

■ ■ SAINT BARNABAS  
■ ■ HEALTH CARE SYSTEM

*Newark Beth Israel Medical Center*



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(b)(6)

May 15, 2009

National Medal of Technology and Innovation  
Nominating Evaluation Committee  
c/o The United States Patent and Trademark Office  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

Attention: Jennifer Lo, Program Manager

Re: Nomination of Dr. Zalman Shapiro

Dear NMTI Committee Members:

I have been informed that Dr. Shapiro has been nominated to receive the National Medal of Technology and Innovation from the U.S. Patent Office. I write to inform you of his extraordinary gift to the health and long-term survival of many patients under my care.

I am a cardiac surgeon, past Director of Surgery and Director of the Pacemaker and Defibrillator Center of the Newark Beth Israel Medical Center in Newark, New Jersey. I was the first to implant a pacemaker in New Jersey in 1961, and among the first to do so in the United States.(1-5) In those days, patients who were candidates to receive implanted pacemakers were almost always suffering from complete heart block, a condition in which the cardiac conduction system is defective, resulting in heart rates barely compatible with life, typically in the range of 20 to 40 beats per minute. Ordinarily the life expectancy of such people was less than 20 years. Implantation of a cardiac pacemaker, in those days a relatively simple device, produced a regular unvarying impulse that set a fixed rhythm and heart rate of 70 beats per minute.

In due course it soon became obvious that there were serious technical problems with these devices, such as fractures of the conducting wires that had been sewn to the heart muscle, leakage of bodily fluids through the pacemaker capsules, and early battery failure. Almost all of the devices were powered by six to eight mercury zinc cells encapsulated within the device. Out-gassing of some of these batteries sometimes produced an almost explosive device failure.

One of my tasks as a clinician was to investigate alternative power sources, such as batteries of different chemistries. I wrote to the AEC suggesting that there might be a role here for radioisotopic power. After applicants were interviewed at a bidders conference, NUMEC, a company founded by Dr. Zalman Shapiro, was selected. He and his colleagues, using his general design specifications, developed the first American-made radioisotopic pacemaker, the NU-5 model, 15 of which my colleagues and I implanted over two days in April 1973. (Another one also was implanted the same day in Bethesda.) The device electronics and the triply encapsulated  $^{238}\text{Pu}$  heat source, were hermetically sealed. It transferred energy by the differential in temperature between the isotope and the body, resulting in a pacemaker that could still function at one half-life of 87 years. All of the NUMEC pulse generators lasted many years. None failed, although some were replaced electively as innovations in the electronics became available, such as multichamber stimulation and external non-invasive programmability of the implants.

As an example, one of my patients, a woman now living well into her 50's, received one of the earliest NUMEC units when still in her teens. The pacemaker still is functioning perfectly, 35 years later. Other patients who received non-isotopic pacemakers, had they lived 35 years, would have had many reoperations for complications of various sorts, most commonly from battery failure. Another patient whose pacemaker I replaced recently endured his 17<sup>th</sup> pacemaker operation. This woman has had but the one.

Dr. Shapiro was for me a behind-the-scenes developer of this remarkable device that has done great things for the health and well being of hundreds of patients and, incidentally, saved the public a lot of money by avoiding repeated operations and device replacements. Along with his numerous accomplishments in science, engineering and industry, this one in itself suggests that he be recognized appropriately by the Nominations Committee.

Sincerely yours,



Victor Parsonnet, M.D.

1. Parsonnet V, Hursen TF (of NUMEC), Myers GH. The development of radioisotope power sources for pacemakers in the United States. *J Newark Beth Israel Med. Ctr.* 1973;23:127-136.
2. Parsonnet V, Myers GH, Gilbert L, Zucker IR, Shilling E, and Manhardt M: Nuclear pacers - A review of two years experience. *ASAIO*, 1975, vol 4 (Apr)
3. Parsonnet V, Myers GH, Gilbert L, Zucker IR, Shilling E, and Manhardt M: Clinical experience with nuclear pacemakers. *Surgery* 1975;78:776-786 and *Cardiol Dig* 1975;78:776-786.
4. Parsonnet V, Myers G. and Manhardt M: Nuclear powered pacemakers after five years. *Circulation* 1978;58(Suppl II):II-49.
5. Parsonnet V, Bernstein AD, and Perry GY: The nuclear pacemaker: Is renewed interest warranted? *AM J Cardiol* 1990;66:837-842.