Chapter 1.2

History of Defibrillation

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Introduction: Defibrillation and Its Creators

Sudden cardiac death is believed to be involved in nearly a quarter of all human deaths, with ventricular fibrillation being its most common mechanism. One of the first descriptions of ventricular fibrillation and its link to sudden cardiac death belongs to the British physiologist John A. McWilliam, a former student of the famous Carl Ludwig, who was working at the University of Aberdeen. He wrote in the late 1880s that ventricular fibrillation wreaks chaos across the fibers of the heart, trapping the organ in a helpless quiver and depriving the body of oxygen, bringing about death within a matter of minutes.

The story of how modern medicine and technology came together first to understand, and then to defeat fibrillation, is enlightening on many levels. It begins with astounding cures that seem to predate the discovery of the phenomenon itself; dives into the gothic with grisly experiments on executed criminals; rises into the light as the understanding of both electricity and cardiac pathophysiology increases; and flows vigorously into the modern blossoming of cardiopulmonary medicine and intensive care. It involves lessons transmitted across academic generations and geopolitical divisions, and discoveries made possible by cooperation of fields as dissimilar as surgery and electrical engineering. However, it also abounds with examples of great gaps of understanding, lengthy detours, and misdirected research; many key discoveries were preceded by periods of stagnation, while others were in fact set aside and had to be rediscovered altogether many decades later. However, as this chapter shows, the delays were seldom arbitrary and the detours seldom fruitless. It was the result of efforts by many devoted experts, many of them working in parallel or in competition, that led to the creation of defibrillation as we know it today. The case of the divergent investigations of alternating- versus direct-current electric shock therapy is particularly illustrative.

All along its length, the development of defibrillation was tightly coupled to developments in other fields of science and medicine and to changes in public understanding and demand.

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for certain types of procedures, often pushing to the limit assumptions—medical and popular alike—about the line separating life and death themselves. Many of these aspects are beyond the scope of the present publication; nevertheless, a detailed examination of the emergence of defibrillation is an intriguing insight into over three centuries of changes in medicine and society. According to many views, the window for defibrillation was opened as the more conservative medical predilections for pharmaceutical treatments began to shift in response to the growth in variety and success of surgical interventions.\textsuperscript{3} Key factors in the boom in pacing and defibrillation research in the mid-twentieth century included an improved understanding of arrhythmias, experience with open-chest defibrillation, rising expertise in cardiac surgery, and a post–World War II cultural change that redefined the hospital as a technological center equipped and intended for the delivery of intensive care to critically ill patients.\textsuperscript{4} Finally, biomaterials and microcircuit electronics were vital in opening new possibilities for medical research and vice versa: refinement of life-saving devices provided a demand for the development and production of advanced power sources, insulation materials, circuit components, and technical support. Defibrillation not only fed off the boom of cardiology as a complex specialty after the 1970s, but itself contributed to the building of optimism and confidence about medical technology as the means to conquer heart disease.\textsuperscript{4}

![Figure 1: Early resuscitation recommendation. An eighteenth-century approach to resuscitating a human patient by blowing smoke into the anus and applying electrodes to the chest cavity. Other methods employed electrodes moistened with conductive fluids and inserted into the patient’s orifices](image-url)