

## THIS YEAR'S NOBEL PRIZE IN MEDICINE



# A personal letter to my fellow medical doctors about this shameful wrong

## Dear Fellow M.D.,

Ever since I looked at the Web site of the Nobel Prize one day at 5:30 in the morning, the time I knew the announcement about the award for medicine would be posted, and was affronted by my inconceivable exclusion from recognition for the MRI, I've had a multitude of thoughts, not only of the wrong done to me, but of you, my fellow medical doctors.

I considered addressing you about the sad event and my public response to it in *The Journal of The American Medical Association*, but, since it is a monthly, there would be no time to prepare the printed piece and schedule it for publication. So I have decided to set aside one of the printed appeals we have been making to right this shameful wrong just to have a talk with you.

First, I hope you understand that my appeal is soundly based. If you would like any information to verify it, many medical books – not to mention the High Court on Patents and the U.S. Supreme Court – indeed agree that I am the discoverer of the tissue signal differences (T1 and T2) that all MRI's today use to produce images of diseased and normal tissue.

**I remember as if it was yesterday** when I, as a young medical doctor a bit out of his element, got hold of an NMR (the original name for MRI) machine to perform the experiments that would prove that life-saving signals existed that would henceforward put NMR in the service of medicine, not just the analysis of inert chemicals and substances.

I decided on cancer tissue because I suspected I would meet with skepticism about the medical application of magnets and knew I needed a cause with a promise so great – the alleviation of suffering from the agonies of that mortal disease – that my critics would be less likely to be able to obstruct an M. D. in the world of the research lab. I also chose cancer because of the distress I had experienced in more than one instance when, as a medical student and then as a house officer, I would arrive at the autopsy table to find a patient riddled with cancer that no one in the clinic suspected the presence of. There was simply no machine that could have seen it. The impediment was the X-ray's fundamental inability to visualize the vital soft tissues of the human body.

In some earlier test-tube NMR experiments with other samples I had begun to wonder if NMR might hold the answer and be transformed from the relatively tiny instrument it had always been – with an opening of less than two inches, into which to insert the test-tube sample for analysis – to a full-body scanner, which I would eventually have to build by hand, in an abandoned laboratory at Downstate Medical Center.

**I wish you could have been there with me in those summer weeks of 1970** when I measured the NMR signals from cancers and normal tissues and saw how dramatically different they are. I discovered, for example, that the signal decay-rate (relaxation time) of hepatoma is 826 milliseconds, compared to the signal decay-rate of normal liver tissue at 293 milliseconds – a whopping difference of 182%. Now, imagine! I knew all X-rays of soft tissue differences – by CT, mammography, or fluoroscopy – were maximally 4%.

Yet how right I was about the reaction I feared might lie ahead. A swarm of detractors, usually from the NMR specialist club of Ph.D. chemists and physicists, immediately branded my fragile proposal of an NMR body scanner as – to quote one of the more offensive and less-prescient broadsides hurled at me – “visionary nonsense.” As you might guess, that sort of pervasive negativism had an exceedingly damaging effect on my ability to raise the funds I desperately needed to build a prototype. Out of desperation, two of my graduate students and I built the first human scanner by hand with spare parts.

**We obtained the first human scan in the early morning hours of 7/3/77.** I still have a picture of it, and it's a beauty! I would not have guessed that one day that handmade scanner would find its way into the permanent collection of The Smithsonian Institution. Yet it is the scanner that proved NMR held, not only some, but vastly unprecedented potential for visualizing the human body.

### THE MRI IS AN MD'S INVENTION

I want you to know something, and I want you to be very proud of it. The MRI is emphatically an M. D.'s invention. Although the two Ph. D.'s who have been named for the prize – one a chemist and the other a physicist – made later contributions to MRI technology, as have many others since then, there is no way, outside of outright deception, to ascribe primary credit for the invention of the MRI to two scientists who merely imagined improved ways to display the image of the signals I discovered. Countless Ph. D.'s had been working with NMR for over 25 years without the idea of a possible medical application ever occurring to even one of them. It's just not the way they think or are trained to think.

- **Always be proud that**, in the coveted world of high-tech equipment:
- An M. D. saw the need of mortally afflicted patients.
- An M. D. proposed an NMR body scanner for the first time ever.
- An M. D. proved the NMR signal could detect a mortal disease, the landmark discovery that proved the scanner was possible.
- An M. D., together with his students, built the first MRI scanner and achieved the first live human scan.
- An M. D. used the scanner to obtain the first MRI picture of patients with cancer.

Yes, my colleagues, an M. D. provided the first invention ever of a scan method to achieve the early detection of cancer. What's

more, that M. D. even had the temerity to patent his invention, so he could have some chance of getting the still much vilified machine out into the world, where it could start to do the great good of which he knew it was capable.

By contrast, the two NMR specialists the Nobel Committee for Physiology or Medicine has decided to honor for “discoveries concerning the invention of the MRI” – the Ph. D.'s Paul Lauterbur and Peter Mansfield, along with literally thousands of other research scientists – had been working with NMR machines for 25 years (1945–1970) without one of them ever asking himself if NMR might have a medical application, let alone if the diminutive magnet-gap for test tubes could be imagined as a full-body scanner, and then knowing which experiments to perform to validate its promise.

Imagine now all of those wasted years of NMR's possible benefit to humanity, quietly waiting for an M. D. to encounter the technology and realize its possibilities for scanning patients.

The simple truth of history is that an M. D. was required to recognize the usefulness of NMR to medicine and to perform the experiments to demonstrate its greatest value.

**Therefore, I believe it is outrageously unjust that the Nobel should decide to exclude from its award the M. D. genesis of MRI.**

And I am not the only missing M. D. in this blighted picture. We are all the missing M. D.'s.

How little did I realize when I made my discoveries that I'd have to be “indomitable” at this late stage in my life. Back then we chose “indomitable” as the name for the first scanner in an attempt to overcome the skepticism and outright scorn that was heaped on our efforts, ridicule that increased in volume to a startling degree when I proposed an NMR machine that would be big enough to insert a human body into.

My report of the abnormal NMR cancer signal and my first proposal of the scanner was published in the journal *Science* in March of 1971. Today, every MRI produces an image – and can only produce an image – by recording and displaying the marked differences in the signal strengths from cancerous tissue and normal tissues that I discovered and reported.\*

I wish you could have also been there when my struggling little company arrived at the first hospital, one in Long Island, that had the foresight to order our first commercially produced machine. We had quite a time getting it into practical service for patients, but we did it! And I am proud to say, for all of us in the medical profession, that since my original experiments, more than 500-million patients have been scanned throughout the world, using the technology I discovered and then implemented.

Yet the Nobel Committee for Physiology or Medicine has chosen to ignore those signal discoveries and achievements. Since my first appeal, the Nobel Assembly, who are advised by the Nobel Committee for Physiology or Medicine, have lamely announced that they are giving the award for “the image only.” They certainly know how to compound the wrong with a second dose of ignorance.

**The MRI image is only there because** it is recording the difference in the signals I discovered between cancerous tissue and normal tissue, as well as the differences between the normal tissues themselves.

As you know, cancer tissue shows up bright (for example, T2 images) on MRI scans because of its strong signals and the surrounding normal tissue shows up much darker because of its weaker signals. The contrast of the two signal types, strong and weak, sets off the cancer dramatically, so it is easily detected on MRI pictures and rarely missed, unlike the condition that existed with the X-ray for almost 100 years.

**Why have I been excluded?** After all, the award in medicine allows for three winners. Yet the Committee chose only to name two and exclude the third. I believe the reason is a cause for grave concern among M.D.'s everywhere. It is not the first time a medical doctor has been excluded for his technological achievement. My friend, William Oldendorf, M.D., who did truly invent the CT Scanner, and shared the Lasker Prize with the Nobel winner, was also excluded from the Nobel Prize. I called him then to console him. He responded, in words I now recall with especial poignancy, with the heartfelt sigh, “They could have given it to three.” Sometime afterward when I asked him how he had fared in the wake of his exclusion, he answered, “What can I tell you? Within six months of the announcement, I had a triple bypass.” Not very long thereafter he died, severely depressed and brokenhearted.

Now, the same wrong has been done to me, another M.D. But don't worry. I'm not going to die over the dastardly wrong. I expect that I am sufficiently resistant to the mortal slings of a prize process that has allowed itself to be dominated by individuals who, regrettable as it is to acknowledge, are ethically and intellectually corrupt. I cannot, however, sit by and permit the illegitimate celebration of a disgrace to my invention and its distinguished history. I am still determined to live in the service of the MRI. I also realize I am the first blatantly wronged scientist to call these arrogant scoundrels to the high standards they espouse, rather than to fade away into the oblivion they prefer for their victims.

**I want to ask, What is the sorry track record of the Nobel selection process symptomatic of?** The regrettable truth is, the process in Stockholm has fallen victim to influences that have nothing whatever to do with the truth of science. It has, in fact, fallen victim to considerations that are a woeful vitiation of the unbiased evaluation of scientific merit.

In the medical technology area especially, the process has been hijacked by advisors who are determined to reserve the research award for Ph.D.'s, in my case, Ph. D.'s who are NMR specialists. We know because we know some of these scandalously prejudiced and, I might add, ill-equipped advisors and because good friends of ours know others. Of course, many Ph.D.'s are dear friends of mine and have always been eminently fair-minded about what they know I have done; I want them to be certain that I am not for a moment including them in the political chicanery that has infected the Nobel process. I am, in fact, proud to say that many exemplary Ph.D.'s have voiced their outrage at my shocking exclusion.

**What is the cure?** I think the whole clubhouse of Nobel insiders need many thousands of us to let them know, in no uncertain terms, that all consideration of values other than the truth of science has no place in the prize process and, in fact, does more harm to science itself than anything else one can imagine. We need, if you will, to write a prescription for these calculating rascals:

**“Sig. Truth, daily. Maximum strength.”**

I hope you wish me well in this unanticipated and unwanted struggle upon which I have embarked. I realized after I was excluded – during a difficult weekend I spent coming to terms with the incongruous fact – that the Committee was making a blatant attempt to rob me of my life's work and of my very identity, which for 33 years has been centered around an all-absorbing dedication to creating MRI machines and advancing their technology for the benefit of our patients.

**What do I hope to achieve?** The best that can be achieved. My goals are clear. I will do my best to help right the shameful wrong that has been done by letting the prize Committee know, in a public forum, that they are answerable for their malevolent decisions. The world has now grown too small to offer a serene hideout for wrongdoers who seek to occupy a global stage. I also hope by my efforts to reduce the possibility that the Committee will wince or discourage other present and future M. D.'s who find their calling in medical research and are partly inspired by the normal human hope for recognition of their achievements. Finally, I believe that, to the extent I am able to succeed, a much-needed purging of the decision-making process for the Nobel will have taken place. Thus I will have left it a more worthy and honorable prize than the one by which I have been wronged.

Now I ask you to help me rally the medical community to put the Nobel Committee for Physiology or Medicine on notice: Either put the truth of science first or get out of science.

**We M.D.'s are 650,000 voices strong in the U.S.** Can you please let these would-be intellectual pickpockets hear from you in the interest of all M.D.'s, so they get the idea that this time they can't get away with their outrageous manipulations?

If you would like to let your voice be heard in this matter, here is the contact information: The Nobel Prize Committee for Physiology or Medicine: Nobel Forum, Box 270 SE – 171 77 Stockholm, Sweden. E-Mail to: [secr@mednobel.ki.se](mailto:secr@mednobel.ki.se). Or call the Committee at 011-46-8-585-823-44, 011-46-8-662-64-31 or 011-46-8-51-77-45-00.

A bit of advice. The Nobel Web site has been down recently. Perhaps, the secretive culprits have just decided to tune out the wide-spread outcry their injustice has, we know, provoked. The current excuses we hear and read from their spokespeople seem to indicate they have realized that their decision has been shorn of any semblance that it was based on the truth of MRI history. They have also, it seems, discovered that assaulting my supposedly feisty personality as a reason for my exclusion is an unacceptable way to justify their wrong. But I admit I do get – understandably, I think – exceedingly upset when I realize, once again, that some unconscionable scientific pilferer is trying to steal my entire life.

**We have noticed** that they have recently marshaled all that is left to defend the indefensible error into which they have allowed this year's Nobel for Medicine to have fallen victim. It is a cold listing of bureaucratic trifles, sputtered about their inviolable statutes, which, we note, they change at will – a regrettable litany which they sent off in response to a high-minded scientist, whom I never met, who copied me on a letter he wrote the Assembly, urging the members to return to the high standard of scientific truth from which they have so maliciously plunged. He also sent along the response he elicited. Here's a distasteful morsel: “Please let us inform you about our rules and work.... The answer is that our statutes state that the decision obtained from our voting meeting is final and without appeal. Hence, this year's award is final, the protocol signed, and the case closed.” What utter, unworthy bureaucratic nonsense they resort to. Decide to destroy a man's life's work and then declare, with accountability to no one, “Case closed!” Apparently, the light of truth has exposed their violation of MRI history.

**What person, worthy of the distinction of being considered a scientist**, who, when confronted with evidence that proves he is indisputably in the wrong, persists in his error? Yet, so far, that's apparently the case in Nobel land as of November 3, 2003.

Let me conclude by thanking you for taking time out in your undoubtedly busy schedule to read my letter. But what else have we physicians known in our lives but caring for and healing the sick, all too often to the point of exhaustion, and, at the very least, according to our oath, to “do no harm”?

Do you know what time I achieved the world's first MR scan of the human body? At 4:45 in the morning. Obviously, we were working late. Yet, dear fellow M. D., what other life would any of us want?

Cordially,  
Raymond Damadian, M. D.

\* Strong signals mean bright pixels on T2 images and weak signals mean dark pixels. The signal strength S is given by  $S = k(e^{-TE/T2})$  for a T2 image; thus the longer the T2, the stronger the signal (for a given TE).