

Outspoken Physician Continues Fight Against Societal Radiation Phobia

## MARSHALL BRUCER STILL FULL OF ACERB WIT 30 YEARS AFTER SERVING AS SNM PRESIDENT

“Jeff Holter, who thought up the idea of starting a nuclear medicine society, studied ocean wave phenomena for the US Navy at the Bikini Atoll atomic bomb tests. He noticed a wave phenomenon in the atmosphere, and devised a method to measure fallout. Later, he learned about what Robley Evans and the Boston group were doing with radioiodine and the thyroid gland, and what John Lawrence was doing with P-32 at Berkeley, and he thought it was all very interesting. ‘Why in the hell aren’t doctors doing this?’ he asked.”

**T**hirty years ago, when Marshall Brucer, MD, was president of The Society of Nuclear Medicine (SNM), fun was a primary mission. “People in the SNM today don’t look like they’re having fun. They’re too busy filling out forms for the government,” says Dr. Brucer.

Government intrusion was one of Dr. Brucer’s pet peeves in the 1950s. Three decades later, he finds that intrusion to be such an expanding stranglehold that he says, “Total anarchy is the only answer for our society.” He’s always saying things like that. Half for effect, half kidding, pretending to give up because anyone sharp enough to see what’s going on would naturally be a pessimist—but, underneath it all, trying one more time to make a point.

### Radiation Hormesis

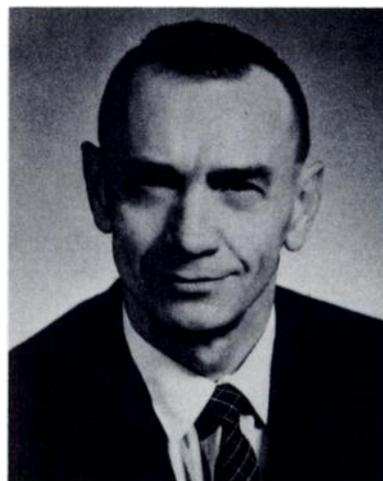
“I’m not against health physicists. I just think that 75% of them ought to be shot,” says Dr. Brucer. He believes, you see, that radiation is good for people, and that many of the rules protecting the public from low-level radiation are unnecessary. “Low-dose radiation is not only good for you, it

is also essential to life. There is still a big problem. How will health physicists now earn a living?” He asks that question at the conclusion of an article on radiation hormesis, published in the Health Physics Society’s *Newsletter* (July 1987, pp. 1-3).

A revolution is happening in the field of health physics, observes Dr. Brucer. A minority within that community is becoming more vocal about questioning the traditional mind-set of radiation protection: prevent as much radiation exposure as possible.

That mind-set has infiltrated the nuclear medicine field as well. Some physicians will say, for example, that nuclear magnetic resonance (NMR) is better for patients than other diagnostic procedures because NMR does not use ionizing radiation. Some physicians, similarly, will say radionuclide studies are preferable to radiologic tests because patients are exposed to less radiation.

Such attitudes go against one of Dr. Brucer’s commandments: Thou shalt not eat thy relatives. “Radiologists are relatives of ours, and if we hurt them, we’ll start hurting ourselves, and vice versa,” he says. “There is no danger from diagnostic x-rays, and

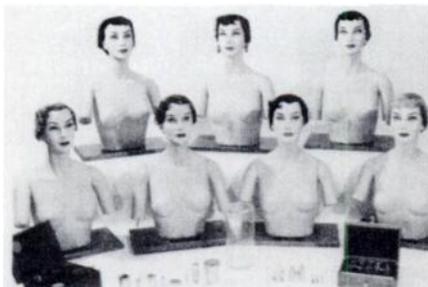


*Marshall Brucer, MD, 1960*

there is no danger from radionuclide studies, so one technique, logically, cannot be safer than the other.”

Dr. Brucer concedes that he may be an extremist radiation proponent, but he insists that such advocacy is needed to combat exaggerated fears of radiocarcinogenesis. “When I went to school, cancer was a disease. Now, the possibility of getting cancer is the basis of all regulation. When people talk about carcinogens, instead of saying they *may* cause cancer, why

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The "Oak Ridge Mock-Iodine Mannequins" (above), christened with such names as Chloe, Drusilla, Euphemia, and Jezebel, served as volunteer "patients" during the 1950s in an international study of thyroid uptake measurements. Researchers at the Oak Ridge Institute of Nuclear Studies (at right) discussing the project in July 1956: Marshall Brucer (left), holding a "mock-iodine thyroid gland," with (left to right) Cyril L. Comar, Kuang-chu Wang, and Hirotake Kakehi. In 1952, "short-lived iodine-131 did not allow inter-city cross-calibrations. To solve this problem, we invented a long-lived 'mock-iodine,' a mixture of barium-133 and cesium-137 with an approximately 10-year half-life. Its gamma spectrum was almost identical to iodine-131. This mock-iodine standard was calibrated (as I-131) by four countries' national standards laboratories to within 0.2%. Over 20 mannequins containing mock-iodine thyroids and body backgrounds were sent to 300 medical laboratories in six countries. The average measurements of "thyroid uptake" were 15% to 50% off in most laboratories, but over 100% off in a few. And all except one lab had different errors for hypo-, eu-, and hyper-thyroid mannequins. The techniques of measurement and the lack of a comparison standard were the primary faults. (The NBS didn't distribute radionuclide standards until late in the 1950s.)" [Brucer M: Half-value layers and the specific gamma ray constant. Vignettes in Nuclear Medicine No. 103. St. Louis: Mallinckrodt, Inc., 1983:2-3]

(Courtesy of Mallinckrodt, Inc., and the Oak Ridge Associated Universities)

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don't they say they may *not* cause cancer? In the great majority of cases, these things may not cause cancer. No one knows what causes any individual cancer," he notes.

Born in Chicago in 1913, Dr. Brucer received his MD from the University of Chicago, and then served in the United States (US) Army. In 1949, he established the basic radionuclide course at the Oak Ridge Institute for Nuclear Studies (I) in Tennessee (now the Oak Ridge Associated Universities). Multiple sclerosis forced Dr. Brucer to retire in 1961 at age 48. He moved to Tucson, Arizona, with a disc-recording dictating machine (now replaced by a personal computer) to help him write letters and articles.

Over the past two decades, Dr. Brucer has emerged as an unofficial, truly original, nuclear medicine historian. Although others may interpret this history differently, Dr. Brucer's

version is widely admired. He attracted a devoted following with the 104 *Vignettes in Nuclear Medicine* he wrote from 1966-1983.

These pithy, irreverent essays—with titles like "The Maximum Ridiculous Dose" and "How to Interpret a Scan Without Actually Lying"—covered everything from nuclear medicine history, current trends in clinical nuclear medicine, dosimetry, mathematics and statistics, the politics of scientific research, and radiation hysteria and phobia. Mallinckrodt, Inc., of St. Louis, published the vignettes and mailed them with advertisements to several thousand readers.

### It All Began with a Snake

In 1978, Dr. Brucer published an article in *The Journal of Nuclear Medicine* that traces the history of nuclear medicine back to a 19th-Century boa constrictor (2). This article, which concludes by describing how

the SNM was founded, was reprinted as the first chapter of *The Heritage of Nuclear Medicine* (now out of print), published in 1979 by the SNM for its 25th anniversary.

Dr. Brucer's current project, *A Chronology of Nuclear Medicine*, from the year 1600 to the present, lists references "from 12 generations of scientists" for the major advances in: science and technology, organizations and politics, instruments, units of measure, drugs, diagnostics, therapy, radiation hysteria, and health physics. "Science is a transient dogma; most of it evaporates in a lifetime. But a durable remnant forms a chronology of concepts explaining some causes of effects," Dr. Brucer explains.

He also cites obituaries of scientists and physicians who contributed to nuclear medicine. "A death signifies the end of an era." The long lists of references come to life in a few hundred "mini-vignettes" that Dr. Brucer has

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## NUCLEAR MEDICINE AS A PRACTICAL MEDICAL SCIENCE

*In 1984, The Society of Nuclear Medicine (SNM) chose Marshall Brucer, MD, to receive its first Distinguished Educator Award. The following essay was his acceptance speech.*

**B**ecause the initial primary purpose of the SNM was "education," I am greatly honored by this award. I accept the honor with the realization that I have done nothing but repeat what I was taught by some of the truly great educators in the Society's history. Three names immediately come to mind: W.V. Mayneord, Robert R. Newell, and Donalee Tabern. They represent the emergence, during the 1950s, of nuclear medicine as a practical medical science. Mayneord taught the "science," Newell taught the "medicine," and Tabern taught the "practical."

Val Mayneord was a physicist at the Royal Cancer Hospital in London. His specialty was the measurement of the roentgen, but not just measurement; it was measurement with precision bordering on exactness. By definition, the roentgen could be measured. In fact, with a few assumptions on the make-up of human tissue, it could be calculated. In a human body with reasonably stable tissues, he arrived at the first concept of the rad: the amount of energy deposited in a human body from an x-ray therapy machine.

This is where Bob Newell disagreed. Newell was a professor of radiology at Stanford. As a matter of principle, he disagreed with every new idea until experimental evidence backed it up. As an academic, he taught students the unique exactness of the roentgen in medical science; but, as a practicing physician, he had never seen a tissue stable enough to accept an energy deposit without changing. The rad, according to Newell, could not be calculated or even measured.

The third man, Donalee Tabern, was an educator of a different sort. As a salesman, he never disagreed with a potential customer. The only trouble was, there weren't any customers for the product he chose to sell: radioisotopes. In fact, there was no product, and the AEC [Atomic Energy Commission] was giving the stuff away. This was the day of the "atomic cocktail" that not only cured cancer but was "the key to life itself." Every Sunday supplement had a story of some professor using "the most important discovery in medicine since the microscope."

Donalee decided that every practicing physician was

his customer. If they didn't know nuclear physics, he would teach them. (He didn't know physics, but as a chemist he could pick up the details over the weekend.) If they didn't know which radioisotope to give for which disease, he would teach them. However, the AEC didn't deal in pharmaceuticals; it made raw isotopes. The company Tabern worked for (Abbott Labs) didn't sell raw anything; it sold pharmaceuticals. He needed a product to sell.

Donalee remembered that a group in Cleveland was using an iodine-tagged serum albumin for blood volume studies. This was a true pharmaceutical. He made up a batch, tagged it with radioiodine, and invented the first radiopharmaceutical (a name he coined). He called it RISA (Radio-Iodinated Serum Albumin). All that remained was to find some customers. We were training a few intensely interested physicians in Oak Ridge. A handful more were coming out of Boston, Berkeley, New York, and a few other centers, but not enough to even titillate a mass production pharmaceutical industry. So Donalee became a huckster for radioisotopes. (An educator is a huckster who really believes in his product.)

Tabern went to every medical meeting he could get into, but he didn't give speeches. He collared physicians individually, told them how easy it was to diagnose and even cure patients with radioisotopes. Was there a problem with "nuclear" instruments? He told them what to buy and which buttons to push. A problem with AEC licensure? He got them the forms, gave them a souvenir ballpoint pen (marked Abbott's), helped them fill out the silly forms, licked the stamp, and mailed the letter. How about the problem of dosage, the roentgens, rems, rads, milly and micro curies and all that stuff? No problem! He would furnish each patient's dose in a separate bottle.

"Dose" to Mayneord meant the roentgen mathematically adjusted to an absorption in a geometric space. "Dose" to Newell meant the rad adjusted by experience of biological effect. "Dose" to Tabern meant "the amount in a bottle we furnish." Guess which is the most common meaning in the current practice of nuclear medicine?

I accept this award as an educator with a twinge of conscience. Deep down in my heart, I think Donalee Tabern deserves it.

*Marshall Brucer, MD*

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written to accompany his chronology.

In September 1986, *Newsline* visited Dr. Brucer to record his remembrances of the early days of the SNM. This visit was part of an ongoing project, initiated by SNM Historian Emeritus William G. Myers, PhD, MD,\* to record conversations with first-generation SNM members and add these records to the SNM Historical Archive. What follows is a condensed version of 10 hours of conversation:

"When I was president of the SNM, the major issue was that we were not going to have a society that consisted of 100% radiologists. Ra-

diology organizations were trying to make sure that only radiologists would be licensed to use radionuclides in medicine.† Robert R. Newell, who was a radiologist, strongly believed that the diagnostic use of radionuclides should be available to any physician, and that endocrinologists were doing it best for thyroid work, and that hematologists (and also John Lawrence\*) were doing it best for blood work.

"Before the SNM was formed, organized radiology and other medical specialties showed little interest in nuclear medicine, then called atomic medicine, when Norman 'Jeff' Holter (3) told them about it in the

early 1950s. Jeff Holter, who thought up the idea of starting a nuclear medicine society, studied ocean wave phenomena for the US Navy at the Bikini Atoll atomic bomb tests. He noticed a wave phenomenon in the atmosphere, and he devised a method to measure fallout. Later, he learned about what Robley Evans and the Boston group were doing with radioiodine and the thyroid gland, and what John Lawrence\* was doing with P-32 at Berkeley, and he thought it was all very interesting. 'Why in the hell aren't doctors doing this?' he asked. He tried to get the local medical society in Montana interested, and he talked to the AMA [American Medical Association], and to surgeons, and to radiologists, but no one really seemed interested.

### Expanding in Physics Journals

"So Jeff Holter, who had a master's degree in physics and another master's in chemistry, called up some of his friends and invited them to the first meeting of what he called a nuclear medicine society. His friends told a few radiologists, and they wanted to come. In December 1953, 12 men gathered in Spokane, Washington, and founded the SNM. They planned a meeting, told their friends about it, the thing spread like wildfire and, with no publicity, 150 people showed up for that First SNM Annual Meeting, held in 1954 in Seattle, Washington. People went home from that meeting and established their own regional societies of nuclear medicine.

"The primary purpose of the SNM was to get people who were not physi-

### SOUTHEASTERN SOCIETY'S LOST EMPIRE

In the beginning, there was no Society of Nuclear Medicine (SNM), but the vision of some adventurous and far-seeing men caused such a society to be formed in 1954. The new society had no chapters; instead, this nebulous and diffuse new organization condensed into local groups also called societies, such as the Southern California Society of Nuclear Medicine, the Central Society of Nuclear Medicine (both early), and the Southwestern Society of Nuclear Medicine (later).

For two years, the SNM was a loose confederation of the regional societies, and held two Annual Meetings. When the SNM held its Third Annual Meeting in Salt Lake City in June 1956, Marshall Brucer, representing the southeast, reinforced the previously established idea that the Southeastern Society of Nuclear Medicine included everything not claimed by any other society. (Temporarily, at least, the Southeastern Society of Nuclear Medicine included most of the inhabited surface of the planet Earth, and Marshall Brucer was its first president.)

Marshall Brucer was elected president of the SNM in 1957. He never got to preside over "his" SNM Annual Meeting at the Beverly Hilton in 1958. Instead, he had to return to Oak Ridge to care for the victims of a critical accident in the Y-12 facility. (Much of what we know about acute radiation syndrome is derived from that incident.) Without Brucer there to protect the interests of the southeast, serious encroachments into the territorial rights of the Southeastern Society of Nuclear Medicine reduced its jurisdiction significantly. We lost Arizona, New Mexico, Montana, North and South Dakota, Cleveland, Northern Ohio, and all of Canada except southeast Montreal. All was not lost, however, as we retained southern Ohio (except Cincinnati) and southeast Tokyo. In 1959, the Southeastern Chapter of the SNM was born. . .

C. Craig Harris

Duke University Medical Center, Durham, North Carolina

\*A recipient of the SNM Hevesy Nuclear Medicine Pioneer Award.

†In 1956, Dr. William G. Myers authored a resolution, passed by the AMA House of Delegates, that overturned a 1951 AMA resolution that stated: "Radium, its disintegration products, and radioisotopes shall be under the supervision of one certified by the American Board of Radiology."

cians working along with people who were physicians on this very brand new and very esoteric area of nuclear physics that was not being written up in the medical literature. It was expanding, though, through physics journals. We had about 1,000 members in the mid-1950s, and we figured out that one-quarter of the members were not physicians. We decided then that the SNM should have a non-MD president every four years, and that tradition is still upheld today.

"The Radiological Society of North America (RSNA) wanted us to join their society instead of maintaining a separate one dedicated to nuclear medicine. They pointed out how only 1,000 people came to our meetings, whereas 10,000 people came to the RSNA, and how our meetings only had about four exhibitors (one year we had Abbott Labs, Squibb, Tracer Lab, and Volk Lab), and how the RSNA had over 100 exhibitors. But we said we weren't radiologists, and they wouldn't let all of us join. The RSNA president told me right then to fill out a membership application, and he pushed it through, and to this day I'm still a member of the RSNA even though I'm not a radiologist. The SNM, though, remained a separate society.

"I remember the early Board of Trustees meetings. The Board met during the SNM meetings, of course, and it also met informally at the RSNA meetings, which we all attended because it had so many exhibitors. I think we spent one-quarter of our time ordering drinks, one-quarter of our time discussing SNM business, and at least half our time—meeting after meeting—arguing about those damn bylaws.

#### Anyone Interested

"Everyone wanted to make rules about who could join the SNM and who couldn't. Jeff Holter [SNM past president 1956-57], Bob Newell, and I always said the same thing: *Anyone*

who's interested should be allowed to join as long as they pay their dues.' That's what we needed then—money. And other people would say, in disbelief, 'You mean you want just *anyone* to be able to join?' And we said, 'No, not just *anyone*. Anyone who is *interested*.' And we went back and forth and back and forth on that point.

"By the time we had our third meeting, we were in a fight with the radiologists. We eventually won. I was amused to read over the past two or three years about the SNM's stand on the cardiology licensure issue. Nuclear medicine physicians are doing the same thing today to the cardiologists that the radiologists tried to do to us 30 years ago. There should be no attempt to divide us from any other field of medicine. Every physician—who is relatively smart, knows his field, learns some basic physics, and has a month of hands-on experience—should be welcomed into nuclear medicine.

#### AEC Licensure

"Paul Aebersold became the first director of the Atomic Energy Commission (AEC) Isotopes Division in 1946. We're lucky that Aebersold was there. If it had been Waldo Cohn, who was seriously considered for that job, the AEC Isotopes Division would probably have been dedicated to basic sciences. Aebersold, though, was fascinated with what could be done medically by injecting these radioisotopes into human beings. I think that if he had more money when he was younger, he would have gone to medical school. Instead, he went into physics. He watched MDs do things with radioisotopes that he wasn't allowed to do because he didn't have that magic MD after his name. I think that influenced him to do his best to see that every MD who was interested could get licensed to use radioisotopes.

In the beginning, the SNM should have objected to the AEC having so

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### CENTRAL SOCIETY JOINS THE SNM

The embryo of the Central Society of Nuclear Medicine formed in 1953 when a group of Chicago physicians gathered on a weekly basis to discuss thyroid cases involving diagnosis or treatment with radioactive iodine. Eventually, in 1955, Drs. Magolloti, Humman, and Landauer invited physicians and scientists in the Chicago area to help them organize a formal society related to the clinical applications of radioactive materials. The Central Society of Nuclear Medicine was chartered on November 28, 1955.

By then, the Nuclear Society, now called The Society of Nuclear Medicine (SNM), was already formally organized. After these two organizations discussed areas of mutual assistance, Robert Landauer, PhD, secretary of the Central Society, announced that members may "retain membership in the Central Society and concurrently join the Nuclear Society" by paying annual dues of \$10. That was 1956. Finally, in 1960, the Central Society agreed to become a chapter of the SNM. In 1967, a proposal by James Potchen, MD, to incorporate Iowa and Missouri into an area called the Plains States Chapter (now the Missouri Valley Chapter) met with approval. It's not clear in the meeting minutes when southern Ohio shifted allegiance to the Southeastern Chapter. . .

*James C. Carlson  
Muskegon, Michigan*

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much control over licensure. But we couldn't have objected too loudly because the AEC also controlled the distribution of radioisotopes. [Today, the Nuclear Regulatory Commission (NRC) controls licensure; the Department of Energy (DOE) controls the distribution of radionuclides produced at federal facilities.]

"One of the first continuing education courses offered by the SNM was geared toward AEC licensure requirements. We created 'midget exhibits,' what you would call posters today, for the SNM Annual Meeting. These midget exhibits were made from three panels of cardboard that, when folded together, were the maximum size allowed on airplanes in those days as carry-on luggage. The midget exhibits covered physics, radiation safety, computations, radiation measurements, radiation dose, radiobiology, and procurement of isotopes.

"Why those topics? The AEC had set up a Subcommittee on Human Uses of Radioisotopes, which we called the 'Sub-Human Committee.' The original Sub-Human Committee requirements for licensure included so many hours of physics, radiation safety, measuring devices, and all the other topics covered in our midget exhibits, and nobody gave a good goddamn about how much you knew about using isotopes to take care of patients.

### Hazards of Calling Radiation a Hazard

"J.R. Maxfield [SNM past president 1962–63] invited Edward Teller to the Estes Park meeting in 1960. Teller lectured about the country's hysteria over fallout from atmospheric weapons testing (5,6), and that was the first time the SNM recognized the hazards of calling radiation a hazard. Georg Charles de Hevesy\* (8) lectured at the SNM Annual Meeting in 1961 (7), and that was the beginning

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of our recognition that we had a very long history. We were not this brand new thing that had just sprung up with the atom bomb. When Craig Harris was president [1968–69], he brought Herrman Blumgart\* (8) to the New Orleans meeting, and that was the beginning of our recognition of the physician who actually started practicing nuclear medicine 30 years before the SNM was founded. [Hevesy is often called "the father of basic nuclear medicine," and Blumgart is referred to as "the father of clinical nuclear medicine."]

"From 1955 to 1958, the Holter and Brucer presidencies, the various nuclear medicine societies talked about becoming chapters under one umbrella group, which actually happened under Henry Jaffe's term as president [1958–59]. During my term, I appointed George Thoma as chairman of the Publications Committee for the sole purpose of stalling the birth of *The Journal of Nuclear Medicine* because I thought we couldn't afford it. When Jaffe was in office, Thoma became the journal's founding editor. Jaffe also decided that it was just too damn much work to run a society, and he hired somebody, Sam Turiel, a staff of one, to do it for us.

"I'm the only SNM president who could not chair his Annual Meeting. I was on my way to that meeting the

day before it opened, and I had reached St. Louis when I got called back to Oak Ridge. That was the day of the 1958 uranium critical excursion, resulting in a big plutonium explosion. And we had spent an entire year preparing for that damn meeting.

"One other regret I have about the early days of the SNM is that we didn't establish a Mexican Chapter. We should have had the same geographic setup as the RSNA. Roberto Maass from Mexico became a member about when I did, and there must be 40 or 50 people in Mexico who are very active in nuclear medicine. We should have some annual meetings in Mexico, and we should have more in Canada. Until this year, the SNM only had one meeting in Canada—Montreal in 1963.

"Our most pressing political problem today, though, is radiation hysteria. The tide seems to be turning against this hysteria and phobia, but the nuclear medicine community has got to push harder. Anyone who says radiation is good for you should be supported. I don't care how they say it, or how many people they insult; it needs to be said—again and again."

Linda E. Ketchum

### References

1. Brucer M: Oak Ridge: Midwife to nuclear medicine. *J Nucl Med* 1986;27:158
2. Brucer M: Nuclear medicine begins with a boa constrictor. *J Nucl Med* 1978;19:581-598
3. Brucer M: Norman "Jeff" Holter (1914-1983): A historical note and, as it must be, an obituary. *J Nucl Med* 1984;25:132-133.
4. Teller E: The hazards of radiation. *J Nucl Med* 1962;3:1-9
5. Myers WG: Commentary, Georg Charles de Hevesy. *J Nucl Med* 1975;16:1107-1108
6. Myers WG: Hevesy Nuclear Medicine Pioneer Lecture—1979: Georg Charles de Hevesy: The father of nuclear medicine. *J Nucl Med* 1979;20:590-594
7. Hevesy GC: Marie Curie and her contemporaries. *J Nucl Med* 1961;2:166-182
8. Brucer M: The ultimate consumer in nuclear medicine: The Nuclear Pioneer Lecture of the Society of Nuclear Medicine, 1969, honoring Herrman L. Blumgart, MD. *JAMA* 1969; 208:2457-2462