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The Alternatives in Radiation Oncology and the Road Not Taken

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Abstract

The problems in radiation oncology are as follows: the creation and application of new methods for treating radiation; the application of therapies based on biology and multimodality; the importance of quality assurance in treatment and data reporting, as well as the role of no radiation "energy" technologies, which are frequently utilized by other medical specialties; and the kind of evidence that is sought before a new treatment is widely used, such as an appropriate study design, analysis, and thorough long-term follow-up. Personal choices need to be balanced: the pressure from hospitals, departments, practices, and universities; the need to help society and the less fortunate; the right amount of reward for each person and a bigger goal; and the significance of personal integrity and values, which frequently necessitate difficult and "life-defining" decisions. Each individual's impact on a career is likely more influenced by character than by the specific details listed on a CV. Choosing the more well-known or less well-known career paths creates a unique tapestry that leads to numerous avenues of success; However, living and acting with integrity is the only path to which there is no viable alternative.

Keywords: Radiation oncology; Personalized medicine; Medical ethics; Medical technology

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Introduction

This year also saw the 50th anniversary of the American Society for Radiation Oncology (ASTRO), so it's a good time to reflect on where we are as individuals and as a group in radiation oncology and where we want to go in medicine [1]. With molecular and personalized medicine, a plethora of new technologies for imaging and treatment, rising health care costs in the face of a struggling economy, and many people in the United States who are uninsured or underinsured on top of the many people worldwide who are living with minimal to no effective cancer care, oncology is facing historic opportunities and challenges [2]. The above poem by Robert Frost serves as a thoughtful framework for considering how one's choices and decisions influence how a career is pursued and how a professional life is lived over the past five decades of radiation oncology. Which route should one take? The one that travelled more or less is it possible, at least in part, to travel between them? How will the lessons learned on one occasion be used in the future? Is the "sigh" a sign of relief or regret for taking the less-travelled path? And how does a person's career choice "make all the difference? Using examples from our shared careers at Stanford University and the National Cancer Institute, as well as 35 years as colleagues in radiation oncology, we consider career paths and choices for our specialty that we have seen and experienced [3]. Of course, there are a lot of examples that one could use, and each reader will probably have their own experiences to think about. There are three sets of options for radiation oncology that we can choose from: chemotherapy and biological-based therapy, as well as radiation and systemic therapy clinical science and technology, including how our field selects technology motivation and legacy: what motivates our professional lives and how decisions now will affect how our careers and contributions are viewed in years or decades from now [4].

Systemic therapy and radiation (Black)

His work which was pivotal for radiation oncology, However as we progressed to higher doses and larger fields, it became clear that radiation had its limits with more advanced stages of the disease [5]. As a result, the overall takeaway was that one must achieve the required radiation dose to eradicate both microscopic and gross disease; however, the biology of the disease and its propensity to spread and metastasize put a limit on very extensive field radiotherapy, probably more so than radiation toxicity [6]. By the late 1960s, radiation oncology had separated itself from diagnostic imaging and nuclear medicine, with early leaders focusing on technology development, disease spread patterns, and cellular and tissue radiation biology. Systemic therapy was also administered by radiation oncologists, a practice that is still prevalent in many nations. As a result, radiation oncology gave rise to combined modality therapy, and the Radiation Therapy Oncology Group was responsible for some ground-breaking research. Medical and radiation oncology have been viewed as competitive, complementary, and collaborative over the past 35 years since the establishment of the specialty of medical oncology [7]. They carried out a pioneering series of randomized trials with both Hodgkin's disease and non-Hodgkin's lymphomas. These trials demonstrated the advantages of making optimal use of radiation in conjunction with combination chemotherapy. Since then, numerous research groups have continued to refine and tailor Hodgkin's treatment. Indeed, the question of "should treatment be radiation or CMT?" was once a concern for Hodgkin's disease. Additionally, chemotherapy alone has recently emerged as a viable option [8].

(Blue) Clinical science and technology

Clinical simulation did necessitate a thorough comprehension of how tumors spread through the body. The introduction of computed tomography scanning enabled the creation of three-dimensional conformal therapy. Image-guided radiation therapy and intensity-modulated radiation therapy were made possible by further advancements in computer technology [9]. External-beam x-ray therapy, brachytherapy, and particle therapy with protons in the United States and carbon ions abroad have all become possible thanks to the precision with which radiation can be delivered. For the past three decades, other forms of energy have been used to treat tumors in the lower part of the "technology and clinical science" pathway. These include focused ultrasound, radiofrequency ablation, photodynamic therapy, cry therapy, and hyperthermia. The disparity between what appears on a computer screen as a treatment and what can actually be done with it has been a recurring theme. Target definition and the imaging physics and biology's limitations limit all modalities. Inter- and intrafraction motion limits radiation; the body's capacity to dissipate heat, as well as the boundaries and heterogeneity of tissue, limit hyperthermia and focused ultrasound; The ability to define the tumour's boundary and the actual physical ablation of normal tissue that is produced limit cry therapy. These energy modalities are sometimes used together, and one modality is increasingly being used to salvage failure by another.

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