

Project E)

The Rapid Learning Loop in Precision Oncology From Research to Clinic and Back Again

Sarah Greene

Executive Director of Cancer Commons

Mission. Cancer Commons is a nonprofit entity founded to fast-track research by matching patients to the best available therapies for their tumors and learning as much as possible from the results. By fostering the free flow of information among researchers, physicians, and patients, and across cancers and institutions, our *rapid learning communities* (RLCs) will propel fresh lines of research based on real-time responses to treatments -- slashing years off traditional drug development processes and improving outcomes for thousands of current and future patients.

Rapid Learning from Patient Outcomes. We are building a collaboration platform to provide the methodology and infrastructure necessary to enable a translational loop from research to clinic and back again. Communities of researchers and bioinformaticists analyze aggregated genomic and clinical data, deposit and discuss results, review the latest published findings and theoretical pathways, and reach consensus on the latest actionable biomarkers, targeted therapies, immunotherapies, and combinations thereof. Peer-reviewed consensus models and supporting data/results will be published in partnership with PLoS, in the soon-to-launch journal *Precision Oncology*, and translated for patients to ensure the widest possible dissemination of findings from the RLC.

We envision every patient being treated as a clinical trial of one, whereby molecular diagnostic testing points the way to treatment regimens described in the latest published model. The patient's response is monitored using scans, biomarkers and sequential biopsies (where medically indicated). Clinical data is reported back to researchers directly from the treating physicians, as well as from patients through our 'Donate Your Data' and similar self-reporting initiatives. When exceptional responses are noted, post-treatment biopsy specimens are analyzed to directly assess response to therapy, and whether resistance mechanisms were activated. A virtual tumor board from the RLC is convened to discuss the results and recommend treatment modifications, and the model is continually updated accordingly.

A striking example of the value of this N of 1 approach was published in *Science*, on the analysis of a single outlier patient who showed a complete response in a "failed" trial of a targeted drug, pointing the way to a new subtype of mutations (Genome Sequencing Identifies a Basis for Everolimus Sensitivity, Oct 2012).

Challenges for the Commons. To be successful, we need to develop and achieve wide adoption of the rapid learning platform. We need to develop collaboration tools that promote sharing of research results and insights with multiple access levels; standardized consents, IRB, and data transfer agreements; open and networked discussion among multiple labs and disciplines; rewards for outstanding contribution to the consensus model; the means to disseminate findings rapidly; and processes to manage the physician/patient follow-through.

Specific problems around information flow:

- What inputs and processes are needed for reaching peer-reviewed consensus for publication and physician/patient consumption?
- What level of information should be made available to patients (e.g., only actionable?)?
- How can genetic test results travel seamlessly to the physician and back to the research community?
- How can treatment and progress of patients be tracked and reported?
- How can insights from the patient community be transmitted to physicians and researchers? How can insights from the RLC be brought directly to patients who have donated their data?

Over to You

E- The Rapid Learning Loop in Precision Oncology From Research to Clinic and Back Again

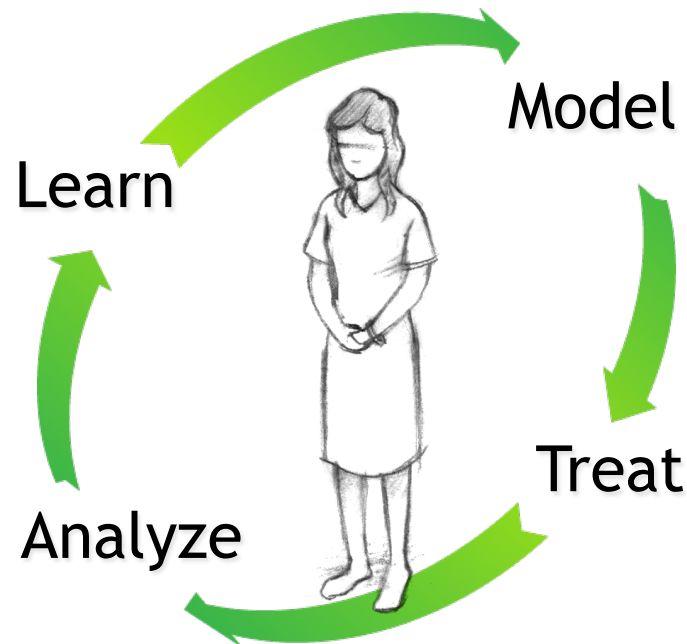
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E	University of Washington	Blau	Tony
E	Nodality	Cavet	Guy
E-Anchor	Sage Bionetworks	Commo	Frederic
E	Fanconi Anemia Research Fund	Frohnmayr	Amy
E	Scripps Research Institute	Good	Benjamin
E-Lead	Cancer Commons	Greene	Sarah
E	Horn Productions	Horn	Elizabeth
E	Open Science Summit	Jackson	Joseph
E	UCSF	Kahlon	Mini
E	Open Medicine Institute	Kogelnik	Andy
E	Blue Print Medicines	Lengauer	Christoph
E	Lilly	Matczak	Jerry
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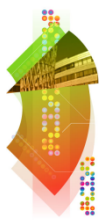


A Rapid Learning Community for Cancer

Sarah Greene, Cancer Commons

- Tools enable us to scale up creative conversations, so connections that would ordinarily require fortuitous serendipity instead happen as a matter of course.
 - Michael Nielsen, Reinventing Discovery
- These conversations must begin with the patient and their caregivers and require education and engagement





Potential alignment with existing Commons' approaches

- Advocacy / patient-centered groups
 - Reg4All
 - OurTomorrows.com
 - PatientsLikeMe
 - CharmTracker
 - OpenMedNet
- Partners
 - Code4America
 - Startup4Cancer
 - Device Makers
 - QuantifiedSelf
- Innovators
 - RockHealth
 - IDEO
 - Silicon Valley startups for cancer campaign



Unmet needs and issues

- How to communicate insights from research back to patients
- How to communicate information from patients to research community
 - How to motivate patients to contribute data
 - Educational content
 - Portal/tools to help patient provide information
 - Focus on small group of patients / physicians / researchers to make a pilot project of what can be done
 - How to motivate physicians to accept patients as partners
 - How to incentivize physicians to close the loop



1-year vision for the future of this project

- For a given type of cancer, have the loop completed for a group of patients, physicians , researchers.
 - Data from 1000 patients
 - 10 exceptional responders identified
 - research insights reflected in new treatment
 - outcomes reported and looped back to research