



Gifts from Surgical Research. Contributions to Patients and to Surgeons

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I'm delighted to congratulate the Initiates who have just joined the greatest surgical organization in the world. I am greatly honored to have been elected president of the College just as we enter a new millennium. I have long believed and have previously stated that whenever you are presented with an opportunity to choose a topic on which to speak, you should select only a subject about which you have strong, even passionate, feelings. I plan to do that. I plan briefly to outline the splendid gifts given to us by research, and because I'm a surgeon, I will place major emphasis on research by surgeons. I feel that a regional disclaimer, though obvious, is necessary. Because I am an American, I will consider contributions made by American surgeons. Were I from Europe or Asia or anywhere else, the emphasis would be different.

Surgeons, and all other practicing physicians in America, have been subjected for the last several years to one of the greatest rearrangements of priorities that has ever occurred, as control of medicine has been ceded to business. The moneychangers are ruling the temple. Bits of evidence in support of this are everywhere, and some days you may feel that you spend more time filling out forms than seeing patients.

We are truly in the midst of a revolution, and we all know that the business people who run our health insurance programs are not even remotely interested in meeting the costs of medical education

or of medical research. Sometime around 1985, the business world was suddenly alerted to the realization that what is now called "health care" was actually a \$1 trillion-a-year industry, inefficient, poorly centralized, and ripe for conquest. Business moved in and is in the process of capitalizing on huge investments that society made in the past in education and research, *and* in keeping folks out of the hospital or, should they slip in, getting them out in a hurry, in part so that they can pay their CEOs their annual \$30 million salary.

If this goes on, business will be practicing medicine utilizing the highly-trained expert physicians that *society* has paid to educate, and they will be working on the fruits of many previous years of heavy *societal* investments in medical research, but we will be putting away no seed corn for the future.¹

What I'd like to do is to ask you to raise your vision, to look up and consider the stunning benefits that medicine in general, and in our case, surgery, have given to our society, and to look at the promise that *research* will lead us all to a New Jerusalem. Specifically, I plan going to talk about the value of research to the patient and to the surgeon. First, let's just consider a general improvement.

When my parents were born, just after the turn of the *last* century, life expectancy in the United States was less than 50 years. My grandchildren have a life expectancy of 80 years, an increase in expectancy of 30 years in four generations—just think of it! Neanderthal man had a life expectancy of 25 years. It took 125,000 years to go from a life expectancy of 25 to 50 years. Say it again: it took 125,000 years to add 25 years to life expectancy, and now we've added 30 years in less than a century.

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Table 1. Nobel Prizes for Surgeons

Surgeons	Year	Workplace	Prize-winning work
Theodore Kocher	1909	Switzerland	Physiology, pathology and surgery of the thyroid gland
Alexis Carrell	1912	USA/France	Vascular suture and transplantation of blood vessels and organs
Sir Frederick Banting	1923	Canada	Insulin
Werner Forssman	1956	Germany	Heart catheterization
Charles Huggins	1966	USA	Hormonal treatment of prostate cancer
Joseph Murray	1990	USA	Organ transplantation

How did this come about? Certainly, some of it was just better plumbing, keeping feces out of the drinking water, but as Lew Thomas² has observed, much of it has been due to brilliant advances in our understanding of basic mechanisms of disease and to the startling adaptations of technology to medicine. Major contributions have come from surgeons, and six have won the Nobel Prize (Table 1).

How *do* we go about choosing the most important contributions from surgical research to actual practice in the last 50 years? Table 2 provides my absolutely arbitrary suggestions. Now, I realize that most of the initiates here are still in the *immortal* phase of life. When, however, in a few years, you begin to encounter the general-allgemeine-fall-apart syndrome, these contributions will achieve great personal significance.

The formidable contributions in Table 3 didn't make the first list. If the talk were to be given in a decade, many of them might be promoted. I'll limit my discussion to the first eight contributions shown in Table 2. Consider, if all these advances, and actually many more, have developed in only the *last* 50 years, think of the improvements that will be revealed to you, your children, and grandchildren in the next 50 years by 2050!

Table 2. Surgical Research Contributions in the Last Half of the 20th Century

Contribution
Cardiopulmonary bypass
Transplantation
Vascular surgery
Total parenteral nutrition
Metabolic response to sepsis and trauma: burn care
Controlled clinical trials for cancer (breast)
Effect of hormones on cancer
Minimally invasive surgery
Joint replacement
Stereotactic neurosurgery
Urinary lithotripsy

CARDIOPULMONARY BYPASS

Let's just start right at the top. For practical purposes, heart surgery did not exist until the time of World War II, when repair of a patient ductus was achieved in 1939 and the Blalock-Taussig operation was introduced in 1944. But open procedures on the heart under direct vision awaited the development of cardiopulmonary bypass.

In 1932, John Gibbon initiated studies at Harvard, Penn, and Jefferson that continued for more than 20 years. At Harvard, Gibbon cared for a patient of Dr Churchill's who died in February 1931 of a pulmonary embolus. During the long night, watching the cyanotic woman struggle for life, Gibbon considered the glorious possibility of taking blue blood from her distended veins, removing the CO₂, inserting oxygen, and injecting the red blood into the patient's arteries. That's how the heart-lung machine was born.³

For the next two decades, Dr Gibbon and his wife, Maly, worked on *development*, trying and discarding model after model (Fig. 1). They shuttled back and forth between Boston and Philadelphia. He had no grant support and they scrounged equipment, technical help, and dogs. And underwent serial failures.

Table 3. Surgical Research Contributions of Great Promise

Contribution
Tumor immunobiology
Telepresence surgery
Combined therapy for tumors (eg, Wilms')
Fetal surgery
Angiogenesis research
Endocrine surgery
Extracorporeal gas exchange
Immune therapy for cancer
Correction sensory (vision and hearing) defects

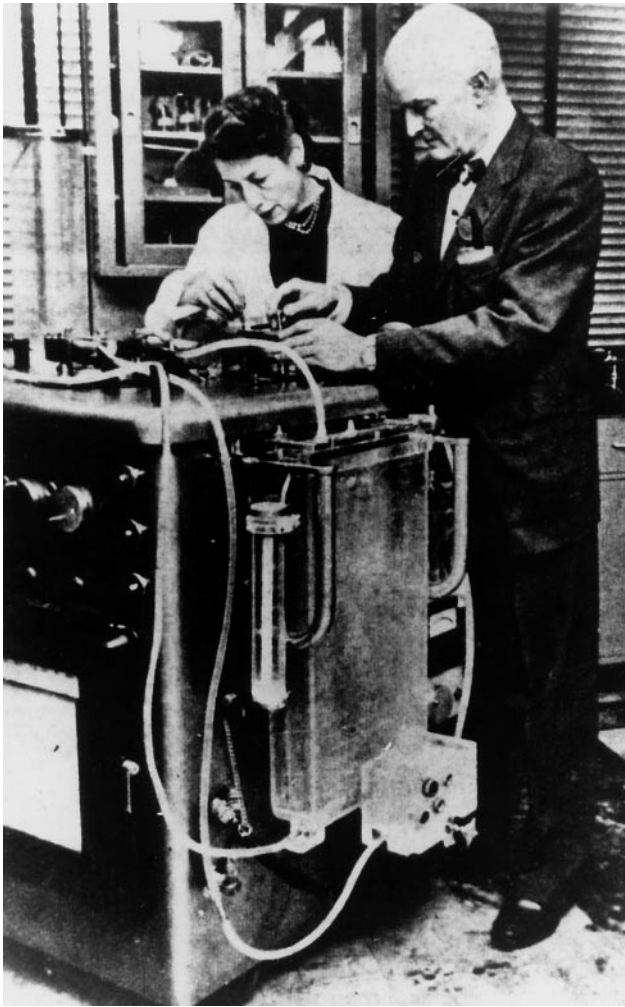


Figure 1. John and Maly Gibbon at Jefferson Medical College with early pump-oxygenator machine (From: Thomas Jefferson University Archives, Philadelphia, PA, with permission).

Early heart-lung machines used a simple roller pump, developed by Michael DeBakey⁴ while he was still a medical student at Tulane. Direct descendants of that pump are still in use. The entire pump-oxygenator prototype was massively complex, but after Gibbon met with Thomas Watson of IBM, the apparatus was simplified and standardized by IBM engineers.

The first successful open-heart operation, the repair of a large atrial septal defect, was performed by Dr Gibbon on Cecelia Barolek, an 18-year-old woman in chronic congestive failure on May 6, 1953 (Fig. 2). She did well and 10 years later, she, the first patient ever to undergo open-heart surgery, was Heart Queen of the year, shown in Figure 3 with a friend.



Figure 2. Photo of first open-heart operation. Dr Gibbon is center figure (From: Review of Surgery 1970; July–August:239, with permission).

In 1967, Favalaro, Effler, and their colleagues at the Cleveland Clinic began a series of coronary-bypass vein grafts for treatment of coronary insufficiency. Use of these vein grafts and later, the internal mammary, made myocardial revascularization popular and spawned one of the greatest surges in all of surgery, so that in the *last 3 years*, nearly 1 million Americans have undergone coronary artery bypass grafting. As a patient who has undergone three separate operations for coronary artery bypass grafting, I reflect that had I been born 20 years earlier, my life



Figure 3. Cecelia Barolek with Vice President Lyndon B Johnson in 1963 (From: the American Heart Association, 1963 Annual Report, with permission).

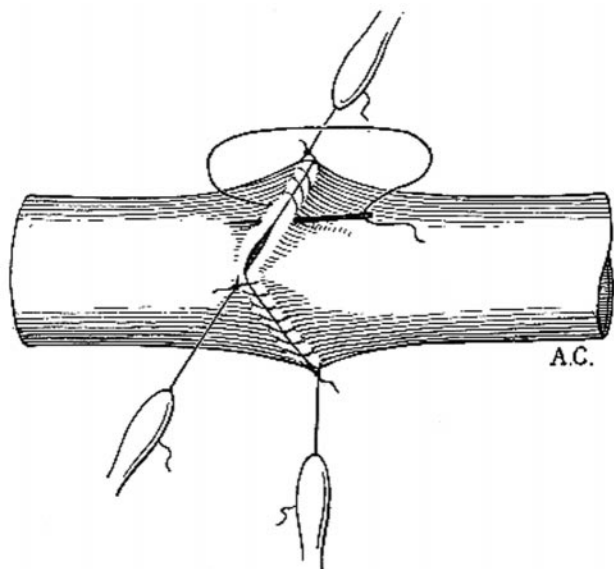


Figure 4. Alexis Carrell's illustration of technique for blood vessel anastomosis.

span would likely have been significantly curtailed. The heart-lung machine makes possible the repair of most all congenital or acquired heart defects.

TRANSPLANTATION

The possibility of exchanging new parts for old has intrigued humans from the beginning of time, but with the exception of a few miracles, such as Saints Cosmas and Damian putting a new leg (from a blackamoor) onto an Italian fellow, the goal was strictly an ephemera until this century.

At the turn of the century, Alexis Carrel taught us how to sew blood vessels together. Just think, for a simple running stitch (Fig. 4), he won the Nobel Prize. Actually he did far more. Carrel worked with Charles Lindbergh on a pump-oxygenator (Fig. 5) and he attempted transplantation of the heart and kidney.

After learning to sew blood vessels, people began transplanting all sorts of things: some Russians put an extra head on a dog and several people transferred limbs, and great efforts were made to graft skin from one person to another. All of these, of course, ran afoul of immune rejection and failed, but intrepid surgeons keep pushing ahead.

Now, Webster defines the word "intrepid" as characterized by resolute fearlessness, fortitude, and endurance. The intrepidity of surgeons is thankfully boundless, and we owe our present success in

transplantation to that intrepidity, because had we awaited a green light from basic immunologists, it may never have come.

In the late 1940s, the first efforts at organ transplantation were directed to the kidney. Acute tubular necrosis had been recently described, when, in 1947, at the Peter Bent Brigham Hospital in Boston, a young pregnant woman developed endometritis and septic shock, leading to anuria. After 10 days, she became comatose and death appeared imminent. As recounted by Moore,⁵ surgeons were asked to try to graft a kidney and David Hume was enlisted to find a prospective donor. Dr Hume got a cadaver kidney that day and the patient was taken to a treatment room off the ward and there Hume and colleagues exposed the brachial artery and vein under a gooseneck lamp and accomplished the vascular anastomoses quickly (Fig. 6). The kidney put out abundant urine for 2 days. Because of great improvement in the patient, the kidney was removed on the third day. She entered a diuretic phase and recovered. Just think what it would have been like to be in that dark room and to witness that great event!

The first truly *successful* kidney transplant was performed on December 23, 1954, less than 45 years ago. Donor and recipient were monozygotic twins whose immunologic identity had been confirmed with skin grafts. The operation was done at the Brigham by Joe Murray, who received the Nobel Prize 36 years later.

After the twins, there was no progress for about 5 years, during which time immunologists and surgeons learned how to thwart immune rejection in folks not lucky enough to have an identical twin. Understanding the immune mechanisms responsible for transplant rejection came in a brilliant series of studies. Perhaps the most important of these was the demonstration by Billingham, Brent, and Medawar of acquired transplant tolerance.⁶ Once immunosuppressive drugs became available, kidney transplantation in humans became a reality. Big programs developed: Hume and HM Lee in Richmond, John Najarian in Minneapolis, Jay Fish in Galveston, Oscar Salvatierra in San Francisco, Gil Diethelm in Birmingham, Sam Kountz at Stanford and then at SUNY Brooklyn, and Fred Belzer in San Francisco and then in Madison. Belzer first invented the perfusion machine for maintaining organs prior to transplant and later invented the Uni-



Figure 5. Alexis Carrel and Charles Lindbergh with model pump (From: *Time*, Volume XXXI, No. 24, June 13, 1938; cover page, with permission).

versity of Wisconsin organ perfusion solution. Though initially developed for the kidney, both inventions greatly facilitated transplantation of the heart, liver, pancreas, and lung as well. Norman Shumway and his colleague, Dick Lower, developed techniques that perfected heart transplantation and then raised it to an art form at Stanford. Clyde

Barker at Penn dissected the finer mechanisms of graft rejection and demonstrated the possibility of privileged sites.

And then along came Tom Starzl, who, with genius and single-minded devotion, created one of the largest centers for kidney transplantation in Denver and then perfected liver transplantation. He

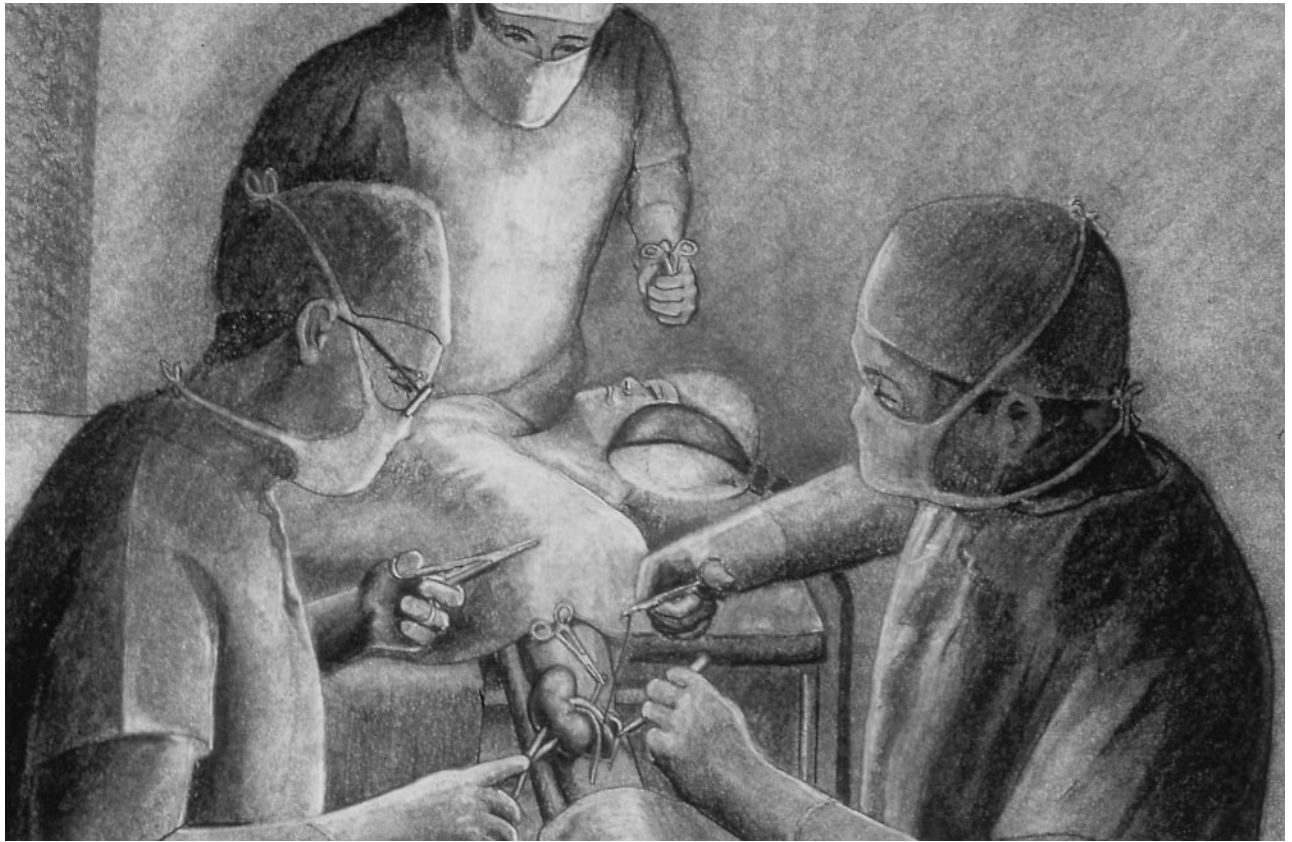


Figure 6. Hume, Hufnagle, and Landsteiner placing a temporary renal allograft into the antecubital fossa of a patient in renal failure (artist's concept drawn by Lee Rose).

and his colleagues made hepatic transplants into reality, and in Pittsburgh created a program so successful that one of the major hurdles was the logistic problem of getting 400 to 500 livers by chartered jet into the Pittsburgh airport every year.

In a recent letter, Starzl narrowed the milestone events in the development of transplantation to two watershed studies: first the demonstration of acquired transplantation tolerance in 1953,⁶ and second, the report in 1963 that allografts can induce donor-specific tolerance.⁷ Starzl's research group at the Denver VA hospital in 1962 developed techniques for liver transplant that showed early successes in dogs, but failures in humans led to a 3½-year moratorium that came to an end with the introduction an antilymphocyte globulin, and within a few years there were several survivors of liver transplantation. The longest survivor is now 30 years posttransplant.

Appropriate honors have come to Starzl: there's a transplantation institute in Pittsburgh named for

him, he's written a book⁸ on his career, and he's thrown out the first pitch for the Pittsburgh Pirates (Fig. 7).

Particularly exciting is that future genetic engineering may make possible the DNA transformation of animal organs so they may not be rejected by humans. If you could put a calf's liver into a human, just think how *that* would handle the donor shortage.

VASCULAR SURGERY

For all of recorded history until the present century, surgery on the vascular tree was considered to be out of bounds, with ligation of bleeding vessels, introduced by Paré in the 16th century, standing as the high water mark until the introduction of endoaneurysmorrhaphy by Matas in New Orleans around 1900. In the 1950s, Voorhees and DeBakey began replacing obstructed and aneurysmal aortas with grafts of fabric, sewn by hand. DeBakey's first suc-

cessful use of a Dacron graft for the repair of an aortic aneurysm in a patient was in 1954.

Now, we all know that conflicts abound whenever you attempt to assign precedence for any procedure, and when all the dust settles, it may turn out that Oog the caveman was there first. But surely DeBakey (Fig. 8) deserves recognition as the man who, in the introduction of innovative, highly ingenious solutions to previously baffling problems, one after another, opened the vascular tree to surgical repair. More than a dozen years ago, *Time* said that Michael DeBakey was the best-known physician on the planet. He developed Dacron grafts, and pioneered aortic, coronary, and carotid surgery in his more than 60,000 cardiovascular operations. He has been advisor to five presidents, he did a coronary artery bypass on the Soviet Minister of Health 20 years ago, and he's made recent house calls on Boris Yeltsin.

One of his 1,000 trainees was Stan Crawford who, with his colleague, Joe Coselli, developed techniques of replacement of the entire aorta. For years, Stan Crawford, at meetings, held folks in awe as he described one spiffy tour-de-force after another, replacing at times the arch (example in Fig. 9), at times nearly the whole aorta. Alexis Carrel showed the world how to suture blood vessels and the boys from Baylor put on a worldwide demonstration of how to open or replace clogged vessels.

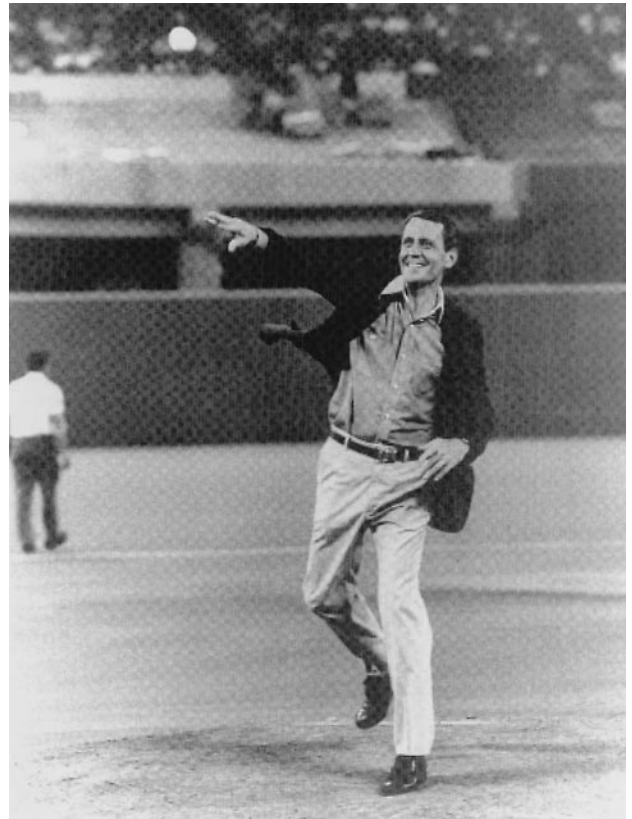


Figure 7. Tom Starzl throwing out the first pitch for the Pittsburgh Pirates (From: the *Pittsburgh Post-Gazette*, 1983, with permission).



Figure 8. Michael E DeBakey at Methodist Hospital, Houston (From: Dr DeBakey, with permission).

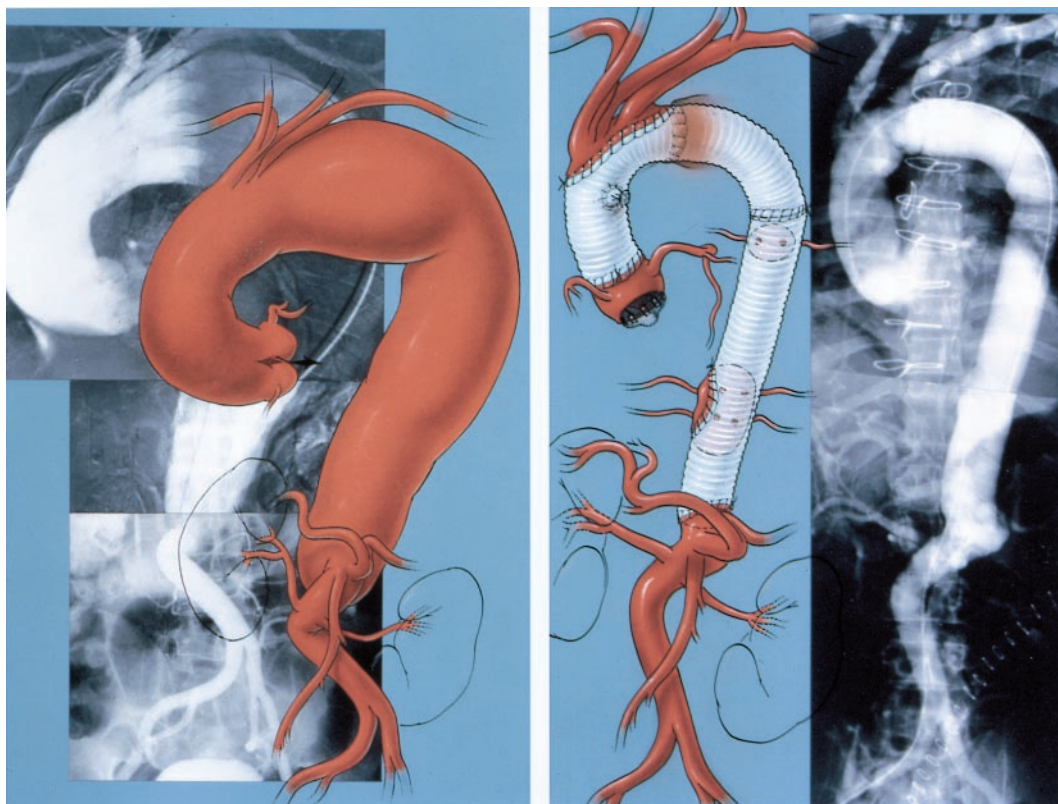


Figure 9. Repair of elephant trunk deformity of aortic arch by Stanley Crawford. Left panel shows preop angiogram with superimposed drawing. Right panel shows third-stage complete repair, drawing and angio (From: Dr Joseph Coselli, with permission).

PARENTERAL NUTRITION

To appreciate the impact of parenteral nutrition, you need to step back from your current practice and think about how nutrition was managed in the past. When, in the late Pleistocene, I was a resident at Penn, any postop patient whose gut we could not get to function would starve and die within 2 or 3 weeks. That was not a rare occurrence. Patients with the short-gut syndrome, with peritonitis, with all sorts of postop complications, with sepsis in general, all might languish and die. Dr Ravdin at Penn had secured a grant from the Army to test ways to improve nutrition and Dr Rhoads inherited that grant. Successions of residents tried all sorts of techniques, to no avail. Hyperosmolar solutions given peripherally caused phlebitis that clotted veins.

The solution to the conundrum was provided by two events orchestrated by Dr Rhoads (Fig. 10). First, the brilliant biochemist, Harry Vars, developed an intravenous solution of hypertonic glucose that contained proteins and minerals and proved

capable of sustaining life. And next, Stan Dudrick, then a resident, developed a simple reproducible technique for insertion of a catheter into a high-flow central vein, enabling longterm administration. The guys at the bottom of this figure were raised from birth on TPN. Their growth patterns closely paralleled those of littermates fed by mouth. The technique was tested in babies with the short-gut syndrome and it kept them alive. When complications associated with total parenteral nutrition arose, means were found to greatly improve *enteral* nutrition, and the crisis often faced postoperatively in patients who could not eat was defused.

METABOLIC RESPONSE TO SEPSIS AND TRAUMA AND IMPROVEMENTS IN BURN CARE

The hypermetabolic-catabolic state that follows serious trauma was probably recognized by old Dr Oog, the caveman, and tachycardia, fever, and weight loss after injury were for centuries deemed

**Rhoads****Vars****Dudrick**

Figure 10. Jonathan E Rhoads, Harry Vars, and Stanley Dudrick. Below: beagle puppies raised exclusively on parenteral nutrition (From: Dr Rhoads, with permission).

inevitable. Monitoring and quantification of this hypermetabolic response probably began when David Cuthbertson (later Sir David)⁹ in 1932 demonstrated persistent negative nitrogen balance in patients with long bone fractures. Other British surgeons called attention to the importance of preoperative repletion of food intake, noting that the rates of wound dehiscence and death were greatly increased in malnourished patients. John Kinney and Frank Gump in New York in the early 1960s noted that the negative nitrogen balance in trauma patients was related directly to the severity of injury.

The modern approach to burn care might be traced to disasters: the Coconut Grove fire in Boston on 28 November 1942, carefully reported by Oliver Cope, and the Texas City disaster 15 April 1947 where Truman Blocker directed the care, immediate and long term, of hundreds of burned victims. Sally Abston and colleagues,¹⁰ in Galveston, demonstrated that body weight in children with massive burns could be maintained with continu-

ous enteral feeding of milk. Shires, Curreri, Carrico and Canizarro in Dallas in 1974 calculated the immense caloric input needed in patients with major burn injury (described in reference 11). More importantly, they showed that early fluid resuscitation with Ringer's lactate could prevent many of the devastating metabolic sequelae of shock. Frank Cerra and colleagues delineated the role of inflammatory cytokines in fueling the hypermetabolic response. John Mannick's elegant studies on cell signaling enlighten us to this day.

Beginning in 1978, the group at Brooke Army Hospital headed by Basil Pruitt (Fig. 11) showed that the hypermetabolic response to trauma was mediated by catecholamines, glucagon, and cortisol. By training burn surgeons, and by means of their collaborative studies on burn patients that ranged from intracellular mechanisms of signal-transduction to techniques of skin grafting, Basil Pruitt has defined modern therapy of burns. His group devised the Brooke formula for fluid resusci-

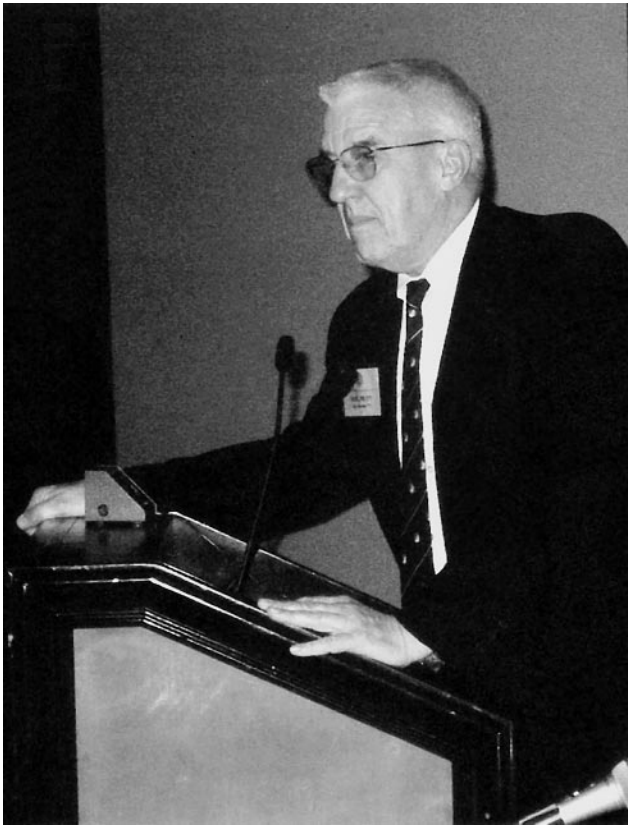


Figure 11. Basil Pruitt (From Dr Murray Brennan, with permission).

tation, and their quantitative bacteriologic studies of burn wounds have had a striking impact on survival. Burn care in children has been greatly influenced by innovations from the Shriners Burns Hospitals. David Herndon and his colleagues at the Shriners Hospital in Galveston showed that early burn excision and the administration of growth hormone would diminish mortality in a child with an 80% burn from 98% in 1950 to 33% today.

CONTROLLED CLINICAL TRIALS FOR CANCER

For the first century after Billroth, the practice of surgery was largely nonscientific, governed by anecdotes and prejudice. Shortly after 1950, however, surgeons realized that the application of scientific methods could lead to clinical trials, by means of which results of various operations could be compared. Earliest control trials came from the Veteran's Administration. Buchwald and Varco established a big clinical trial to test the effect of partial enteric

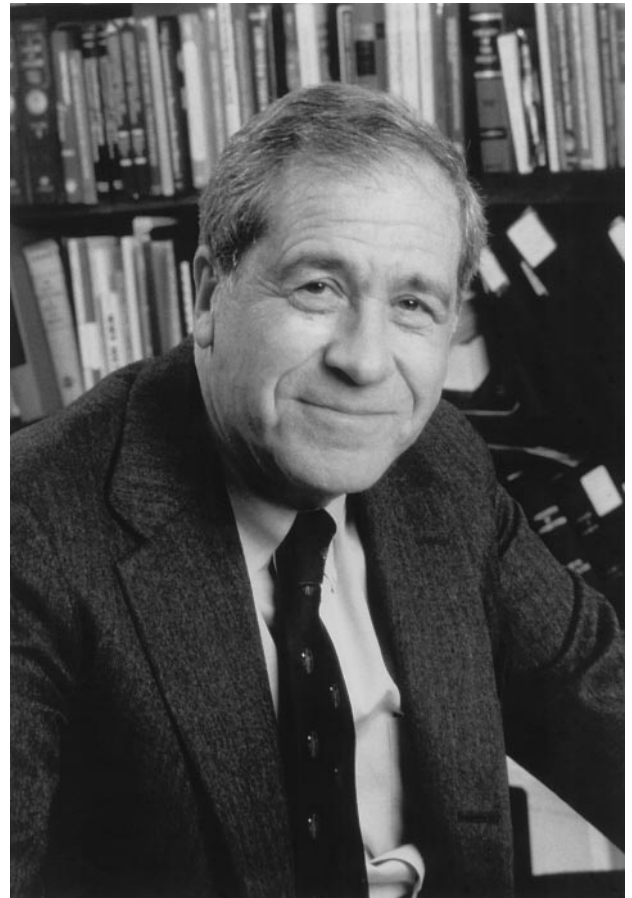


Figure 12. Bernard Fisher, University of Pittsburgh (From: Dr Fisher, with permission).

bypass on the metabolism of cholesterol and Orloff initiated a series of control trials to study patients with bleeding varices.

Nowhere have changes been more pronounced than in the treatment of breast cancer. From 1900 to 1970 we followed Halsted's concept that breast cancer spread almost exclusively along lymphatics, hence, the proper operation was removal of the primary tumor, pectoral muscles, regional lymphatics, and all regional lymph nodes, *en bloc*.

Beginning in the late 50s, Bernie Fisher (Fig. 12) at Pittsburgh challenged these concepts, proposing that there was no way to separate the role of blood versus lymphatics in the spread of breast cancer, and that metastases are largely governed by genetic factors within the tumor cells. To test these ideas, Fisher, with NIH support, initiated trials beginning in 1971 to evaluate the outcomes of patients with invasive cancer, and later to appraise the

worth of lumpectomy. To the great surprise of most surgeons, lumpectomy proved to be as effective as radical mastectomy. Most are familiar with the magnitude of the problem, but it's worth repeating: in the present decade, 1,700,000 American women will develop breast cancer, and 30% (510,000) will die.

To highlight the changes that Dr Fisher's studies¹² have brought about, just imagine in your mind's eye, the postop chest wall of a woman after a Halsted radical mastectomy, and contrast that image with the near-normal picture of a woman after lumpectomy and irradiation.

Many of you may know that under the auspices of the American College of Surgeons, a series of NIH-supported, prospective, randomized clinical trials in cancer patients has begun. The director of this effort is Sam Wells, and the earliest trials are: the use of sentinel node and bone marrow biopsy in the treatment of breast cancer, the role of occult metastases and lymphadenectomy in lung cancer, the role of PET in lung and esophageal cancer, the efficacy of 5FU after curative resection for colon cancer, radical surgery versus elective kidney sparing for renal cell carcinoma, and the use of tumor necrosis factor in the treatment of limb melanoma. These studies have been funded by the NIH and multiple other studies (including outcomes studies in trauma and sepsis) are in development.

EFFECTS OF HORMONES ON CANCER

One of the arguments that plague those people responsible for allocating money for research is how much to give to investigator-initiated projects and how much to give to directed research, that is, research aimed at the solution of a specific problem. Both have been successful, but as business tightens its control of medicine, the temptation greatly increases to tell investigators exactly which paths to take. Pharmaceutical research is a prime example. We must remember, however, that most real advances in science have come from undirected basic research.

Brother Gregor Mendel (Fig. 13) tending his sweet peas in the garden of an Austrian monastery led to the study of genetics, one of the central themes in medicine today. We see it manifest in everyday practice: in amniocentesis and in facing the genetic implications of families prone to breast



Figure 13. Brother Gregor Johann Mendel, father of genetics, Augustinian monastery, Brünn, Austria, c. 1870.

cancer or colon polyposis, or inborn errors of metabolism. Unlike all other heroes in this litany of praise, Brother Mendel was not a surgeon, but his findings influence surgical (and all medical) practice.

More than 50 years ago, Charles Huggins (Fig. 14) announced in Chicago that the prostate gland cannot function without male sex hormones. Huggins' work was based on a series of brilliant random observations made 200 years ago, for example, by John Hunter, who noted prostatic atrophy in castrated bulls, and 85 years ago by the English physiologist, Griffith, who noted seasonal changes in the size of the prostate in hibernating moles and hedgehogs. Just think of it: sweet peas, castrated bulls, moles, and hedgehogs; that's pure science.

Dr Huggins' observations have led to our understanding of the effects of hormones on the growth of cancer, especially of the prostate and

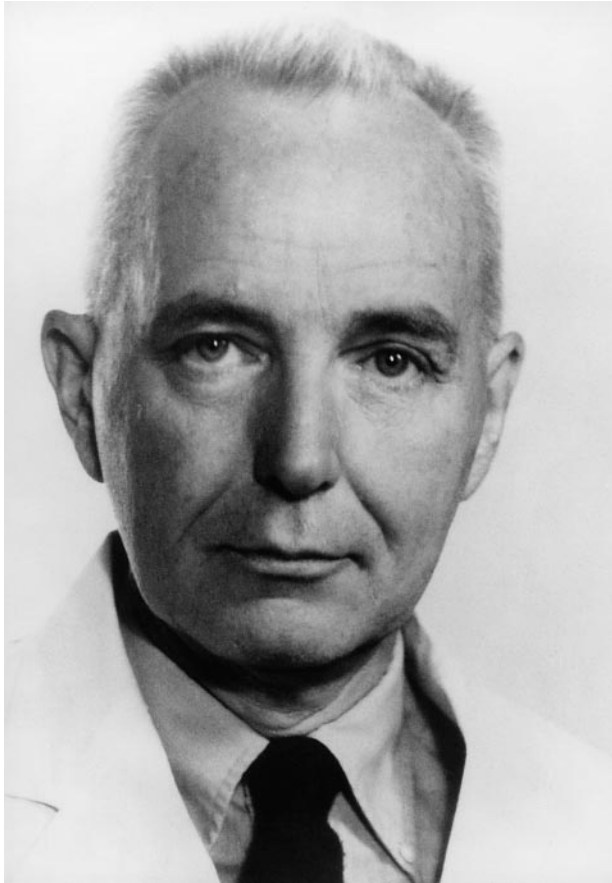


Figure 14. Charles Huggins, University of Chicago, Nobel Laureate 1966 (From: Nobel Foundation, with permission).

breast. Application of Huggins' work to the study of breast cancer led to our understanding of the significance of estrogen receptors and ultimately to the current near-triumph of tamoxifen. Dr Huggins received the Nobel prize in 1966 for his work, and 30 years later he took me around his lab and showed me his current studies on genetic factors regulating hormone sensitivity of cancer cells.

MINIMALLY INVASIVE SURGERY

This last topic to be considered has probably changed your own lives as much as any other single innovation. Just 14 years ago, on September 12, 1985, Eric Muhe, in Boblingen, Germany, performed the first successful laparoscopic cholecystectomy. In 1987, Phillipe Mouret, in Lyon, greatly improved the procedure. Laparoscopic cholecystectomy began in this country in 1988 and became,

with blinding rapidity, the procedure of choice, so that in 1991, within 3 years of its introduction, more than 250,000 laparoscopic cholecystectomies were performed. Not only that, it wiped out the competing, nonsurgical approaches, both gallstone dissolution and lithotripsy.

Laparoscopy is now firmly established as the method of choice for cholecystectomy and probably for Nissen fundoplication. In other procedures (colectomy, inguinal hernia repair, and appendectomy), the impetus appears stalled, as no clear-cut superiority has emerged.¹³ Other applications, such as splenectomy, nephrectomy, and evaluation of abdominal trauma and peritonitis, are promising.

Now, this may be the last chance I have to speak before such a splendid audience and it is important for me to mention the great debts that I owe, some of which I've formerly acknowledged.¹⁴ I would not be here were it not for all of my splendid colleagues in the Department of Surgery in Galveston.

There are several other heroes that I want to mention. Scott James has been an anchor to the wind in a time of threatening changes. Compared to Scott, Gibraltar is a mere flimsy. Phil Rayford taught me how to measure circulating peptides, and showed us that in research, what counts is persistence, persistence, persistence. Claude Organ has been a generous friend who has put together one of the finest surgical training programs in the country and on the day I gave this talk, received the Distinguished Service Award of the American College of Surgeons.

My closest polymath is Sy Schwartz, who knows about maps and wine and fine cooking, hepatic resection and splenic function, history and editing, and how to put together a textbook of surgery. Not a week passes that I fail to learn from him. Marshall Orloff and I started our residency the same day at Penn, and 45 years later, he served as chief resident on my case while I was in the ICU for 3½ weeks on a respirator, with a trachea, and he kept me alive.

I have been extraordinarily lucky in the people in whose training I have participated. Outstanding in this group are three stalwarts: Dan Beauchamp, Mark Evers, and my successor, Courtney Townsend. Anything these men say, you can take to the bank. I owe a special debt to the 100 research fellows who came to our lab from all over the world. One of the

greatest and most productive segments of this group is from Japan. I've often visited them, and while in Japan, I've had the opportunity to interview promising prospective research fellows.

That's about the end, but I have a little froth left in the glass which I'd like to share with you, to offer a suggestion about handling a sometimes difficult query. Because I've been around awhile, I am often asked to discuss papers, and for a time, these discussions were about increasingly rare clinical entities, especially rare tumors. In a give and take after the discussion of a paper on mastocytoma, someone asked how to handle questions when your own experience is slight. I suggested that, should he have cared for the problem once, he might refer, quietly, to his experience. If he had done it twice, he could speak, diffidently, about his series, and in the happy event that he had taken care of the problem at least three times, he could say that he could show you case after case after case.

Years later in Edinburgh, I met a professor who confided that when he had first gone into practice, he had been sent from London to the very north of Scotland and his first consultation was with a mother whose child needed a tonsillectomy. Ahh, this was an operation the man had *never* done. On query about experience, he said, "Oh yes, hmm, so . . ." and then, looking her straight in the eye said, forthrightly, "Madam, I would hate to *tell* you how many of these I've done."

Again, congratulations. Raise up your eyes and think of all the great innovations on the way in this next millennium. Well, for practical purposes, the next 50 years. Many of these innovations will make their initial appearance at the ACS Surgical Forum, which I commend to you. Those of you interested in research should know that the NIH has money and that now is a great time to submit a grant. Before you tell me how busy you are, please allow me to visit a discomfoting idea on you . . . and that concept is: Time is infinitely elastic and expands so

as to allow you to do the things you *want* to do. I know this to be true because no matter how busy I find myself, if a truly great opportunity were to arise (say, dinner with Warren Buffett, Ella Fitzgerald, and Walter Cronkite, or a ride on a space launch, for example), I'd simply elbow all commitments aside, and do it. What this actually means, is that when I tell you that I haven't the time to accede to some request of yours, what I'm actually saying is that I've weighed that request on the scale of my priorities, and have decided to do something else.

Painful but true.

I hope you find time to do research.

Let me say again what a great honor it is to be your President.

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