



### THE INVENTOR

**“If you see something very clearly, it becomes compelling.” —Raymond Damadian**

When Dr. Raymond Damadian proposed in 1971 that body images more vivid than X-rays could be produced with a machine that measures magnetic properties of atoms, he was considered crazy. Critics called his theory, which built upon a phenomenon known as nuclear magnetic resonance, “visionary nonsense.” Prestigious scientific journals refused to publish his findings, and government funding bodies refused to support his research.

But Damadian, 50, who dubbed his alternative to X-ray machines “Indomitable,” has proved to be an indomitable force himself. Working on a shoestring at Brooklyn’s Downstate Medical Center of the State University of New York, he and colleagues Larry Minkoff, Joel Stutman and Mike Goldsmith rummaged through surplus electronic hardware stores on Canal Street in lower Manhattan to get equipment. By the time they completed their contraption, which would have made Rube Goldberg proud, Damadian was \$40,000 over his faculty-research budget. The chairman of his department disconnected his telephones and threatened to kick him out of the lab. “Fortunately,” says Damadian, “I was tenured or I would have been out the door.”

Today, the imaging devices that Damadian invented are considered an invaluable tool for diagnosing cancer and other diseases, and they have been installed in hundreds of hospitals around the world.

A prodigy of sorts, Damadian was an accomplished violinist by age 8, played professional tennis in his teens and won a Ford Foundation scholarship to the University of Wisconsin at 15.

This rigorous early training promoted his mastery of science. Nothing, however, could prepare Damadian for the hostility with which his colleagues greeted his ideas. “I believe the source of their anger,” says Damadian, “was that my findings overturned theories upon which literally thousands of scientists had pinned their reputations.”

Through difficult times, Damadian was sustained by the strength of his own vision. “The concept was extremely clear in my head—down to the finest minutiae,” he recalls.

In 1978, Damadian set up his own company, FONAR, to manufacture his magnetic resonance scanners. Despite skepticism on Wall Street over whether the scientist would be an effective business executive, FONAR now is operating for the first time at a profit, with sales of \$37 million this fiscal year.

What enabled Damadian to survive the years of adversity and ridicule? Like most creative thinkers in science, it’s not the money that motivates Damadian. The biggest thrill, he says, is in “seeing ‘visionary nonsense’ transformed into mainstream medicine.”

by Kathleen McAuliffe

businesses owned by women had sales under \$10,000 and 51 percent had sales that were less than \$5,000. The trend may change, however, as more women invest in businesses. Sales figures suggest that a greater number of women-owned firms are becoming larger enterprises.

Management experts theorize that women may not have been as aggressive because they are newer to the game of owning a business or building a career. Others cite problems with finding affordable day care and a lack of financial resources as obstacles to building a business. Unconscious fears, such as worrying about being too successful, also make some women temper their risk-taking tendencies. “Women have to play both sides of the street,” notes psychologist James Webb at Ohio’s Wright State University. “Gifted women have to manage their brightness and creativity but also play accepted female roles.”

That’s not to say all women shy away from career risks and challenges. Harvard Law School Prof. Susan Estrich, 34, took a big intellectual gamble when she staked her chances for receiving tenure on a scholarly article on rape law that began with a description of her own rape. Estrich received the appointment.

### Death of the garage inventor

Those who want to live at the creative fringes in the world of art and science have obstacles of their own to overcome. The high cost of electron microscopes, high-speed computers and atom smashers has made the garage inventor almost obsolete. David Packard, cofounder of Hewlett-Packard, told an interviewer recently, “When I first started in the [electronics] field 40 years ago, a few hundred dollars’ worth of instrumentation was all you needed. Today, you can’t work at the frontiers of technology and electronics without equipment costing millions of dollars.”

Many of the projects that do win coveted government support are the kinds that peer-review committees feel comfortable with, not the wild hunches that may turn into brilliant cures or discoveries. “What human being is so impartial as to want to fund research that—if proven correct—would challenge concepts he or she spent a lifetime developing?” asks Robert Becker, a retired orthopedic surgeon who pioneered methods of healing bone fractures.

Funding austerity forces some scientists to turn to private philanthropists or to dip into their own pockets. After a U.S. government funding body rejected her grant application to purify interferon, the anticancer drug, Dr. Mathilde Krim obtained enough of the compound