St. Jude Genomes for Kids Clinical Trial

Cancer begins when changes in DNA trigger cells to grow out of control. Through an ambitious initiative known as the Pediatric Cancer Genome Project, St. Jude and Washington University have successfully pinpointed the DNA changes behind some of the toughest childhood cancers. Now St. Jude is launching a new program to apply its powerful technologies where they are needed most: the bedsides of our patients.

The Genomes for Kids (G4K) research study uses a technology called next-generation sequencing to pinpoint the specific gene changes that cause cancer to develop. Armed with those details, scientists will be able to understand more about why the tumors formed and learn how to treat them better.

G4K is the first step in a clinical genomics effort that will usher in a new day—an entirely novel way of treating children with cancer and other life-threatening diseases.

The study's participants agree to let researchers isolate DNA from part of their tumor or bone marrow to look for changes in 565 cancer-related genes.

To identify changes that could reveal whether the risk for cancer was inherited, St. Jude scientists currently look for alterations in 63 genes in the child's healthy tissue. These genes have been commonly associated with childhood cancer predisposition. The number of genes examined will increase in the coming years.

By doing this study, scientists hope to learn why childhood tumors form and predict how tumors will respond to treatment. They will also determine the best ways to share the results of genomic sequencing with families.

St. Jude is the only institution to tackle such a project. Other institutions that are doing genomic analysis perform only whole-exome sequencing, which looks at a slice of the human genome—about 1 to 2 percent. St. Jude is also doing whole-genome sequencing and RNA sequencing. Our scientists are looking at every part of the entire human genome, as well as every part of what is known as the "transcriptome," which is the RNA blueprint from which proteins are made. It's a comprehensive way to investigate the tumors for as many genetic abnormalities as possible.

Findings from the G4K study will help St. Jude create a precision medicine pipeline, in which mutations are discovered in a child, a team of scientists identifies drugs that target those particular alterations, and the treatment is provided to the child.

All St. Jude cancer patients are now offered the opportunity to have their tumor and normal cell genomes sequenced as part of their routine workups. Through G4K, St. Jude is laying the foundation for the future.