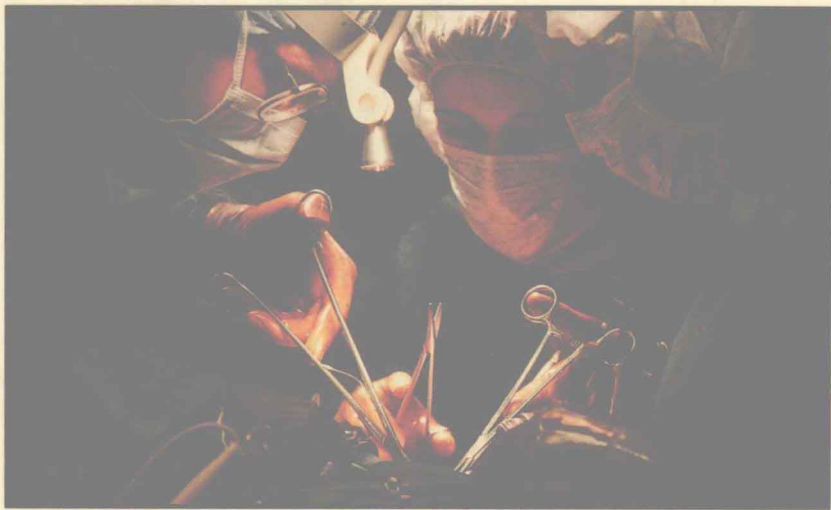
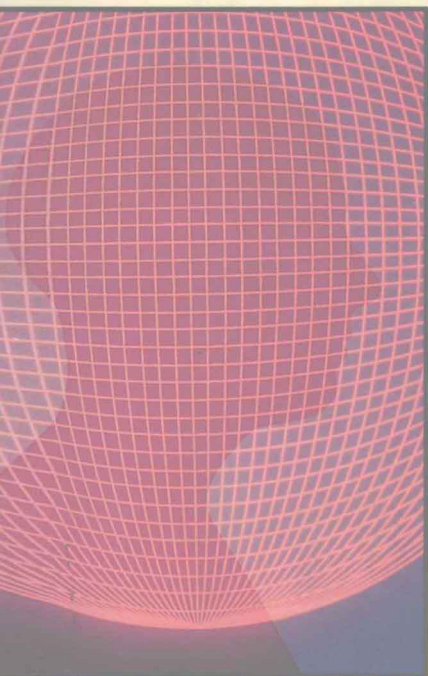


THE HEALTH CENTURY

Edward Shorter, Ph.D.



A companion to the PBS television series



THE

HEALTH

CENTURY

Edward Shorter, Ph.D.

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First Edition

Books by Edward Shorter

THE MAKING OF THE MODERN FAMILY

THE HISTORY OF WOMEN'S BODIES

BEDSIDE MANNERS:

THE TROUBLED HISTORY OF DOCTORS AND PATIENTS

For my dearest Anne Marie

Acknowledgments

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PREFACE

As he lay dying, Hezekiah turned his face to the wall and prayed to God to grant him fifteen more years. He had been a good man, and it came to pass that the Lord fulfilled his prayer. Hezekiah got fifteen more years. But for a thousand years and more after that biblical story, it did not occur to most people that fifteen more years might be possible, outside of a miracle. They lived in the midst of plague, filth, and death.

We are the modern Hezekiahs. Only in the last century has it become possible for us to seize more time. Although the *idea* that science could help medicine goes back a long ways, the results were yet to be born. Today we have them in hand. The practical means of extending our life span and granting ourselves years free from chronic disease lie now before us as a result of the advances in research and therapy of the Health Century.

Before the middle of the last century, doctors could set broken bones, lance boils, and treat symptoms, but they could not cure disease. Today, if we fall ill with most of the common diseases, we have a good chance of getting Hezekiah's fifteen years and many more. This book tells the story of that progress.

The story is an international one, of scientists and bedside doctors from throughout the world—especially Europe and North America—making contributions in research that cumulate sooner or later in better health. This book concentrates on American contributions to that larger tale, for two reasons. One is that, after 1945, it really was the American locomotive that led the train; other engines pulled along, but the strongest by far was that of the United States. And this world predominance of American medical research was made possible by a historically unique combination of circumstances: a triangle of cooperation among academic medicine, research in the private sector, and the American government's National Institutes of Health, the world's largest organization for medical research. Some countries, such as Germany, had great traditions of academic medi-

chine. Others, such as Switzerland, had energetic drug companies doing research. But only in the United States did these three spheres—academe, industry, and government—come together for a surge in knowledge about the body that is comparable to the surge of understanding of art and culture in the Renaissance.

There is a second reason for concentrating on the United States. The publication of this book marks the hundredth anniversary of the “jewel in the crown” of the federal government’s research effort, the National Institutes of Health (NIH). This is not a history of the NIH. But it is a history of the Health Century that began in 1887 with the foundation of a one-room laboratory in the Marine Hospital on New York’s Staten Island from which the NIH later grew.

While there are many players in the game, among them universities like Harvard and Yale or companies like Merck and Pfizer, the NIH has dominated the field in the years after World War II, either financing or being directly involved in most of the major medical advances we have seen. So it is not puffery to feature its contribution to the Health Century.

We shall move in the book from youth through old age. Or, as Dr. Edward Schneider of the National Institute on Aging—one of the twelve NIH institutes—says, “Only after scientists had conquered the diseases of infancy and childhood could they afford the luxury of investigating the diseases of old age.” We begin with the triumphs over infectious diseases, maladies that once struck children with special force. We will look at a new conception of the body and its processes—molecular knowledge—and then at several specific areas where fundamental medical research has produced important clinical payoffs: the brain (which is the organ of the mind), cancer, and the immune system. We describe the real advances over heart disease and the melioration of the aches and pains of aging which have occurred. And finally, we will explore the manipulation of genetic material, the very stuff of life itself, for a future of research that would have seemed unimaginable twenty years ago.

Twenty years ago! At that time John Kennedy had already been dead for four years. The changes have been breathtaking. This book will let us catch our breath a bit by putting these changes in historical perspective.

EDWARD SHORTER

Toronto, Canada
April 1987

THE
HEALTH
CENTURY

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ONE

The Health Century Begins

Two Sick People, a Hundred Years Apart

Our first story concerns two sisters from Long Island. In 1887, in their world of grand homes and carriages to take them to the doctor, the sisters swam in disease. Five of their eight brothers and sisters had perished in infancy. Their mother "had died of some nervous trouble after childbirth."

At age nineteen one of the sisters went to see Dr. F. I. Knight with a cough of some nine months' duration. Dr. Knight diagnosed tuberculosis in her lungs, but there was nothing he could do about it; he had neither drugs nor therapy for tuberculosis. Nor did any other doctor. "The patient gradually declined," Dr. Knight wrote, "and died April 15, 1887."

But then her sister fell ill as well, and it is the case of this sister that interested Dr. Knight, for he was trying to demonstrate that tuberculosis was contagious. The sister had occupied the same bedroom as the first victim. "She had continued to attend closely upon the invalid all winter, and had disregarded all my advice. She had even slept with her sister. . . .

She was with her night and day.” The second sister then developed a dry, hacking cough, a fever, and began breathing quickly. After listening to her lungs, Dr. Knight diagnosed tuberculosis. She was now so weak that she had to be supported from the carriage to Dr. Knight’s house, where he saw his patients. She started coughing up blood, and died two months after her sister.

In the world of disease of 1887, the beginning of the Health Century, doctors could diagnose disease but not cure it. Medicine had been placed on a sufficiently scientific basis that doctors were starting to understand what underlying physical lesions in the body produced what symptoms.¹ But there science stopped. Tuberculosis was the number one cause of death in those days, and doctors had few drugs that worked. For pain they could inject morphine; for malaria there was quinine; smallpox vaccination was becoming routine; and digitalis was available though seldom used for heart failure. And that was it. There were no other vaccines; no specific remedies against any particular disease; no antibiotics; nothing. Not even aspirin was available.

A hundred years later another New York woman, Professor Elaine Brody, a sixty-three-year-old musicologist at New York University, lay ill. This time it was not tuberculosis, which has been curable since the 1950s. It was breast cancer. Her doctors at New York’s St. Vincent’s Hospital had treated the actual cancer in the breast well enough, but it had spread to her liver and abdomen. “Her liver was massively enlarged and it was failing. She was a few days from death,” said Dr. William Grace, chief of the hospital’s cancer program. Professor Brody knew she was dying. “I was making funeral arrangements. I knew I would never finish my book. My family and I would never take our barge trip through France.”

But medicine now has resources, even against as awesome a disease as breast cancer. Radiologist Richard Neff, watching what he was doing with a computerized X ray system that produces an enhanced image, was able to insert a thin tube into the patient’s liver. “With this system,” Dr. Neff said, “we can put a catheter in some very hard-to-reach places. Without secondary organ damage, and with much less discomfort for the patient.” Cancer drugs could now be infused directly into the liver, at concentrations that wouldn’t be possible if they were injected into the blood or swallowed. And after six days of treatment, Professor Brody’s liver had gone back to its normal size. “All evidence of cancer on physical examination,” the hospital tells us, “had disappeared. Within two weeks, she was back at work on her book. And soon thereafter she and her family were floating down a French canal.”²

In the hundred years between these two typical illnesses, many diseases

have miraculously been cured, and our life expectancy increased. In 1887 a baby girl could expect to have forty-four years of life, today she can expect to live for seventy-eight years. That is a 77 percent increase in life expectancy at birth in this Health Century. If you were a woman of twenty in 1887, you could expect to live another forty-two years; today a woman of twenty can expect to live another fifty-nine years. Today's young woman has thus won a 40 percent greater life expectancy.³

Not all these extra years are owing solely to medical research and drugs. Before the Second World War, great strides in the life expectancy of children, for example, had resulted from the public health movement, from clean water and flushing away sewage in cast-iron pipes, from washing one's clothes and body regularly, and from laws stipulating that food and drink no longer be adulterated. It is really after the Second World War that the drug revolution begins to take hold, making a major contribution to life expectancy and to the relief of such chronic problems as arthritis and infertility. Since 1950, for example, death rates from heart disease have been dropping by an astonishing 4 percent a year; over that period deaths from stroke have declined almost 2 percent annually.⁴ Both declines are due in large part to the development of drugs against high blood pressure.

Because so much of this book will be about distinctively American contributions to health after the 1930s, it shouldn't be forgotten that all was not blackest night before that time. In the millennia of previous history, some substances had been unearthed that helped fight some illnesses.

Take malaria, for instance, a disease that James Shannon, one of the coming cast of characters, helped push back. In the sixteenth century it was discovered that the bark of a certain tree, when taken medicinally, helped fight the disease. Quinine was isolated from that bark as early as 1820.

Parents have always been hypnotized by the epidemic killers of childhood, although historically many more children have died of simple dehydration from diarrhea than from such notorious maladies as scarlet fever. It was not with antibiotics but with vaccines that these diseases were vanquished. The first vaccine, against smallpox, came in 1798. Then there was a bit of a pause, and an antiserum against the toxin of diphtheria appeared early in the 1890s. Thus, even before the beginning of the Health Century, the health of children had begun to improve significantly.

And what of the health of middle-aged men? After reaching an age when they could look back in dismay upon their student days and drunken trips to bordellos, men would begin to obsess about syphilis. Of course, people

had long known of a general connection between venery and syphilis, but doctors also thought that loose living and staying up late at night could cause it. Not until the first decade of the twentieth century was it established that syphilis was transmitted through a venereally acquired organism. And a successful therapy for it came several years later, when in 1910 Paul Ehrlich announced the discovery of a compound that really did stop the causative organism from multiplying in the body. The Bayer chemical company produced it at works in Hoechst, Germany, under the proprietary name Salvarsan.

Before 1935 there were a few other drugs for specific maladies: insulin for diabetes, discovered in 1922 at the University of Toronto; a liver extract developed by several American scientists for pernicious anemia; and several vaccines for other diseases of childhood.⁵ But although diabetes and pernicious anemia were tragic diseases, they did not reach into the life of every household.

What reached into every household were bacterial infections, and against these doctors were totally helpless. "As I look back over the old casebooks," wrote Arthur Hertzler, a Kansas country doctor, in 1938, "I wonder now just how much real good I did. Certainly the medicines I dispensed were merely symbols of good intentions."⁶ William Osler, probably the most distinguished physician of the day and then at Johns Hopkins Medical School, wrote of scarlet fever, "Many specifics have been vaunted . . . but they are all useless." Of therapies for rheumatic fever, a bacterial infection that affects the heart valves in particular, Osler said, "Medicines have little or no control over the duration or course of the disease, which, like other self-limited affections, practically takes its own time to disappear."⁷ Osler was like many doctors before 1935, when the first wonder drugs were announced—a therapeutic nihilist. He was dubious about the ability of drugs to cure disease.

Although earlier vaccines had caused many historic killers such as smallpox to recede, children in particular in the Roaring Twenties were still exposed to infections that could be life-threatening. A random survey of illness in 1928–31 among nine thousand white families living in eighteen different states found that, for children under five, each year one child in thirteen had had measles; one child in twelve had had whooping cough; one child in a hundred caught scarlet fever.⁸ These figures may not sound enormous. But they mean that, in any given year, if a child had twelve friends, one of them would have whooping cough; if there were a hundred children in the first grade, one of them would come down annually with scarlet fever. You can die very easily from either disease, and there was nothing that medicine could do to help, save ease the symptoms.

The true medical revolution of our times begins in 1927, when Gerhard Domagk was appointed chief of animal research in a German drug and chemical firm, the I. G. Farben company, a firm later to become notorious for its exploitation of slave labor under the Nazis. He had been experimenting with the kind of dyes the German organic chemical industry had been so successful in developing. In 1931 he hit paydirt when some of the dyes with a sulfur-nitrogen side chain (sulfonamide) began to cure mice without side effects. The researchers were jubilant, and a year later, on Christmas Day, 1932, they submitted a patent application for a particularly promising red dye. They called it Streptozon.

Weeks later the head of I. G. Farben's medical division approached Domagk, asking him if he had anything that might help a ten-month-old boy dying of blood poisoning. "Treatment began at once, the baby receiving half a tablet twice daily by mouth. To everyone's astonishment, the baby did not die." Instead the infant was cured and was discharged from hospital three weeks later. Two years now pass; the drug is tested on patients locally, and in February 1935 Domagk announces his discovery to the world. He has invented sulfa drugs.

Domagk's own daughter pricks her finger, develops severe blood poisoning, and is saved by the new drug. In January 1936 samples are given to doctors at the Queen Charlotte's Maternity Hospital in London for women with postdelivery and postabortion infections. There is success on every front with a drug that I. G. Farben is at this point calling Prontosil.

In the meantime the scene switches to France. In the spring of 1935 doctors at the Pasteur Institute—the French equivalent of the National Institutes of Health (NIH)—had synthesized some Prontosil on their own. Then they analyzed the urine of the patients to whom the drug had been given. They found, not leftover Prontosil, but a much simpler substance long known in the literature as sulfanilamide. The complex dye had been broken down in the body to its essential active ingredient, and now since the patent protecting it had just expired, French chemists proceeded to make sulfanilamide on their own.⁹

These sulfa drugs mark the beginning of the end of *bacterial* infection. There are other kinds of infections, which as yet remained untouched, but this first step in conquering bacteria was revolutionary. And the sulfa drugs were just the beginning. By 1941 penicillin was on the horizon. Then after the war new drugs were discovered for tuberculosis, for chronic inflammation, for ulcers. And the list goes on. The current edition of *Goodman and Gilman*, which is the Bible of drug therapy, has 1839 pages, and these are not pages about the healing power of chamomile tea, like the