



# Dr. Michael Milano: a better understanding in how radiation interacts with immunotherapy will be a future trend of precision cancer research

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## Editor's note

Dr. Michael Milano has just joined the Editorial Board of *Precision Cancer Medicine (PCM, Precis Cancer Med*, ISSN: 2617-2216) since August 2018. He has been devoted to pursuing radiation oncology all through his career and treating and caring patients with cancer or benign brain tumors. This time, we are honored to interview Dr. Michael Milano to share with our readers his expertise in radiation oncology, his insights of cancer treatments in the perspective of precision medicine, and his valuable experience during his clinic and research practice.

## Expert's introduction

Dr. Michael Milano is an associate professor of radiation oncology at the University of Rochester School of Medicine and Dentistry. Dr. Milano's practice focuses on the care of patients with primary brain tumors, brain metastases, spine tumors, benign intracranial tumors (such as pituitary tumors, acoustic neuromas and meningiomas) and trigeminal neuralgia. Dr. Milano also treats patients with lung cancer and other thoracic tumors, head and neck cancer and metastatic cancer. He is involved in clinical research in all of these areas.

Dr. Milano is a board-certified radiation oncologist. His undergraduate training was at the University of Notre Dame. His medical school, graduate school and internship training were at the University of Rochester. He received his residency training in radiation oncology at the University of Chicago. In 2005, he returned to Rochester to become a faculty member at University of Rochester's internationally recognized Department of Radiation Oncology. Dr. Milano has clinical expertise in stereotactic radiosurgery (SRS), stereotactic body (including spine) radiation therapy (SBRT), intensity-modulated radiation therapy (IMRT), and image-guided radiation therapy

(IGRT) and tomotherapy.

## Interview

*PCM: You have extensive clinical expertise in radiation therapy for different types of cancers. What do you think are the advantages and limits of radiation therapy for now? How to better use and develop this method in cancer treatment?*

**Dr. Michael Milano:** Radiation is, and always has been, a non-invasive manner to offer local therapy to a tumor or to anatomic regions at high risk of harboring cancer cells. In the past decade we have seen tremendous advancement in the incorporation of image guidance (IGRT) into treatment delivery. IGRT coupled with more conformal delivery of radiation achieved by modulating the radiation beam and/or particle therapy have facilitated treatments that minimize normal tissue dose exposure. This in turn has allowed for more aggressive dose fractionation schedules, including shorter course hypofractionated radiation.

*PCM: In recent years, "precision medicine" has been a research highlight among medical researchers. How does this concept evolve or impact the clinical and research practice in the field of radiation oncology?*

**Dr. Michael Milano:** The concept of more accurate targeting of tumors (discussed above) can fall into the realm of precision medicine. In parallel with advancements in radiation treatment planning and delivery systems has been marked advancements in functional imaging and magnetic resonance (MR) imaging, which are technologies that radiation oncology use to help delineate their target volumes. Radiation oncologists are also investigating how to incorporate cancer biology into radiation treatment decision making. Investigators from the University of South Florida's

Moffit Cancer Center have pioneered a promising means to determine a cancer's potential radiation sensitivity, based upon genomic signatures. At the University of Chicago, genetic signatures have been shown to correlate with likelihood of a cancer developing widespread metastases, and thus potentially less well-suited for radiation therapy. Recent studies have focused on correlates of single nucleotide polymorphisms (SNPs—genomic sequence variations) and genetic signatures to toxicity risks. Perhaps the greatest strides in oncology care over the past few years have been made with immunotherapy; the radiation oncology community is actively investigating how radiation might potentiate an immune response. Radiation to select lesions might potentiate an immune response in other sites. This may be a low- or high-radiation dose effect.

**PCM:** *What would be the leading direction or future trend of precision cancer research?*

**Dr. Michael Milano:** As discussed above, a better understanding in how radiation interacts with immunotherapy, and in identifying those patients likely to benefit from immunotherapy and radiation will be a future trend. Using genomic, as well as radiomic measures to predict treatment response and toxicity is also an exciting direction for precision cancer care.

**PCM:** *Based on your clinical and research experience, would you give some suggestions to the young doctors on how to select a clinical problem and design and conduct the research?*

**Dr. Michael Milano:** For me, the best clinical research experiences have come from patient encounters that prompted me investigate an answer to a question that I had about patient outcomes or care. I've relied much on retrospective analyses, particularly population-based registry studies, to answer these questions, but certainly prospective trials are optimal, albeit a lengthy process to initiate, run and analyze. Research is a collaborative effort, involving multiple specialties as well as statistical support. It is important to find a team of people you want to work with. Most important is to find research projects that motivate and inspire you!

**PCM:** *When and why did you decide to focus on radiation oncology?*

**Dr. Michael Milano:** I did not decide to pursue radiation

oncology until my last year of medical school. I had been somewhat familiar with the field of radiation oncology for a few years prior to that, having met several radiation oncologists at national meetings when I was a PhD student studying the early physical-chemical reactions in irradiated solid-state DNA systems. At that time in my life, I did not envision radiation oncology as a career choice for me. However, after my fourth-year elective in radiation oncology, I realized that it was the perfect fit for me. The patient interactions are rewarding, and the technology and treatment planning decisions are intellectually stimulating. I have never regretted my choice!

**PCM:** *What do you think is the greatest feeling of accomplishment from your work?*

**Dr. Michael Milano:** My greatest sense of pride comes from treating and following patients with cancer (I treat thoracic and central nervous system cancers) or benign brain tumors. I have followed some patients for over a decade, some with diagnoses that carried a median survival of less than 2 years. I have also treated and followed many patients, from young adults to elderly, with terminal disease. While being so involved with patients facing death can be immensely saddening and maddening, it is an honor to be able to do so. I feel the most accomplished when a patient expresses gratitude for the care I have given.

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