Reviews and reflections

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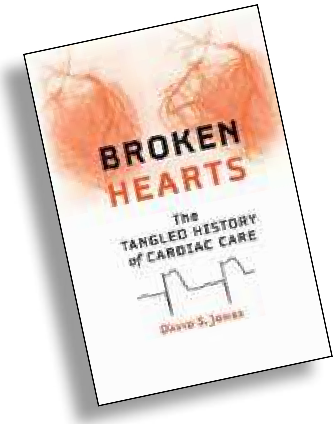

Broken Hearts: The Tangled History of Cardiac Care

David S. Jones
Baltimore, Johns Hopkins University Press, 2013

Reviewed by Jack Coulehan, MD (ΑΩΑ, University of Pittsburgh, 1969)

As medical practitioners, we naturally assume that our current approach to diagnosis and treatment is the culmination (at least for the time being) of a long process of steady scientific development. After all, progress in medicine is one of the most characteristic themes in today's popular culture. If we think about history at all, it is often with condescension: "By George, how did they ever get along with such primitive tools?" Take, for example, myocardial infarction. Who among us would want to bring back the pre-statin, pre-angioplasty, pre-bypass era? We rarely raise any doubt that medical progress since then has been entirely rational.

David S. Jones, in his compellingly written *Broken Hearts: The Tangled History of Cardiac Care*, knocks that sense of historical complacency off its rocker. Jones, the A. Bernard Ackerman Professor of the Culture of Medicine at Harvard, is a psychiatrist as well as an historian. His book is essentially a history of decision making in the field of cardiac therapeutics over the last several decades. As the subtitle indicates, the story is intensely "tangled," rather than the simple and straightforward plot we often imagine.

One sentence best sums up Jones' argument: "Disease and therapeutics are social processes that reflect the structures and values of our society." [p228] This fact explains the disjunction that developed over time between the scientific understanding of coronary artery disease and the preferred methods of treating it—e.g., the vast popularity of "plumbing" approaches, like bypass surgery—when it was already clear that they did not address the principal cause of acute myocardial infarction (AMI). These "social processes" also explain why cardiologists and surgeons for so long were guilty of "selective inattention" to the substantial neurological and psychiatric sequelae of bypass surgery.

Jones first considers the etiology of AMI. Soon after William Heberden described the syndrome of angina pectoris in the eighteenth century, autopsies on angina began to reveal thickening and sometimes obstruction of coronary arteries by what were later found to be atherosclerotic plaques. Since angina and infarction were closely related, the belief developed that AMI must result from a gradual process of plaque growth and eventual blockage. However, beginning in the 1930s, careful pathological studies of coronary arteries demonstrated a different mechanism: plaque rupture. Evidence accumulating from the 1940s through 1980s strongly supported this mechanism: plaque rupture led to hemorrhage, which then activated platelets to coagulate and form an acute thrombus. In other words, AMI was caused primarily by plaque instability, which did not necessarily correlate with the extent of atherosclerotic obstruction.

Though many lines of evidence contributed to the plaque rupture model, for a long time it remained controversial. Paradoxically, two major medical developments militated against its acceptance. Selective coronary angiography (early 1960s) and coronary bypass surgery (1967) were both predicated on the plumbing model of heart disease, i.e., prevent AMI by cleaning out the pipes. With the later addition of angioplasty and stent placement, revascularization procedures skyrocketed. "Bypass surgery peaked at over 607,000 operations in 1997. Its subsequent decline—to 405,000 operations in 2007—reflected the rise of angioplasty . . . In 2007 interventional cardiologists performed nearly 1.2 million angioplasty procedures, with balloons alone or with stents in addition." p90

These figures are remarkable since studies showed that anywhere from thirty-one to eighty-five percent of these interventions were unnecessary. p96 When performed to relieve persistent angina, revascularization was effective, although often not more effective than medication alone. When performed immediately after an infarct, angioplasty clearly improved survival. However, revascularization soon became widely used as a "prophylactic" measure in the belief that opening up the arteries could help prevent AMI and sudden death. This practice flew in the face of a scientific consensus that infarcts result from unstable plaques that rupture and result in clot formation.

Two things were clear. First, "bypass surgery and angioplasty certainly made many people rich." p97 And second, there were enormous geographic, economic, racial, and gender disparities in rates of revascularization, both within the United States and between the United States and other countries with a similar prevalence of coronary disease. Dr. Jones considers the complex and poorly understood issue of disparities in his final chapter, "Puzzles and Prospects."

A second major historical conundrum concerns the "missing" neurological complications of coronary bypass surgery. At the time Rene Favaloro performed the first bypass operation at the Cleveland Clinic in 1967, surgeons were well aware that heart surgery was often complicated by strokes and other serious neurological sequelae. Decades of experience with valve surgery should have led them to expect serious complications, despite technological advances in heart-lung machines. Yet, surprisingly, "Of the first two hundred articles published about bypass surgery between 1968 and 1973 . . . Only four made more than a passing mention of neurological or psychiatric outcomes." p150

By the early 1980s, large-scale studies began to reveal more frequent adverse events; for example, among 421 bypass procedures at the Cleveland Clinic, patients developed delirium in 11.6 percent and strokes in 5.2 percent. p173 In the late 1980s and 1990s, further studies documented the relatively common occurrence of more subtle complications, such as cognitive deterioration and personality change. The authors of a multicenter study published in the *New England Journal of Medicine* in 1996 concluded, "Adverse cerebral outcomes following coronary bypass surgery are relatively common and serious; they are associated with substantial increases in mortality, length of hospitalization, and use of intermediate- and long-term care facilities." p177 Yet, despite this evidence, as well as serious questions about its prophylactic value, coronary bypass surgery remains among the most frequently performed surgeries today. Jones considers a number of factors that may contribute to this phenomenon in his chapter on "selective inattention."

I think most physicians will find *Broken Hearts. The Tangled History of Cardiac Care* a surprising and sobering book. David Jones combines rigorous research with a clear narrative style to produce a very persuasive historical analysis. I heartily recommend that physicians read *Broken Hearts* to benefit from a dose of detective work, a dose of insight, and a good dose of humility.

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Ned's Head

Cargill Alleyne, illustrated by Michael Jensen and Karen Bradley
CreateSpace Independent Publishing Platform, 2012

Ages 7-10

Reviewed by Diane Hackett

The challenge of writing a nonfiction book for children is to present accurate information that engages and entertains the young reader. Dr. Cargill Alleyne, a neurosurgeon and author of the children's book, *Ned's Head*, succeeds in this task by using witty limericks along with funny informative illustrations to describe the structure of the brain and how the brain is the command center to the rest of the body. His limericks and Michael Jensen's and Karen Bradley's delightful illustrations will capture the imagination and interest of young children who are perpetually curious.

Writing for an audience aged seven to ten, Dr. Alleyne's story about the brain begins with a young boy named Ned wondering, "What's inside my head?" Ned's mother answers his questions with information about the structure of the brain and its protective covering, the skull. The factual information is presented in an understandable and easy-to-read format, using limericks that contain similes comparing parts of the brain to everyday objects that are part of a child's environment. Here are a few examples:

Brain parts called motor strips
Have grooves and bumps like Ruffles
potato chips

Bone is hard, tough and strong like a
bull
(about the Skull)

Long nerves to your toe like a train
Nerves on: your toe taps
Nerves off: you take naps

Ned's curiosity is never quite satisfied by his mother's information. Despite his mother's request to refrain from asking further questions, Ned wants to know more about how the brain works.

But mom how do I smile or frown?
Or how do I move my eyes around?
And how do I taste?
Or feel cold on my face
Why, how do I stick out my tongue?

Mother patiently answers Ned's questions with the help of charming and funny illustrations.

Michael Jensen and Karen Bradley's colorful illustrations illuminate the facts and aid the reader in understanding the complex information contained in the limericks. The design format is attractive and reader friendly. The illustrations closely accompany the text so that the reader can visualize the parts of the brain that are being presented in each limerick.

The illustrations convey a sense of humor. Many will make the young reader smile and spark an interest in how the brain and the body are related; for example, the vivid drawing that accompanies this text:

Popping eyeballs and a big wagging
tongue
Are attached to cranial nerves of the
brain

The use of color in the illustrations also helps clarify and support the medical terms. Vivid colors of the carotid artery and the jugular vein weaving their way to and from the brain are definitely eye-catching. The reader can easily follow the flow of blood through a maze of colorful pumps and gauges. Dr. Alleyn has also added a very useful glossary at the end of the book. The definitions of medical terms add meaning to the text and serve as a handy reference tool. They are clearly defined and reinforce information presented in the limericks and the text. The book also includes a pronunciation key that will help older children verbalize the scientific names for various parts of the brain. Younger readers will have fun wrapping their tongues around multisyllabic words like "hypoglossal" and "oculomotor."

Dr. Alleyne clearly has a thorough knowledge of the brain and an appropriate understanding of his target audience. Young children enjoy rhyme and will want to read this book many times. *Ned's Head* is a book that will encourage parents, caregivers, and teachers to develop the habit of reading to their children. The information presented in limericks and illustrations will spark an interest in the human body in young minds.

About the author and illustrators: Dr. Alleyne is Professor and Marshall Allen Distinguished Chair of the Department of Neurosurgery at the Medical College of Georgia of Georgia Regents University in Augusta, Georgia. Michael A. Jensen, MS, CMI, is an Assistant Professor of Medical Illustration in the School of Allied Health at Georgia Regents University. He has previously illustrated twelve books in the popular *Curious George* series. Karen Bradley, MS, CMI is founder of KB illustrations and an award-winning medical illustrator.

Ned's Head is the first in a series of educational children's books to be created by this team.

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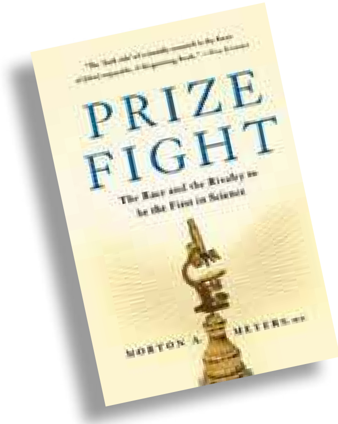

Prize Fight: The Race and the Rivalry to Be the First in Science

Morton A. Meyers
New York, Palgrave Macmillan, 2012

Reviewed by Jack Coulehan, MD (ΑΩΑ, University of Pittsburgh, 1969)

The summer before entering medical school, I worked at the University of Pittsburgh in Dr. Julius Youngner's laboratory. Dr. Youngner, one of the world's leading virologists, was a formidable figure. Naturally, behind the scenes there was scuttlebutt about the boss, especially the story of his work with Jonas Salk in the early 1950s. Younger's method of quantifying virus particles had been a major breakthrough that made the polio vaccine possible, or so the story went, but his contribution had never been acknowledged. In fact, Salk had completely "stiffed" his many collaborators, even to the extent of refusing to include their names on articles.

That backroom story came vividly to mind as I read the first chapter of Morton A. Meyers' splendid new book, *Prize Fight: The Race and the Rivalry to Be the First in Science*, in which he uses Jonas Salk as an example of a keenly competitive scientist who refused to share credit for his vaccine. Selfish, indeed, but this is only the tip of an iceberg of scientific misbehavior, which *Prize Fight* illustrates with many instances of data manipulation, plagiarism, falsification, and outright fabrication, in addition to bitter conflicts over priority and recognition. Dr. Meyers introduces the reader to the culture of modern biomedical science with its relentless pressures, cutthroat competition, and outsized egos. He provides numerous examples of scientists behaving badly, like William Summerlin, the dermatologist who fabricated "successful" skin grafts on mice by darkening their backs with a felt-tipped pen; and John Darsee, the cardiologist in Dr. Eugene Braunwald's lab who simply invented data for many (or most?) of his profusion of abstracts and articles. This is truly the dark side of biomedical science.

Dr. Meyers devotes much of his book to extended analyses of two major scientific disputes. The first involves Dr. Simon Waksman's "ingenious, systematic, and successful studies of the soil microbes that . . . led to the discovery of streptomycin," for which he won the Nobel Prize in 1952. Waksman was a soil microbiologist who had noticed that *Actinomyces species* seemed to inhibit nearby bacterial growth. He hypothesized that such fungi might produce "antibiotic" chemicals that could be potentially useful in treating human disease. Thus, Waksman developed a systematic research program to identify such substances. The first one he isolated was actinomycin, which proved too toxic for most medical uses. He hired his student, Albert Schatz, as an assistant in 1943. Within a few months, Schatz had identified two strains of *Streptomyces* that produced an antibiotic substance (streptomycin) that later proved to be a "miracle drug," effective in treating tuberculosis, as well as a wide array of other infections.

Who was the real discoverer of streptomycin? Waksman had the original idea, set up the research program, and hired Schatz to participate in the systematic search. However, it was Schatz who actually isolated the substance. Waksman shared credit with Schatz on the original patent, but, though he frequently acknowledged the help of his assistants, he never publically identified Schatz as the discoverer, or co-discoverer. Schatz's quest for credit (and royalties) eventually led to a rupture in their relationship, a bitter lawsuit, emotional turmoil, the destruction of Schatz's academic career, and a long shadow over Waksman's life.

The more recent case of the Nobel Prize awarded in 2003 for the development of the magnetic resonance imaging (MRI) process provides an even more complex example of rivalry and its ramifications. The award was given to Drs. Paul Lauterbur and Peter Mansfield. Lauterbur, a physical chemist at Stony Brook, had developed the mathematics of applying field gradients of known shapes to create images using nuclear magnetic resonance (NMR), while Mansfield had later invented a method of using NMR to create three-dimensional images in living subjects. So far, so good. However, it was the physician Raymond Damadian who had first observed differences in nuclear reaction times between normal and cancerous tissue, a finding that led him to envision NMR's potential as a medical imaging tool. He published this data in 1971, two years before Lauterbur's seminal insight. Subsequently, Damadian worked furiously to triumph over Lauterbur in solving the practical problems of MRI development and, in fact, he succeeded in producing the first full-body human MRI machine utilizing a very crude scanning technique.

However, over the years Damadian became increasingly marginalized, as Lauterbur and others generated breakthroughs that made today's highly accurate MRI machines possible. Being overlooked for the Nobel Prize was the last straw for the irascible and pugnacious Damadian. He began a very public crusade against the Nobel committee, asserting his priority over Lauterbur in a series of full-page advertisements in the *New York Times* and other major newspapers, proclaiming, "this shameful wrong must be righted."

To whom should the credit go? Meyers presents a fascinating analysis of this complex case. "While facts can be established," he observes, "the determination of who merits priority in discovery requires judgment." [p195] He illustrates this by citing a number of historical errors. In a few cases, scientists have won the Nobel Prize for discoveries that were either false or insignificant. In others, major discoveries have gone unrecognized. Meyers also discusses the subtleties of the mentor-student relationship, using Waksman and Schatz as an illustration. In a sense Schatz became a whistleblower by revealing the inner workings of a hierarchical relationship. Likewise, Damadian might be considered a whistleblower because he upset the applecart by publicly challenging the "authorized" story of MRI development. Whistleblowing rarely works to the advantage of the blower.

Prize Fight is a very engaging book. At a superficial level, the reader can enjoy a wealth of interesting stories, well told. At a deeper level, the book presents a provocative investigation into rivalries and the dark side of science. However, at every level, *Prize Fight* is well worth reading.

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