

## Powering Personalized Immuno- Oncology: Big Data's Role

NIKESH KOTECHA, PHD

It is an exciting time to be in medicine. Improvements in computational and laboratory technologies have enabled the movement from a "one drug fits all" to a more personalized treatment approach. As evidence, for the first time, personalized medicines comprised over 30% of new drug approvals in 2017. Included among these, approval for 3 new gene therapies and 16 personalized medicines. Immunotherapies continue to be a key driver of this effort. Two of the three gene therapies approved were immunotherapies for cancer and existing immunotherapies were approved for new indications. Also for the first time, an oncology drug was approved based on a biomarker rather than the location of the tumor.<sup>1</sup>

### *How can barriers to data sharing be reduced?*

The Parker Institute for Cancer Immunotherapy is a part of this movement toward more personalized medicine. A network of 170 of the nation's top researchers across 7 institutions, the Parker Institute was charged with accelerating the development of breakthrough immune therapies and getting them to the clinic faster. Our efforts are broadly organized into research areas that include development of next generation cell therapies, understanding why some patients respond to immunotherapy while others do not, identifying novel cancer biomarkers that can be used to develop new therapies and personalized treatments, and understanding how the tumor microenvironment affects a patient's ability to mount an immune response. In addition, we are working with the research community to further understand the mechanisms behind immune-related adverse events (irAEs) following immunotherapy administration in order to avoid and diminish toxicities.<sup>2</sup>

Our work in the informatics group includes systems setup and enablement of new clinical trials, big data infrastructure, and pipeline

development for analyzing and integrating data across more than 10 molecular assays, developing methods to process and analyze data from emerging single cell technologies, providing context to experimental data using existing knowledge from the literature and public data sources, and understanding how to make this information actionable to inform new studies and treatments. Ultimately, we want to enable personalized immunology, i.e., characterizing and profiling the hundreds of different immune subpopulations in each individual patient.<sup>3</sup>

Determining the best personalized treatment for a patient will require input from a team of physicians, ideally with access to a patient's information over time and across multiple modalities. Collecting data in a consistent, secure, and scalable manner with the ability to share across disciplines will be vital to furthering personalized medicine. National infrastructure efforts are underway<sup>4</sup> and discussions continue around reducing barriers to data sharing, but it is still early days.

The data ultimately belongs to the patient. By invoking their right to access and being stewards of their data, patients can be further empowered to play a central role in shared decision-making.

1. Personalized Medicine at FDA. 2017 Progress Report.
2. June CH, Warshauer JT, Bluestone JA, et al. Is autoimmunity the Achilles' heel of cancer immunotherapy? *Nat Med.* 2017;23(5):540-547.
3. Delhalle S, Bode FN, Balling R, et al. A roadmap towards personalized immunology. *NPJ Syst Biol Appl.* 2018;Feb,6:4-9.
4. NIH strategic plan for data science. June 2018.



Nikesh Kotecha, PhD, is vice president of informatics at the Parker Institute for Cancer Immunotherapy. He is a member of the Big Data Working Group.

The ACCC Immuno-Oncology Institute is supported by Bristol-Myers Squibb (charitable donation); EMD Serono; Kite, a Gilead Company; and Merck & Co, Inc. (educational grant).

The **Association of Community Cancer Centers (ACCC)** is the leading education and advocacy organization for the multidisciplinary cancer team. ACCC is a powerful network of 24,000 cancer care professionals from 2,100 hospitals and practices nationwide. ACCC is recognized as the premier provider of resources for the entire oncology care team. For more information, visit [acc-cancer.org](http://acc-cancer.org) or call 301.984.9496. Follow us on Facebook, Twitter, and LinkedIn, and read our blog, ACCCBuzz.

The **ACCC Immuno-Oncology Institute** is the leader in optimizing the delivery of cancer immunotherapies for patients by providing clinical education, advocacy, research, and practice management solutions for cancer care teams across all healthcare settings. View the "Immuno-Oncology Insights" series from the ACCC IO Institute Working Groups—and join the conversation online—at [acc-cancer.org/IO-Insights](http://acc-cancer.org/IO-Insights).



Association of Community Cancer Centers