



Reinventing Clinical Oncology for the 21st Century

CancerCommons.org was founded on the hypothesis that there are two huge opportunities for improving cancer care: First, that many thousands of lives could be saved if every oncologist knew as much as the world's best; and second, that many more lives could be saved by optimizing the use of currently available drugs, off-label and in cocktails.

There are now hundreds of approved targeted drugs and immunotherapies, and hundreds more in pharma's pipeline. Effective treatment will require intelligently designed, individually tailored, sequences and combinations, utilized in adaptive regimens. In most cases, no one knows the optimal way to treat any cancer because there are far more plausible multi-drug regimens than can be efficiently tested in clinical trials. Successful outcomes fall off rapidly from elite cancer centers to secondary and tertiary clinics because knowledge is not evenly distributed.

A problem of this magnitude must be addressed by a "Virtual Trial" that continuously learns from the experiences of all patients on all treatments all the time. Patients who have exhausted the standard of care are routinely treated with off-label drugs and rational cocktails. Unfortunately, these individualized ('N-of-1') experiments are uncoordinated, and their results seldom reported, so little is learned. A Virtual Trial adaptively plans each patient's treatment regimen to optimize individual outcomes, and coordinates these plans across the whole patient population to maximize collective learning. The algorithms required to do this are novel, drawn from the emerging fields of Statistical AI and Bayesian adaptive trial design.

Cancer Commons is building a network of leading oncologists and tumor boards to provide rational treatment hypotheses, and a team of top AI experts to create the algorithms and processes for rapidly testing and refining these hypotheses in a Virtual Trial. We focus on patients who have exhausted the standard of care, both because they are most in need, and because they are routinely treated with off-label drug combinations.

By vastly accelerating the rate at which new, highly effective drugs and drug combinations come online, these activities have the potential to reduce cancer mortality worldwide by 50% in ten years. Dramatically improving the efficiency and economics of clinical research would also create billions of dollars of value, part of which we intend to capture through licensing or a commercial spinoff, to provide sustainable support for our non-profit mission.