

# Introduction



## EVANGELISTS AND MARTYRS

**T**hough sometimes portrayed as merely serendipitous, the discovery of new sources of ionizing radiation in 1895 and 1896 was actually the predictable result of ongoing research into cathode rays and other electrical phenomena made possible by increasingly powerful electrical equipment and new developments in vacuum tube technology. The application of radiation for therapeutic ends also represented a natural progression; individuals working with radiation could not help but notice that it affected their bodies, causing burns and other physiological results. The observation of results, however, did not imply understanding. The intermingled triumph and disaster of early radiation therapy turns on a simple fact: people figured out that X-ray and radium treatment *did* work, in the sense of visibly reducing tumors or infections, long before they understood *how* it worked. To understand *why* X-ray exposure could burn skin or cause hair to fall out would require a new understanding of matter, energy, and human bodies. As a result, early radiation therapy operated on a kind of faith, tapping into an unseen and mysterious power to deliver miracles of healing.

Early adopters took on the role of evangelists, spreading the good word about the miracles of X-rays and radium, fighting back against skeptics and competitors, and battling with one another over the “true” interpretation of radiological omens and portents. Eventually they would end up as martyrs, consumed along with numerous patient sacrifices in what one X-ray therapist called the “Baal-fires” of ionizing radiation. No character exemplifies the dynamics of this narrative better than Heber Robarts, the founder of the *American X-Ray Journal* and the first president of the American Roentgen Ray Society. Robarts always made an impression. He was one of the first Americans to experiment with using X-ray technology in medicine, and a vigorous popularizer and advocate for the use of radium in cancer treatment. Robarts lived a life by turns glorious and ignominious. He was a bombastic self-promoter and a thin-skinned editor with little tolerance for disagreement. Colleagues variously venerated him as a founder and denigrated him as a quack; the flavor of his reputation at any particular moment reflected some of the larger conflicts that divided practitioners of radiation therapy. Robarts’s experience with X-rays and radium also reflected the larger conundrum of the field, insofar as it killed him. Indeed, Robarts began to work with radium in the hopes that it would treat his X-ray-induced cancer. That choice throws into stark relief a question that recurs throughout this study: why did patients and practitioners accept the risks of radiation exposure in the face of clear evidence of its danger?

The first would-be radiation therapists needed faith because they operated in a space of uncertainty: uncertainty about the technology and how it worked, uncertainty about the causes of disease, uncertainty about the professional structure of medicine, uncertainty about the availability of materials, and even the day-to-day uncertainty of running a small business. Unfortunately, that faith proved too durable; radiation therapists failed to respect the dangers of radiation exposure even in the face of clear evidence of harm. Faith in the technology and hope for future breakthroughs made radiation workers too comfortable with uncertainty, and people got hurt as a result.

Radiation therapy is necessarily a topic with a broad scope. In addition to featuring two very different technologies—X-ray emitters and radium sources—the historical narrative of radiation therapy encompasses a large and diverse group of people. Although some early radiation therapists were doctors with medical degrees, many of the early practitioners were inventors,

pharmacists, medical students, or entrepreneurs, as the relative lack of regulation in the late nineteenth and early twentieth centuries meant that people with incomplete or no medical education could open clinics devoted to X-ray therapy or sell tonics containing radium. Together, this group of early adopters—the radiation evangelists—developed therapeutic procedures through a process of trial and error, often on patients, that raises important ethical questions not only for historians but for the contemporary practice of medicine.

X-ray and radium technologies received a burst of scholarly attention beginning in 1995, with Joel D. Howell's *Technology in the Hospital*.<sup>1</sup> This book expands that conversation specifically around the early development of radiation therapy, examining the development of radium and X-ray therapy in the thirty years following Wilhelm Conrad Röntgen's 1895 discovery of X-rays.<sup>2</sup> I consider both of the major technologies deployed as therapeutic tools in the early twentieth century, and I attempt to elucidate not just what therapists were doing but how they thought about radiation, risk, and the therapeutic process. As a case study, the radiation therapy narrative opens a window into the process by which new technologies get transformed into therapeutic tools. That no one understood precisely how radiation worked, or how it would affect human bodies, makes this story exemplary rather than extraordinary. Whether attempting to build neuromechanical interfaces for replacement limbs or trying to use genetic manipulation for therapeutic purposes, today's physicians and medical researchers still live with uncertainty and still face many of the same temptations and risks confronted by the radiological faithful.

## **MOVEMENT WITHOUT PROGRESS**

For physicists and chemists working with X-ray emitters and radium, the two decades that followed the discoveries of Röntgen and Henri Becquerel proved enormously exciting and productive.<sup>3</sup> In some ways, radiation and radioactivity represented a challenge to basic ideas about the world. Radioactivity, for example, fundamentally refuted the notion of atoms as indivisible and unchanging and made real the old alchemical dream of transmutation. In biology the story proved more complicated. For biologists, X-rays and radioactivity would push some researchers in fruitful new directions, especially with respect to their attempt to understand the origins of life. But the phenomena would also become fodder for the latest instantiation