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EDITORIAL

Raising the Next Generation of Physician-Scientists: The Chairs' Perspective

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Progress in decreasing the cancer burden remains a priority of our health care system. Over the years we have achieved incremental progress in extending the life expectancy of cancer patients and major improvements in their quality of life (1). For many malignancies, however, the disease-associated mortality rates have not improved over the past 20 years (Fig. 1) (2). This stagnant situation is even more worrisome for cancer worldwide (3). Although the value of incremental progress should not be overlooked, "more of the same" is unlikely to successfully defeat this disease in a reasonable timeline. Cancer advocacy groups have clearly voiced their concerns regarding this urgency (4). Transformative innovations and paradigm shifts are clearly needed.

If radiation oncologists wish to participate in this challenge, it is crucial to solidify our commitment and invest appropriate resources to fuel the research and innovation engine. The increasing availability of gifted trainees to carry out this mission is an opportunity by which some of the "leaps" required to evolve the dream of a cure into a reality can be attained. However, this can only happen within the "culture of innovation and scientific breakthrough" that Vapiwala et al correctly describe (5).

Vapiwala et al question whether our discipline (ie those of us who have the privilege and responsibility of offering formal training programs and research mentorship) is poised to sustain our young and to ensure that appropriate resources are in place to take on this challenge.

Radiation oncology poses fewer "physical" demands (eg night calls, ward duties), and the scientific learning is not any more difficult to master than for other medical subspecialties.

The structure of radiation oncology practice allows for flexibility in time allocation, and the broad technological, anatomic, and biological underpinning of our discipline provides a unique advantage for trainees eager to combine technical and medical learning with the pursuit of scientific inquiry. Nevertheless, although it is neither necessary nor possible for all programs to cover the full gamut of research, many programs focus on transmitting the knowledge we have, rather than stimulating a need for generating new knowledge.

Most of the suggested solutions in the thoughtful and well-written article from Vapiwala et al are already in place at selected academic institutions offering American Board of Radiology (ABR)-approved residency programs. Some residency programs offer protected research time, mentorship, and formal training in research. In certain programs, the faculty group practice even contributes resources to initiate and sustain resident-initiated research. Indeed, some

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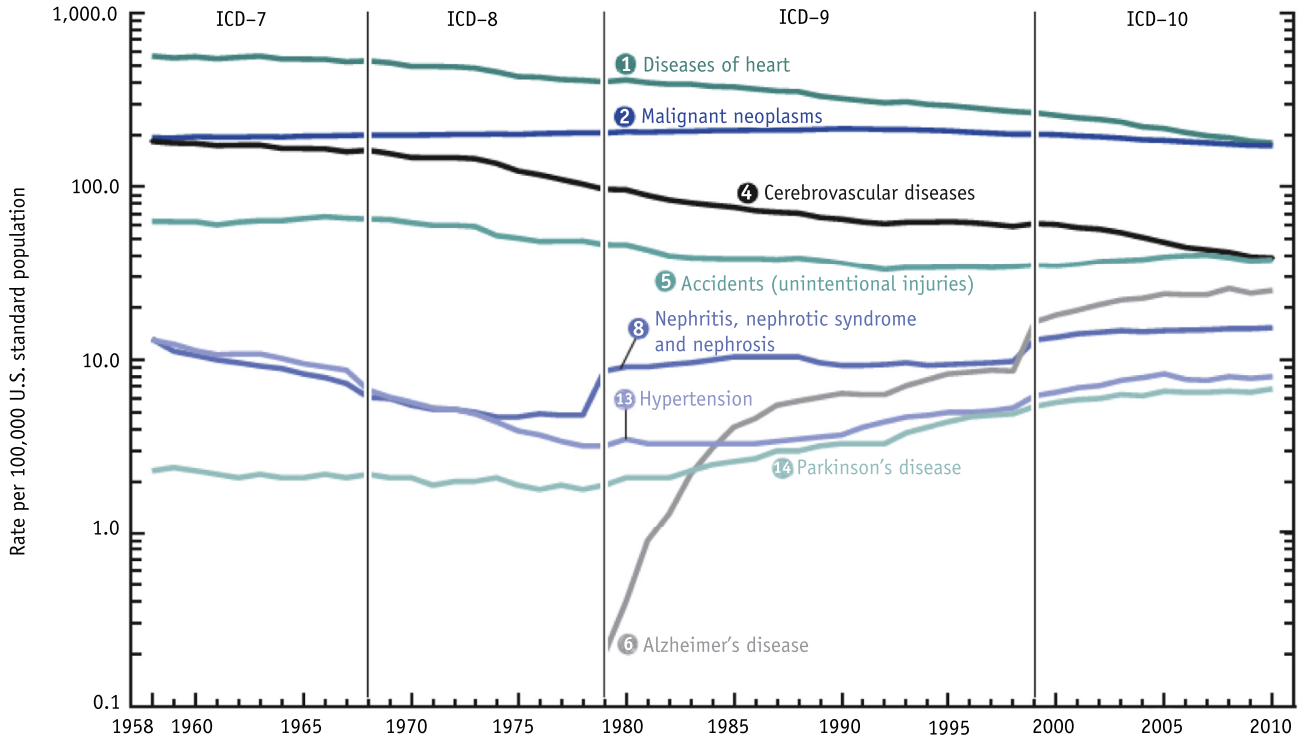

NOTES: ICD is the *International Classification of Diseases*. Circled numbers indicate ranking of conditions as leading causes of death in 2010. Rates for 2001–2009 are revised using updated intercensal estimates and may differ from rates previously published; see Technical Notes.
SOURCE: CDC/NCHS, National Vital Statistics System, Mortality.

Fig. 1. Age-adjusted death rates for selected leading causes of death: United States, 1958-2010.

senior faculty members spend much of their time as mentors, a role that is neither adequately recognized nor appropriately rewarded.

However, the landscape is uneven and difficult to monitor. A coordinated standardization for required research rotations during residency training by the ABR could correct the current heterogeneity of opportunities across programs. As a first step, the Society of Chairmen of Academic Radiation Oncology Programs (SCAROP) and the Association for Directors of Radiation Oncology Programs (ADROP) should join in conducting a prospective assessment, through a questionnaire sent to residency directors, geared at generating comprehensive information regarding the current situation, as a necessary first step to inform an intervention. While accepting heterogeneity among programs, measures can be introduced to ensure that critical research thinking is taught universally.

Residency training and medical boards respectively provide and examine current knowledge and, as mentioned in the Vapiwala et al article, the "state of the art." Yet intriguing evidence suggests that the more medical education we accrue, the less creative we become (6). As trainers and mentors, are we, as a specialty, prepared to accept challenge and true innovation? Can we find the time and space to accept the critical expression of some of the brightest, perhaps less-experienced trainees, and encourage them, perhaps with the refreshing vantage point of a newcomer, to challenge our points of view and dogmas?

In summary, it will take more than achieving standardization of research training and critical assessment opportunities listed by Vapiwala et al to take advantage of this fortunate and unprecedented infusion of brain power into our field. It will require humility, perspective, confidence, and vision to cultivate this new gifted generation to prepare them to become our future leadership. In the current era of high-throughput -omic and "big-data" opportunities, our trainees, supported by their mentors, are best poised to bridge the gap between radiation and molecular cancer biology (7).

We have focused a significant amount of energy and resources to maintain our identity and reimbursement for radiation care, but much less to develop radiobiology on the critical platform of cancer research. The first activity is relevant in today's medicine because ensuring the proper use of our technology avails patients the spectrum of optimal therapeutic options. Still, the risk of "missing the boat" in significantly improving cancer outcomes should command comparable investment and urgency, including making the best use of this infusion of brain power. In this era of phenomenal advances in information and biotechnology, ensuring sufficient resources such as space,

investment, and encouragement to our younger colleagues has never been more crucial.

Not only will this benefit the future of our discipline, but it is vital to our continued commitment to solutions to this formidable disease.

As leadership of SCAROP, we see the potential of our field to contribute substantially to the cancer research mission. We must, however, create the appropriate environment that values research, promotes skilled mentors, and provides the optimal research experiences for our trainees. There are many challenges to these efforts, mostly related to generating the necessary resources to support dedicated research time, start-up funds, and high-quality research infrastructure. An ongoing concern of course, is the external landscape of National Institutes of Health funding, and the overall research enterprise for young investigators (8). There is also the added issue related to expectations for clinical workload. As reimbursement declines and pressure to increase clinical productivity grows, these challenges will become even greater. However, they cannot deter our efforts. We welcome the opportunity to work with our colleagues at the American Society for Radiation Oncology, ABR, ADROP, and the Accreditation Council for Graduate Medical Education to develop an approach to solidify the role of radiation oncology in cancer research.

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