States National Health Survey (Series B—No. 16), U.S. Department of Health, Education and Welfare; Public Health Service, Washington, D.C., 1960.

<sup>16</sup> Estimate from: *Accident Facts—1961*, National Safety Council, Chicago, Illinois, 1961.

<sup>17</sup> Estimate based on: Health Statistics from the United States National Health Survey, Disability Days (Series B—No. 16), U.S. Department of Health, Education and Welfare; Public Health Service, Washington, D.C., 1960. Estimated number of work-loss days due to injuries for “usually working” persons, 17 years of age and older, was 87,127,000.

<sup>18</sup> Estimate from studies of Automotive Crash Injury Research, Cornell University.

hol, with the highest fatality rates among those who had consumed the largest amounts of alcohol.<sup>19</sup>

- (10) Home accidents ran a close second with 27,500 deaths. Forty-five percent of these deaths resulted from falls.<sup>20</sup> Recently, home safety campaigns have been intensified and industrial off-the-job safety programs comprise an important part of this trend.

Modern industrialization and urbanization go hand in hand. In turn, modern public health and sanitation activities have made urbanization compatible with man's survival as a city dweller.

But, as Kehoe has warned:

The physical background of modern industry (and of modern life) is something new under the sun—an environment made by man which in the making, has taken so much of his total time, effort, thought and ingenuity as to leave very little for learning what might be its ultimate effects upon himself.<sup>21</sup>

Water pollution has increased 600 percent in the past 60 years, and this could become the critical problem of the next 50 years. Wolman has estimated that by 1975 or 1980 our cities and industry will require nearly double the 300 billion gallons daily that we currently are hard-pressed to produce in tolerably good quality.<sup>22</sup>

Control of smog will be another leading and critical health protection need of this decade. Smog consists of industrial wastes, automobile and other engine exhausts, incinerator smoke, other chemicals, dirt, dusts and pollen. Its irritant properties are well demonstrated by eye inflammations in Los Angeles.

The danger of heavy concentrations of smog was shown in 1948, in Donora, Pennsylvania, where 20 died and 6,000 became ill; and in London, where 4,000 excess pulmonary and cardiac deaths occurred in a heavy smog in 1952. And it has been shown in many countries, particu-

<sup>19</sup> Various studies indicate that 40 to 75 percent of drivers and 50 to 60 percent of pedestrians dying as a result of motor vehicle accidents had measurable amounts of alcohol in their blood or breath. In a New York City study ("A Controlled Study of Fatal Automobile Accidents in New York City" by McCarrroll, James R. and Haddon, William, Jr., 1961), of fatally injured, noncommercial drivers, believed responsible for their accidents, 73 percent had been drinking, compared to 26 percent among a control group of nonaccident drivers exposed to similar conditions (same intersection, same time of day, etc.); and 46 percent had very high, *i.e.*, 250 mg. percent or more concentrations compared to none in the control group.

<sup>20</sup> *Accident Facts—1961*, National Safety Council, Chicago, Illinois, 1961.

<sup>21</sup> Kehoe, Robert A.: "Occupational Medicine—Whether and How!", *Journal of Occupational Medicine*, 1:1, January, 1959.

<sup>22</sup> From Dr. Abel Wolman: estimate that 1975–80 requirement will be about 560 billion gallons daily, contrasted with current 300 billion plus gallons.



larly England, that continuous exposure may cause, or at least aggravate, certain nontuberculous lung diseases—chronic bronchitis and bronchiectasis, lung fibrosis, and possibly lung cancer.<sup>23</sup> Successful treatment of the bacteriological complications, such as pneumonia, of some of these diseases is prolonging the lives of the victims for them to become disabled respiratory cripples.

Within the lifetime of most of you, the number of organic chemical compounds used in industry has increased from 20,000 to a million, every one with potential new hazards to people. Yet research and constant diligence by industrial physicians, hygienists and toxicologists has set an enviable example of successful predicting, detecting and controlling of new hazards. This is reflected in the continual decrease in life insurance industrial occupational ratings.

These highly important hazards may be overshadowed, in the coming years, by the dangers from ionizing radiation. As Hilleboe has stated:

Atomic fission and fusion—the scientific offspring of the twentieth century—have changed forever the environment of every living creature on earth.<sup>24</sup>

There are five chief sources of ionizing radiation. The hazard to human beings must be measured in terms of total lifetime exposure to all of these sources combined:

- (1) Natural: cosmic radiation and naturally-occurring materials, such as radium and uranium.
- (2) Man-produced for medical, dental and related purposes: X-rays and radioactive isotopes. Their great benefits are accompanied by dangers which, however, are steadily being reduced by special protective equipment and techniques. Unnecessary hazards, such as commercial shoe-fitting fluoroscopes, are being eliminated by regulations.<sup>25</sup>
- (3) Man-produced, for industrial nuclear power: the hazard to employees working with atomic fission power equipment has been well-controlled. Disposal of radioactive waste from such equipment constitutes a major public health problem. Price warned four years ago that the Atomic Energy Commission

<sup>23</sup> "Medical Aspects of Air Pollution," International Conference, Vienna, August, 1960, from *Conference*, published by Science Information Bureau, Vol. 1:2, October, 1960.

<sup>24</sup> Hilleboe, Herman E. and Larimore, Granville W.: *Preventive Medicine—Principles in the Occurrence and Prevention of Disease*, W. B. Saunders Company, 1959.

<sup>25</sup> Prohibited in New York State by a 1957 regulation.

had more than 65 million gallons of radioactive waste buried in tanks in the earth.<sup>26</sup>

- (4) Radioactive fall-out from nuclear weapons testing: the greatest but not the only danger is from ingestion of food, particularly milk, contaminated with radioactive matter, with subsequent immediate damage or long-term effects of deposition in bone marrow or other tissues.
- (5) Enemy attack with nuclear weapons: this is not within the scope of my remarks.

The chief dangers from ionizing radiation, whether from single over-dosage or repeated smaller exposures, are (a) somatic or body effects, leading to bone cancer, leukemia, acceleration of the aging process, and other tissue destruction, and (b) gonadal effects with subsequent mutations and major genetic changes.

Accurate assessment of these hazards is not possible. The limits of relatively safe, presumably unsafe, and distinctly unsafe or lethal exposures are a matter of legitimate controversy. It is of scant comfort, in today's circumstances, to pontificate that the only safe exposure is no exposure.

Medical and industrial sources, as well as certain fall-out products, can and *must* be controlled. This need is emphasized by the fact that occurrence of fall-out from weapons testing and massive radiation from cataclysmic nuclear warfare are not within the control of normal health protection services.

In brief summary, I have tried to establish that:

- (1) Man's life expectancy at various ages probably will gradually increase but not to the extent of commonly heard optimistic conjectures.
- (2) Many infectious diseases have been brought under control in this country but the danger has by no means been eliminated.
- (3) Degenerative diseases are the major disease problem of the coming decade and will continue to be for many decades.
- (4) Intensified medical research is imperative but mere increase in financial support of research cannot quickly solve our health problems.
- (5) Accidental deaths and injuries are major hazards to life and health, and can and must be reduced.
- (6) Water and air pollution will be increasing hazards to health in the coming years unless far more effort is devoted to controlling them.
- (7) Ionizing radiation could become our foremost health problem and every possible effort must be made to reduce this hazard.

Finally, time would not permit discussion of many other important disease considerations, including the critically important problems of mental health.

<sup>26</sup> Price, David E.: "Radiation as a Public Health Problem," *Public Health Reports*, 73:3, March 1958.