

DOCTORS ON
THE NEW FRONTIER

Breaking Through the
Barriers of Modern Medicine

*by WILLIAM HOFFMAN
and JERRY SHIELDS*



DOCTORS ON

Breaking Through the

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Contents

Acknowledgments

Introduction

	1
1 <i>Norman Shumway and Heart Transplants</i>	5
2 <i>Kenneth Cooper and Exercise</i>	42
3 <i>Thomas Noguchi and the Doctor as Detective</i>	61
4 <i>Nathan Kline and Mental Health</i>	87
5 <i>David Baltimore and Genetic Engineering</i>	110
6 <i>Frances Oldham Kelsey and Thalidomide</i>	134
7 <i>Patrick Steptoe and the "Test-Tube" Baby</i>	157
8 <i>Irving Cooper and Brain-Freezing</i>	181
<i>Index</i>	201

Introduction

FULL OF THEMSELVES and thrilled by what they had accomplished, the two men who were about to be world famous left Cambridge University's Cavendish Library by a side door, angled across Free School Lane, and popped into the Eagle, a popular pub where generations of the great institution's scientists have met to discuss experiments and celebrate triumphs. Over drinks, James D. Watson, then only twenty-four, a youthful Ph.D. in biology from Indiana University, and Francis Crick, thirty-six, talked together excitedly like little boys. When friends stopped to ask what the commotion was about, Crick did not waste words: "We have," he said, "discovered the secret of life."

It was an astounding remark, guaranteed to generate instant disbelief, but in a sense it was true. On that late, unpromising winter day in 1953, the two unknown scientists had succeeded in working out the double-helical shape of deoxyribonucleic acid, DNA. Inside DNA's spiral-staircase construction were locked the riddles of heredity, growth, disease, and aging—and in higher creatures like human beings, perhaps memory and intelligence. DNA was truly the master molecule of life, the basic ingredient in the cells of all living organisms.

The unraveling of the DNA double helix—one of the great achievements in science, comparable to the publication of Darwin's *Origin of Species* or the splitting of the atom—was accomplished by an extremely unlikely pair. Crick and Watson were, on the surface, poorly equipped to succeed at a task so forbidding it had stymied many of the world's most skilled chemists, including the celebrated Linus Pauling, the only individual ever to win two separate, unshared Nobel Prizes. Watson was deficient in chemistry, mathematics, and crystallography, while Crick knew almost nothing about genetics. Yet *together* the brash young scientists demonstrated how it was possible for virtual unknowns to win the coveted Nobel.

The Watson-Crick breakthrough at Cambridge was merely one of the first in an unprecedented series of recent scientific advances that have the entire medical community astir with excitement. Many laymen are not even aware that the advances have occurred, yet this progress promises to do nothing less than revolutionize human history. What follows are a few examples:

- Artificial blood has been developed. It was first used in the United States in October 1979, at the University of Minnesota, for a sixty-seven-year-old Jehovah's Witness who believed that transfusions were forbidden by the Bible. Previously, doctors had to catch blood on the operating table and return it to certain religious-minded patients, but the development of artificial blood goes far beyond this rather narrow application.

- The "Six Million Dollar Man" may soon become a reality. Dr. Nathan S. Kline, director of New York's Rockland State Hospital, and one of the real giants of medicine, believes humans can be surgically adapted to life in other environments (space, other planets, underwater) by implanting medical devices. A similar idea has been put forth by Jacques Cousteau, who suggested that surgically implanted gills would allow humans to live in the oceans without auxiliary life-support systems. Altering the human structure with chemical and/or electromechanical devices may soon produce a superhuman creature who can do almost anything, anytime, anywhere.

- Thanks to technological progress in the dynamic field of microsurgery, sterilized women and men can become fertile again. In 1978, 80 million people were sterilized; the figure is expected to rise to 200 million by 1985. Scientists predict that when the delicate reversal procedure is perfected (and some doctors have already achieved a pregnancy rate of 75 percent for patients), sterilization will be the most desirable method of birth con-

tol for people who choose only to postpone, not preclude, parenthood.

● The human-to-human heart transplant operation, when performed by Stanford University's Norman Shumway, has attained a success ratio equivalent to that for kidney transplants, and the *artificial* heart is perhaps only a year away. Since more than half the deaths in the United States are the result of heart disease, advances in this critical field may soon herald dramatic increases in life expectancy rates.

● Diseases of the nervous system have become increasingly amenable to surgical intervention. New technology based on the operating microscope and microinstrumentation has made it possible to redirect blood flow from an artery in the scalp through the cranium into the arteries that supply the brain. This new *bypass procedure* can prevent a stroke in some patients who otherwise would likely have one; for many stroke victims it can prevent another stroke; and for some it may lead to at least a partial recovery of lost function. Again, for the general population, the result could be an increase in life expectancy.

● Human cloning, the asexual reproduction of genetic carbon copies, is within the realm of understood scientific knowledge. But who should be cloned, and why? When geneticist Hermann J. Muller broached the idea of sperm banks in *Out of the Night* (1935), he suggested that a man like Lenin would have been a promising donor. In later editions of Muller's book Lenin was replaced by Leonardo da Vinci, Descartes, Pasteur, Lincoln, and Einstein. Most scientists put cloning on their lists of things people should never do, but history teaches that if individuals are capable of accomplishing an act, they will probably proceed to do it.

● There is a growing and barely suppressed sense of excitement among medical researchers that a major advance in cancer therapy is just around the corner. Cancer, mankind's most dreaded disease, claimed 405,000 lives in 1980 in the United States alone, yet the illness was fought with only one or a combination of three kinds of often-unpleasant, seriously debilitating, and sometimes quite disfiguring treatment: radiation, chemotherapy, and surgery. One of the new possible "miracle" substances is leukocyte interferon, produced by extracting white blood cells from whole blood and exposing them to a virus, resulting in a cellular protein that acts to inhibit viral growth. The normally very cautious American Cancer Society says "early indications suggest that interferon may have the capacity to bring about objective tumor reduction."

● The first test-tube baby (actually a misnomer—conception takes place in a flat container called a Petri dish) was delivered at the Oldham and District General Hospital in Lancashire, England, on July 25, 1978. Ever since the birth of Britain's Louise Brown, childless American couples have

been asking for a similar chance in their country. It seems their requests have been answered. Virginia became the first of the states to approve establishment of a center for *in vitro* (in glass) fertilization, and the clinic in Norfolk was promptly inundated by 2,500 applications. "This is an answer to our prayers," said Sarah Smith, thirty-three, of Virginia Beach, who appeared to be voicing the thoughts of countless infertile couples.

There have indeed been many startling, spectacular advances in recent medical science, bold breakthroughs wondrous to witness. The plain truth is that in no other time have the practitioners of medicine accomplished so much.

It has been argued by reputable philosophers and scientists that man assumes the role of God, venturing into areas best left unexplored, and despoils, pollutes, and kills. Yet it is undeniable that man has learned how to preserve life, to improve it, and therefore to hold out the promise of an existence incomparably better than any we have known.

This book is about those scientific advances, and about the super-doctors who brought them to fruition.

Norman Shumway and Heart Transplants

Coronary heart disease has reached enormous proportions, striking more and more at younger subjects. It will result in coming years in the greatest epidemic mankind has faced unless we are able to reverse the trend by concentrated research into its cause and prevention.

—WORLD HEALTH ORGANIZATION

THE INTERNATIONALLY ACCLAIMED DOCTOR was not on trial for murder, although some knowledgeable courtroom observers thought he might as well have been. Defense attorney John Cruikshank was arguing it was not the bullet from his client's gun that killed Samuel Moore, but the illegal removal of Moore's heart for transplantation by Dr. Norman Shumway. Indeed, if Cruikshank successfully persuaded the jury, it was possible the pioneering heart transplant surgeon would himself be charged with murder. *Someone* killed Samuel Moore.

Fifty-year-old Norman Edward Shumway was no flashy Denton Cooley or Christiaan Barnard-type surgeon—darlings of the medical media—but a quiet, modest, hard-working, exceptionally gifted doctor with an unparalleled record of success: at the time of the trial he had performed sixty-five heart transplants, and twenty-three of the recipients were still living. Moreover, Shumway was not just a brilliant surgeon. He was a thorough and absolutely dedicated researcher who had spent the unglamorous, painstaking, but necessary years in laboratories developing the techniques that made the heart transplant operation possible—techniques the talented South African Christiaan Barnard employed to amaze the world and make

medical history. Yet Shumway had accomplished still more. As chief of cardiovascular surgery at the University of Stanford, he had shunned a lucrative private practice to become a teacher training doctors for the future, and already two of his pupils were establishing solid reputations as heads of cardiovascular teams at other universities. Colleagues called Shumway an "early-and-late man"—he arrived at work very early, was always one of the last to leave. His rare skills were in such demand (patients came from all over the world to see him) that he seldom had the time he wanted to be with his wife and four children.

Nevertheless, at times in the courtroom it seemed as if Norman Shumway were on trial, and not the individual who had squeezed the trigger.

The national media were interested in the case. It was courtroom drama of the landmark variety that promised to make both legal and medical history, yet the facts were remarkably simple. On September 10, 1973, in Oakland, California, Andrew D. Lyons, thirty-four, shot Samuel Moore, twenty-nine, in the head after a dispute at Lyons' house. The accused was initially charged with assault with a deadly weapon, a serious offense but hardly murder. Defense lawyer Cruikshank would reason that his client might never have been charged with the graver crime had not Dr. Shumway removed Samuel Moore's heart.

On September 12, 1973, two days after the shooting, doctors at Highland Hospital in Oakland ruled that Moore was "neurologically dead," which meant there was no independent breathing, no response to stimulation, and no brain activity; a flat pattern denoted the absence of brain waves being measured on an electroencephalograph. Highland Hospital's Dr. Rubert Burn concluded that Moore's chances of living were "one in a million" and called Norman Shumway to notify him of a potential heart donor, since Moore's wife and mother had both given permission for the victim's heart to be taken.

Despite this go-ahead from relatives, the course Shumway set sail upon was across very dangerous waters, and he knew it. Alameda County regulations outlawed transplants from apparent homicide victims until after an autopsy had been performed, since proof of cause of death would be required in any subsequent trial. Shumway

had a legal and ethical question to answer and did not hesitate. He was more concerned with saving the life of his own terminally ill patient, Blaine Wixon, than with observing a law he considered a carryover from a past that could not envision the development of transplant surgery, much less know that organs would be useless for transplant after an autopsy.

Shumway faced still another problem. The acting medical director at the University of Stanford had signed an agreement with the Santa Clara County coroner's office stating that no transplants would be performed on "known or suspected homicides" from that county.

Most serious of all, Samuel Moore's machine-assisted heart was still beating.

Technically at least, Shumway skirted both the Alameda County law and the agreement signed by Stanford's acting medical director. He removed Moore's heart in Oakland, immersed it in a cold brine solution, and transported it to Stanford by helicopter, the first time in history a heart was carried any significant distance—about twenty-five miles—for transplantation. Thus the transplant was not performed in Alameda County, nor was the victim from Santa Clara County.

A law and an agreement may have been deftly sidestepped, but the controversy was just beginning. It soon became clear that the trial of Andrew Lyons was to be no ordinary murder case but would examine an enormously important medical, legal, religious, ethical, and philosophical question: When is a person dead?

"Most surgeons wanted a 'brain death' definition," a San Diego physician pointed out. "But in extremely rare cases some doctors will argue that people have 'come back' to life after brain death, and it's a proved medical fact that while certain body functions can continue for long periods after the brain has stopped working, life of *any sort* is impossible after just a few minutes without a beating heart."

This doctor, and most others in the United States, believed that a working heart was the most reliable sign of the existence of life, but they also felt "brain death" to be an eminently valid concept. The Soviet Union's Minister of Health, Dr. Boris Petrovsky, did not accept the American idea of brain death. Petrovsky said the Soviets had discontinued transplant research because they did not believe it was proper to take a heart while it was still able to function. The

Russian medical chief had spent more than an hour with Shumway at Stanford Medical Center and said he respected the American as "a great surgeon and pioneer in his field," but contended the two had "divergent" views on heart transplant surgery. He said that although no one was "more qualified" to perform the operation than Shumway, such surgery should wait for the development of an artificial heart.

Santa Clara County coroner Dr. John E. Hauser was vocal in his criticism of Shumway's avoidance of the law. Hauser had been feuding with Shumway since 1968, when the coroner's office filed a complaint with the county district attorney, saying Shumway had promised to notify the coroner's office "as soon as possible" when a heart donor situation arose. In the 1968 case it was claimed notification had not been received until three hours after surgery started. The operation involved the heart of Marine corporal Larry B. Smith of Stockton, who was in an auto wreck while on leave and sustained irreparable brain damage. Shumway transplanted the twenty-year-old Marine's heart into the chest of Leonard Drake, a forty-two-year-old retired postal clerk with a long history of heart trouble.

"Somebody is trying to make a big name for himself," said Larry Smith's mother, who had given permission for her son's heart to be used in the operation. "They ought to leave Dr. Shumway and his good work alone."

Mrs. Smith's statement seemed to settle the matter, and the controversy died—but only for the time being. It would be resurrected again at the trial of Andrew Lyons.

The narrow legal question was whether the cause of death was the bullet fired by the accused or the removal of the heart by Shumway, but what really was at stake was the distinction to be made between life and death. Moreover, the future of heart transplant operations to a large extent hung in the balance, because people like Samuel Moore, with a damaged brain but a healthy heart, were the ideal donors sought by surgeons (incidentally, Moore's kidneys were successfully transplanted into two women, age fifty-two and sixty-two, in what the *Los Angeles Times* called an "unprecedented three-organ transplant").

The trial of Andrew Lyons really did go far beyond the question of one man's fate. In 1968 a prestigious panel of medical scientists

at Harvard had proposed "brain death" as a substitute for the traditional definition—"when the heart stops beating"—but many people inside and outside of medicine, especially outside, were not willing to accept such a radical change. The truth was that an individual's own life might someday depend on the distinction: it seemed easier to imagine being asked to donate a heart than to receive one.

Oakland coroner Roland Prah! disagreed with his Santa Clara counterpart, John Hauser. Shumway had not violated the law, Prah! said, and furthermore the Stanford surgeon's decision to operate was justified and could not morally be reversed, since he had clearly promised the dying patient Blaine Wixon that he would be a transplant recipient. Wixon, incidentally, died before the trial. He lived a month with Samuel Moore's heart.

The argument that Shumway felt morally obligated to Wixon was a powerful one, and easily substantiated. Shumway was known for taking a strong personal interest in his patients, and unlike most of the great heart transplant specialists, whose schedules were also packed to bursting, he never failed to find time *after* the operation to maintain what he believed was a psychologically helpful one-to-one relationship.

Andrew Lyons was charged with murder on September 13, 1973, the day after Samuel Moore's heart was removed. But what would happen if Lyons' defense were successful? Would Norman Shumway, little known by the public but perhaps *primus inter pares* among heart surgeons, be brought to trial for homicide? Samuel Moore, after all, had not been dead according to the traditional definition—"when the heart stops beating"—and it could and would be argued there was always that "one" in "one in a million."

Shumway may have welcomed the controversy, but not because he saw a means of furthering his career or grabbing headlines. Far from it. His career was already a ringing success, and, in any case, he had never sought publicity. He was scrupulous in focusing attention not on his own individual accomplishments but on the collective work of his surgical team. It was to the team he invariably gave credit.

Shumway was anxious for vindication in the Lyons' trial because of a bone-deep belief that the current definition of death belonged to an era of medicine no longer relevant. Also, he was the world's

number-one proponent of human heart transplant operations; for more than fifteen years he had been researching and experimenting in the field, carrying on with determination when other surgeons became discouraged, and he knew full well the crucial importance of the decision to his specialty.

California law was not specific. It did not define death, but said instead that a doctor must pronounce a potential donor dead before a transplant could take place. Dr. Rubert Burn had made such a pronouncement by declaring Samuel Moore "brain dead," but the court would have to decide whether that was sufficient. Also to be determined, of course, was the future of a living human being, Andrew Lyons.

Previously, breathing and heartbeat had been the criteria for judging life, and there was no problem because the cessation of those vital functions always closely coincided with the end of brain activity. But the invention of respirators, which mechanically induced breathing and kept oxygen and blood flowing through the body, wrought nothing short of a sea change. The heart, unless otherwise damaged, would continue to pump blood as long as oxygen was provided, and the body could go on living even though the brain no longer worked. When a person was breathing and his heart beating, was it permissible to "pull the plug"—disconnect the respirator and other mechanical life-support systems—and allow the body to die along with the brain?

The case came to trial on April 10, 1974, and the courtroom was packed. The curious were there, and so were numerous reporters, because even the most obtuse editor could tell this was a story that sold newspapers. At stake for Shumway were his considerable reputation and his life's work. For defense attorney Cruikshank there was the opportunity to win a sensational case and save a client from what otherwise was certain conviction. For Andrew Lyons, it was freedom or possible lifetime imprisonment.

Shumway's testimony came on the sixth day and was the highlight of the trial. The jury saw a tall man, just under six feet, slender and dignified. He was pleasant-looking rather than handsome, had a broad Midwestern face with high cheekbones, prematurely gray hair, dark eyebrows, and intelligent, alert eyes. He spoke softly on the witness stand, but was tough-minded and totally unwilling to con-

cede any irregularities where his own professional conduct was concerned.

“To use stoppage of the heart,” Shumway said, “is a Boy Scout definition of death. When the brain is dead, that’s it.”

It would have been helpful to the defense to be able to portray Shumway as an adventurer, a reckless medical daredevil playing free and loose with people’s lives, but that would not have worked. The doctor’s reputation was simply too secure. Nevertheless, Cruikshank’s examination was vigorous, and Shumway stuck doggedly to his position that Samuel Moore was legally and actually dead when his heart was removed. “The brain in the 1970s,” he said, “and in the light of modern-day medical technology, is the *sine qua non*—the criterion for death. I’m saying that anyone whose brain is dead, is dead. It is the one determinant that would be universally applicable because the brain is the one organ that can’t be transplanted.”

John Cruikshank was not so easily put off. He tried to establish that because Samuel Moore’s heart was to be used for transplant, doctors had been less than conscientious in doing everything possible to save his life. Dr. Jack Copeland, a resident in heart surgery at Stanford Medical Center, had been with Moore in Oakland for twenty-four hours prior to the removal of his heart, and he responded angrily to Cruikshank’s suggestions: “The fact that we considered him a possible heart donor bore no relationship to the way we treated him. With the respirator, the use of drugs, and doing everything that possibly could be done, the heart would have probably stopped in any case within twenty-four to forty-eight hours after the removal.”

“Probably.” “One in a million.” These were not certainties, and Cruikshank did what any skilled attorney would have by hammering away at them. Samuel Moore might still be alive, he argued passionately, if his heart had not been removed. In that case, the murder trial of Andrew Lyons would not even be taking place.

The district attorney had a precedent on his side, and he cited an earlier court suit involving Norman Shumway’s distinguished former colleague, Dr. Richard Lower. In 1968, Lower and his team at the Medical College of Virginia had transplanted the heart of Bruce Tucker, a fifty-four-year-old black laborer who had suffered massive brain damage in an accident, into the chest of Joseph Klett, who lived