

**THIS YEAR'S NOBEL PRIZE  
IN MEDICINE**



*Proof that this  
shameful wrong  
must be righted:*

**The two winners acknowledge that their work grew out of  
Dr. Damadian's prior discoveries in magnetic resonance**

The following recount of the events in the development of the MRI is quoted from the book  
*A Machine Called Indomitable* by former *New York Times* reporter Sonny Kleinfeld, published by Times Books in 1985\*

In a second effort to right the shameful wrong that has been done to Raymond V. Damadian, M. D., by his exclusion from the Nobel Prize for the development of the MRI, we present the words of the two winners, revealing how their achievements are based on the landmark discoveries made by Dr. Damadian.

**THE CHAIN OF EVENTS BEGINS**

In his office at Johns Hopkins University Hospital, both his legs outstretched, Donald Hollis put aside Damadian's 1971 *Science* article on NMR and rolled its fundamentals over in his mind. Hollis had a happy-go-lucky voice and the air of a born charmer. He was a medical researcher, caught up by NMR explorations of biological systems, and he carefully pondered any discovery of note in the field. It was thus inevitable that Damadian's step into the unknown was going to fire up some engines in Baltimore, Maryland, where Hollis worked....Among the medical students who worked with him was a particularly energized individual named James Economou [sic ""]....When Damadian's *Science* paper came out, Economou read it. It was an eye-opener and it added a strong filip of energy to his normal rarefied state. As Hollis recounts it, "He came rushing in and said this guy said you can detect cancer..." Hollis and Economou determined that they would test Damadian's results and, if they proved correct, explore the subject further. At that time, Hollis was not yet in a position to duplicate the experiments on his own NMR machine. Thus at the tail end of the summer, a year after Damadian left, he and Economou arranged to visit New Kensington [where Dr. Damadian had done his original experiments]. They were escorted to a machine and spent a day or two testing tissue samples....

Hollis's results compared favorably with Damadian's.... At the time of Hollis's experiments, a mild-mannered, forty-two-year-old chemist happened to be in town who came to play a significant role in the development of NMR imaging in medicine... After he was discharged from the Army, Lauterbur felt he wanted to continue doing NMR work, since he saw it as a valuable technique for a chemist to use in unlocking the secret of compounds.... Since he had established himself as a powerful voice in NMR research, it was not surprising that Lauterbur was invited to become a member of the board of directors of Nuclear Magnetic Resonance Specialties.... As it turned out, the company had sunk into even sorer shape than Lauterbur imagined... Having been named president and chairman of the company, Lauterbur found himself facing this mess in New Kensington in early September of 1971, the same time that Hollis happened to ride into town.

**Dr. Lauterbur, in his own words,  
credits Dr. Damadian**

Lauterbur remembers the events well. He had seen some of the readings being done on the rats by Economou, and he was intrigued by the experiments. A candle was lit. One evening, he and the personable Don Vickers, as was often their night-time habit, went out to grab some dinner at... a hamburger joint. This is how Lauterbur tells of that evening.

"I had watched some of those experiments being done. And they were seeing some differences between the cancerous tissue and the normal tissue. A phenomenon seemed to be at work there. But I couldn't imagine that it was very likely that it would be important to do such investigations of tissue. A method that required cutting out the samples didn't seem all that interesting. From what little I knew, I thought you could probably characterize biopsy sample better by

microscopic investigation. But it did seem useful if you could take measurements from the intact human body and create images....And I got to thinking that magnetic field gradients provide a general solution to this problem...."

The next day he scribbled down his idea about gradients in a tan spiral notebook, suggesting in his notes that it could allow NMR images to

be done of the body and therefore serve as an application of Damadian's research. He asked Vickers to sign his notebook as a witness to his idea, a common safeguard in scientific work when a researcher believes he may have stumbled upon a patentable discovery....

Lauterbur told me the story of his breakthrough at his orderly, fluorescent-lighted office in the graduate chemistry building at Stony Brook...Lauterbur was gazing out of his fifth-floor window at the campus below, students languorously making their way to class, when I said to him that it was really a remarkable combination of chance events - Damadian coming to NMR Specialties to attempt his experiments, Hollis being stimulated by the resulting paper and showing up there because he didn't have his own equipment ready, he being asked to run the company at the same time that Hollis was in town - that converged to steer him to his discovery. "Yes," Lauterbur replied, "but life is full of things like that. If you turn left instead of right at the corner, you might not meet your wife."

At the time he ate his momentous Big Boy, Lauterbur said that he had no inkling that Damadian had evolved any ideas about scanning the human body or fashioning a machine that could search through the body for disease; about all he had heard, he said, was that Damadian was looking into launching a company that would manufacture devices earmarked for use in hospitals that would test biopsy samples. Damadian, of course, was talking about much more than that. (Vickers himself says, "I think it was common knowledge at this time, at least throughout New Kensington, that Ray Damadian wanted to stuff people in NMR machines.") He had clearly spelled out his intentions in several grant proposals, mentioned them in a letter to President Nixon, and informed a journalist of his plans....

**Lauterbur's Nature article is rejected,  
until he includes  
Damadian's prior discovery**

Details of Lauterbur's technique for imaging were eventually published in the March 16, 1973, issue of *Nature* magazine, along with the first NMR image ever made. Achieved on a conventional NMR device that had been somewhat modified for the purpose, the image was of two tiny tubes of water immersed in a larger tube. The paper, as it was initially submitted, was rejected by *Nature*, in large part because Lauterbur had outlined no application of the imaging technique. As he puts it, "They wanted to see something more than this funny idea." So, in a revision, he tacked on the suggestion that the technique could be used to distinguish between malignant and normal tissue, writing: "A possible application of considerable interest at this time would be to the in vivo study of malignant tumors, which have been shown to give proton nuclear magnetic resonance signals with much longer water spin-lattice relaxation times than those in the corresponding normal tissues."

However, Lauterbur did not see fit to reference Damadian's paper, but rather some subsequent experiments performed by several other researchers that corroborated what Damadian had suggested; only in later years would Lauterbur acknowledge that Damadian's work first triggered his interest.

When asked why he chose not to bestow credit at the time, his explanation was that he decided to cite experiments that he was more familiar with. Damadian, however, read sinister motives into the omission, and he became convinced that Lauterbur was out to steal his discovery, a charge that Lauterbur has vigorously denied....

Damadian quickly got hold of Lauterbur's *Nature* paper... After reading it and finding no mention of his own work, he blew up...Lauterbur gave a speech sometime late in 1973 at Brooklyn College and a professor of chemistry there who was chummy with Damadian called him to report on it...[Damadian, on being told about it]: "Here I was talking about medical scanning and getting ridiculed and here was this guy standing up and saying that he had invented it." I was absolutely shocked. I couldn't believe it."

**Dr. Mansfield, in his own words,  
credits Dr. Damadian**

In a coffee room in the physics department at the University of Nottingham, a wavy-haired professor named Peter Mansfield sat down one morning in June 1972 to drink a cup of eye-opening coffee with Allan Garroway, a postdoctoral associate of his, and Peter Grannell, a research student in his lab. They had a problem to thrash out. The team had been doing NMR studies of various substances, and they were having quite a bit of success but had exhausted the materials that were

immediately available in the lab. As Mansfield puts it, "We didn't have any more materials to pop into the machine. So we were wondering what to do with it. It was going well, and it was sort of a pity not to do something else with it."

As Mansfield sipped his coffee in Nottingham (according to his retelling of the events), various concepts jiggled around in his head, and then something fused together. "I was saying, 'What can we do with it? What is it good for?' It occurred to me in a flash around the coffee table that we could study the distribution of atoms linearly using gradients - basically do imaging," Mansfield says he was entirely unaware at this point that Paul Lauterbur had already had essentially the same idea. Mansfield, though, was not thinking specifically of medical applications; in the first paper he published on this in 1974, in fact, he didn't even make any mention of imaging. Rather, he wrote of a general method to use an NMR machine to detect the faces of crystals in samples that possessed them.... Right in the coffee room Mansfield dashed to the blackboard and demonstrated the methodology to his companions. Once he realized he could achieve spatial imaging, he looked around for applications, and Damadian's tumor experiments were drawn to his attention. "So he certainly had an influence," he said. "I think Damadian's work had some influence on everyone."

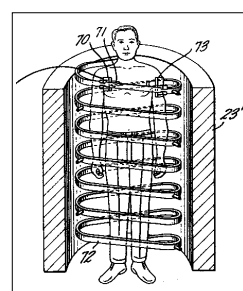
**The Nobel Prize for Medicine  
allows for three winners**

There is only one substantial hope that the Nobel Assembly will change its mind and include Raymond Damadian in this year's Nobel Prize for Medicine. The two winners must put the truth of discovery first, step forward and insist that he be included.

The award allows for three winners. There is absolutely no reason to exclude Dr. Damadian and willfully perpetuate the shameful wrong that has been done to a man who is, because of his brilliant mind and indomitable spirit, one of the greatest living benefactors of patients worldwide and the last person who deserves to be needlessly injured by a prize committee or by anyone else.

The time has come, not only for great science, but for greatness of character. It's time for one and all to relegate any disputes or ill-will to the past, so all three may share the award for their mutually distinguished contributions to the development of the MRI, and people all over the world may view the evening of its presentation with unreserved delight.

**DR. DAMADIAN'S LANDMARK ACHIEVEMENTS**



Drawing submitted with Damadian's patent application. Patent filed in 1972.



Dr. Damadian (left) pictured with the two coworkers who helped him build the world's first full-body MR scanner.

- 1969 - Proposal by Dr. Damadian for first time by anyone of an MR (magnetic resonance) body scanner.
- 1970 - While conducting experiments at Nuclear Magnetic Resonance Specialties Corporation in New Kensington, Pennsylvania, Damadian makes the discovery that makes the MR scanner possible. He discovers a dramatic difference in the MR signal between cancerous and normal tissue, proving Damadian's scanner concept is achievable. For the first time in history a radio signal that originates inside tissue (the MR signal) is discovered that can monitor tissue from outside the body and be used to hunt down cancers. Damadian also discovers marked differences in the same signals among normal tissues (called their T1 and T2 relaxations), so that all body tissues can now be seen with greater clarity.
- March 1971 - Damadian's article about his discovery of the MR cancer signal is published in the journal *Science*.
- March 1972 - Damadian files patent for world's first MRI.
- 1977 - Damadian and co-workers, Goldsmith and Minkoff, build the first MR scanner, which they call *Indomitable*, and achieve the first image of the human body using the scanning method of Damadian's 1972 patent.
- 1980 - Damadian and the company he starts, Fonar Corporation, introduce the first commercial MRI scanner.
- Dr. Damadian also invented the first Open MRI, the first mobile MRI, and now the world's first Stand-Up™ MRI.

All facts are public record. Details available on request.

**HOW YOU CAN HELP RIGHT THIS SHAMEFUL WRONG**

TO: The Nobel Prize Committee for Physiology or Medicine  
Dear Members of the Nobel Committee: The TRUTH must have a place. I/We believe this year's Nobel Prize for Physiology or Medicine should include Dr. Raymond Damadian.

Name \_\_\_\_\_  
Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_  
Mail to: The Nobel Committee for Physiology or Medicine, Nobel Forum, Box 270 SE - 171  
77 Stockholm, Sweden E-Mail to: secr@mednobel.ki.se  
Or call the Committee at 011-46-8-585-823-44 • 011-46-8-662-64-31 • 011-46-8-51-77-45-00

**Express Your Outrage, Now. Paid for by Friends of Raymond Damadian**

Contact D. Culver, 631-694-2929.

Lauterbur's notebook entry of his contribution, where he credits Damadian's prior discovery. (Copy of the signed, handwritten original is at www.fonar.com)

*"The difference in relaxation times that appears to be characteristic of malignant tumors [R. Damadian, Science, 171, 1151 (1971)], should be measurable in an intact organism."*

**It's time for the two winners to help right this wrong and insist that Dr. Damadian be included in this year's Nobel Prize for Medicine**