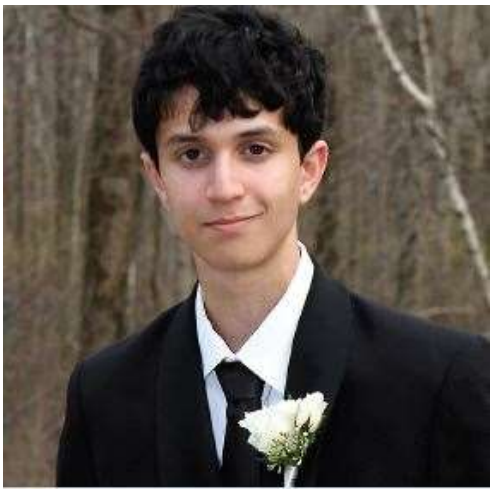
Team Science: A Model for Cancer Discovery

The past decade has been witness to unprecedented cancer discovery – advances in how we diagnose, treat, and prevent cancers that could scarcely have been imagined only a few short years ago have become the norm in clinics both at the Sidney Kimmel Comprehensive Cancer Center at Johns Hopkins and across the nation. For patients diagnosed with certain cancer types, these discoveries have meant that cancer is no longer a fatal disease, but a chronic one. However, for patients confronted with the rarest cancers, a lack of dedicated resources can mean that the most cutting-edge approaches have not yet been translated into treatments for their specific disease. The ingenuity of cancer researchers at our country's leading institutions has resulted in a solution for overcoming the limited resources that accompany rare disease types – and that solution is found in team science.

Ian before his junior prom



When it comes to the more commonplace cancer types, such as breast, lung, and prostate, the volume of patients diagnosed with these diseases ensures that researchers have the capacity to conduct research into the most innovative, novel treatment approaches. The availability of funding to support these more well-known cancers, as well as the ability to recruit patients into the most promising clinical trials, ensures that clinicians and scientists have the tools they need to pursue advances that will benefit these patients. Yet when it comes to less frequent disease types, where only a small number of patients are diagnosed with that specific illness each year, it becomes increasingly more difficult for researchers to obtain the resources they need – such as funding, tumor samples, or clinical trial participants – to advance the state of the science at the rate these patients and their families both require and

IAN'S STORY

At the age of 17, Ian Rahimi was diagnosed with a rare form of sarcoma – a Gastro Intestinal Stromal Tumor, or GIST. A difficult disease that does not respond to most conventional treatments, Ian's GIST began to rapidly impact his health, spurring his family into action. Through the support of numerous donors, Ian's family was able to establish the "For Ian GIST Project" – a team science undertaking which sought to combine the skills, expertise, and resources of clinician-scientists from Johns Hopkins, Harvard, Virginia Commonwealth University, the NIH, Columbia, Technion University, and Memorial Sloan Kettering in an effort to advance the state of the science for patients diagnosed with GIST. Outside of academic medicine, organizations such as Champion Oncology, Store My Tumor, and MITRA Biotech also contributed resources to this vast team effort. While Ian sadly passed away from his disease in the fall of 2015 after a two year battle, the efforts begun in his name shall continue – a befitting legacy for Ian and a testament to the dedication of this team of scientists to make a difference in the lives of patients and families diagnosed with rare and difficult cancers.

deserve.

It is at this juncture that the team science model becomes exceedingly relevant, for by embarking on trans-institutional research efforts scientists and clinicians can pool resources and expertise in a manner that renders these diseases researchable in a clinically significant way. Such combined and collaborative efforts can be effective in breaking down the barriers and silos that often occur within and between individual institutions. Whereas clinicians may only care for one or a few patients with a specific diagnosis at their home institution, sharing resources across multiple institutions means that all of these researchers now have access to molecular and clinical information from many patients – an increase that can mean the difference between a research standstill and definitive research progress. A team science approach also means that each of these patients now has access to the expertise of not only one, but several if not all of the leading researchers on their specific disease – a critical difference that not only ensures progress at the laboratory bench, but also that the best possible care is being administered at the bedside of patients battling the rarest and most difficult cancers.

For Victor Velculescu, M.D., Ph.D., Professor of Oncology and Pathology and Co-Director of Cancer Biology at the Johns Hopkins Kimmel Cancer Center, the team science approach holds the key to improving our ability to answer some of the most difficult questions in cancer medicine. Dr. Velculescu has developed technologies for analyzing the cancer genome that have led to novel diagnostic and therapeutic approaches. In the For Ian GIST Project, he worked closely with academic colleagues from Hopkins, Columbia, Harvard, Virginia Commonwealth, and the National Institutes of Health to examine molecular alterations in patients with hereditary forms of GIST. In addition collaborators from MITRA biotech, Champions Oncology and Store My Tumor have also been tapped to assist in moving this important project forward. "It is inspiring to work with investigators that have world-class expertise in genomics, signaling pathways, and therapeutic targeting, as well as a passion for making a difference in the lives of patients," says Dr. Velculescu. "We are hopeful that this research will lead to new therapeutic avenues in GIST, as well as novel diagnostic approaches for patients that are most likely to develop this disease."

The For Ian Gist Project has served as a model of team science that is now becoming available for other cancers as well. Stand Up to Cancer (SU2C) and the American Association for Cancer Research (AACR) have both established "dream teams" focused on advancing our understanding of and developing novel treatment approaches for challenging tumors such as pancreatic and ovarian cancers. The genomic technologies that Dr. Velculescu has developed, for instance, are being used by a SU2C dream team focused on the early-detection of colorectal cancer, once again underscoring the importance of the cross-institutional collaboration in making cutting-edge research advances available to the greatest number of patients. Most recently, the White House has initiated a Cancer Moonshot that, as one of its main goals, seeks to encourage collaboration, interaction, and data sharing among scientists nationwide.

Advancing the state of cancer medicine through a collaborative, trans-institutional team science approach has incredible potential to transform the way that the most difficult tumors are treated, improving the understanding of how these diseases initiate, grow, and spread in order to

develop cutting-edge treatments designed to halt them in their tracks. Outside of the laboratory, however, the team science approach also represents a new opportunity to provide the best possible care to the person in each patient, ensuring that patients diagnosed with the least common disease types have access to the experts, technologies, and support they need to live as well as possible for as long as possible.