Making it work together

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The precision oncology platform patients need.

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Precision medicine holds incredible promise for cancer patients, but realizing that potential has proved challenging. Over the past decade, the FDA has approved dozens of novel targeted- and immunotherapies, which are generally safer and more effective than traditional chemotherapy. They are also much more expensive and only work in selected patients, but the selection criteria are not well-understood. Moreover, no one knows the optimal way to use these therapies because the best treatments involve intelligent combinations, and there are far too many plausible regimens to test in clinical trials.

These issues have sparked a wave of investment in technologies and services (e.g., -omics profiling, ex-vivo drug screens, liquid biopsies) that can predict and monitor the safety and efficacy of therapies in individual patients. In principle, precision oncologists can use these tools to inform the treatment of individual patients, and then collectively use the outcomes data to incrementally refine treatment regimens and patient cohorts. In practice, however, it is virtually impossible to do this: patients can't get or afford the recommended treatments; payers won't reimburse tests or drugs that haven't been validated in trials; manufacturers are reluctant to provide investigational drugs for testing in combination with drugs from other makers; no one shares their comparative effectiveness data.

The only practical way to understand what is working is to employ a learning system in which these technologies are made available to patients and their physicians. By collecting patients' individual experiences and outcomes we will begin to be able to calculate the utility of these treatments. This is the only way to make comparative decisions about the relative value of these complex treatments.

There are those who believe that the solution will be found in Big Data, but this ignores the retrospective nature of Big Data, not to mention that curing cancer is more akin to playing chess, you don't win in one move. We need to do something differently.

One approach is to leverage expert knowledge, with AI-support, to find the best treatment for each patient. From these treatments, whether successful or not, all patients provide a systemic learning opportunity that is captured as Real World Data and used to generate Real World Evidence.

A method for coordinating this evidence generation is Global Cumulative Treatment Analysis (GCTA). Using networked GCTA coordination, all patients are monitored and treated based on the best available knowledge. When there is uncertainty about a treatment's benefit, a decision algorithm – a combination of human and AI - presents patients a set of balanced options and treatment rationales that have been ranked based on their contribution to system-wide information-gain.

Experts and algorithms enable GTCA to efficiently and safely coordinate thousands of treatment decisions made across the medical system, delivering the best possible treatment to every patient. Closing the loop, the platform generates data on both successful and unsuccessful therapies. These learnings are fed back into the system to guide the treatment of future patients.