

"Medical Alley": The Rise of the Medical Device Industry in Minnesota

David J. Rhees, *Member, IEEE*

Abstract—This paper analyzes the factors that led to the establishment in Minnesota of a thriving network of advanced medical device firms sometimes referred to as “Medical Alley.” Factors examined include a favorable “business-technology infrastructure” that included the University of Minnesota, the migration of high-tech professionals from other industries, the emergence of specialized services and suppliers, the availability of capital, government encouragement, and support from trade associations. The seminal role of Medtronic, Inc., founded in 1949, is examined, particularly the invention of the first wearable cardiac pacemaker by the company’s co-founder Earl Bakken in 1957 and Medtronic’s licensing of the first fully implantable pacemaker developed by Wilson Greatbatch and William Chardack in 1960. Some of the major spin-off’s from Medtronic will be examined, particularly CPI (now part of Boston Scientific) and St. Jude Medical. The paper will broadly characterize the evolution of “Medical Alley to the present.

I. INTRODUCTION

Beginning after World War II, the Twin Cities area of Minnesota has served as the center of a thriving network of advanced medical technology firms, healthcare providers and service organizations known collectively as “Medical Alley”. Medical Alley has fostered numerous innovations of national importance, including open heart surgery, organ transplantation, the bubble oxygenator for life support, and the first wearable cardiac pacemaker. In 1992, *Business Week* singled out this area as one of the leading high-tech “hotspots” in the nation.

II. EARL BAKKEN AND MEDTRONIC

Without a doubt, Medical Alley owes its origin to the founding of Medtronic, Inc. in 1949 and its subsequent growth and development. Founded by electrical engineer Earl Bakken and his relative Palmer J. Hermundslie, the firm began its existence in a three-car garage in northeast Minneapolis by repairing and selling medical electronic equipment. Soon, though, Bakken began to design and produce custom devices. In 1957, at the request of Dr. C. Walton Lillehei, a cardiac surgeon at the University of Minnesota and one of the founders of open heart surgery, Bakken developed the first wearable, external, battery-powered, transistorized pacemaker. Utilizing only two transistors and a photoflash battery, this device fostered

much greater mobility for the young patients on whom it was first used. With the invention of a new bipolar electrode by Dr. Samuel Hunter and Norman Roth, it also opened up the possibility of long-term pacing for elderly patients with heart block. In 1960 Medtronic began producing and marketing a fully implantable cardiac pacemaker developed by engineer Wilson Greatbatch and physician William Chardack of Buffalo, New York.

III. MAJOR SPIN-OFF FIRMS

The remarkable success of the pacemaker and related therapeutic devices fueled the rapid growth of Medtronic and dozens of spin-off companies, including major firms such as St. Jude Medical and Cardiac Pacemakers, Inc. (now part of Boston Scientific). CPI was founded in 1972 by Manny Villafana and three other Medtronic employees to produce a lithium battery-powered pacemaker that revolutionized the industry. Villafana was also instrumental in founding St. Jude Medical in 1976, which manufactured a mechanical heart valve that soon became the industry leader. By one count, at least 35 companies were founded by former Medtronic employees, though this is probably an underestimate.

IV. FACTORS INFLUENCING GROWTH

Many factors were involved in facilitating the rise of Medical Alley. This paper argues in particular for the importance of what I call a strong “business-technology infrastructure.” This term provides a useful way to cluster a factors that were necessary, if not sufficient, causes of this growth. These factors include: the availability of highly-skilled labor from technologically relevant industries such as computers and electronic; the emergence of specialized services and suppliers, such as intellectual property law firms, plastics and metal materials suppliers; the willingness of local investors to risk capital on new, unproven ventures; the timely support of state officials; and the founding of a trade association that adopted the name “Medical Alley” for itself.

V. “MEDICAL ALLEY” TODAY

One measure of the dimensions of Medical Alley today is the size of its trade association. Interestingly, the association recently changed its name to LifeScience Alley to reflect the increasing importance of bioscience technology in the region. Nevertheless, we can take the fact that its current membership numbers about 580 organizations as a sign of a generally quite prosperous and innovative industry

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David J. Rhees is with the Bakken Museum, 3537 Zenith Ave. S., Minneapolis, MN 55416 USA (phone: 612-927-6508; fax: 612-927-7265; e-mail: rhees@thebakken.org).

concentration. The fact remains that firms like Medtronic (still the largest of the firms headquartered in Minnesota), St. Jude Medical, and Boston Scientific (which purchased not only CPI/Guidant but also SciMed Life) remain innovative and prosperous in spite of the current economic downturn. Many challenges face the industry, but there is little sign that the Minnesota medtech industry is losing ground to other areas of the country or the world, particularly in the cardiovascular field in which it has long excelled.