Envision a day that cancer clinicians can ask an app to advise on immuno-oncology (IO) treatment options for a patient. That day may not be far off. Big data, deep analytics, and predictive modeling methods are transforming how cancer clinicians weigh treatment options.

The next frontier in IO treatment lies in harnessing highly granular data to explore treatment options by answering questions that will increase the ability of clinicians to deliver personalized medicine. Those questions include: 1) Which options might apply to this patient, but also which do not, and why? 2) Why may some options work for this patient, but some not? 3) What is the relative effectiveness of each of these options for this patient, and how do they stack up against each other? 4) What adverse events can we expect, when, and why—for this patient? 5) Which treatment options can this patient tolerate physically and psychologically, and why? 6) How do treatments compare in balancing effectiveness and safety? This is where predictive modeling comes in: answering questions about unique patients and their IO treatments so that these treatments can be as individualized as possible.

Predictive modeling requires several types of datasets. There are the evident data: clinical, biological, and genetic variables; history and present status; and prior treatments, if any. There are the data about whether and how patients cope with cancer: psychological and social. There are the demographic data (think health disparities): where the patient lives and with whom; whether the patient works, goes to school, or is unemployed; where the patient gets health and social care; and where the patient volunteers, worships, and recreates. There are the economic data (think health inequities): income and insurance status, for example.

Both historically and today, many predictive models have focused on the negative: risk over opportunity and what could go wrong over how to improve. That is, on the “risk of,” not the “opportunity to”; on “what may go wrong,” not on “what will make this better.” Instead, the questions to ask are: 1) What plays in this patient’s favor, and why? 2) What do I need to be concerned about, and why? 3) What and where is the balance between efficacy and safety, and why? 4) What outcomes can I expect? 5) Can I predict what will happen to this patient after treatment—shortly after as well as beyond?

To caution, models may be statistical artifacts. Especially with big data, associations are easily found, equations easily constructed, and algorithms easily specified. But are the models plausible, both biologically and clinically? Predictive models may be acontextual: perhaps the best treatment in general, but not the most realistic for this patient—clinically and socially. Hence, it is critical that expert clinicians review models for their validity.

To end on a positive note—processing information in ways that humans cannot, predictive models can help clinicians identify the most appropriate treatment options for each patient wherein the models advise and explain. The clinician, however, must decide what to discuss, how to treat, and how to monitor each patient.

How can predictive models inform delivery of personalized medicine in immuno-oncology?

The Association of Community Cancer Centers (ACCC) is the leading education and advocacy organization for the cancer care community. Founded in 1974, ACCC is a powerful network of 28,000 multidisciplinary practitioners from 2,100 hospitals and practices nationwide. As advances in cancer screening and diagnosis, treatment options, and care delivery models continue to evolve—so has ACCC—adapting its resources to meet the changing needs of the entire oncology care team. For more information, visit accc-cancer.org or call 301.984.9494. Follow us on Facebook, Twitter, LinkedIn, and Instagram; read our blog, ACCCBuzz; and tune in to our podcast, CANCER BUZZ.

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 accc-cancer.org/IO-Insights.