

Clinician-Scientists: New roles, new ideas

Breakthroughs happen by thinking differently and working differently. Donors to SickKids make this possible by funding our innovative “Clinician-Scientist” program. Through this program, our physicians and surgeons have time to conduct laboratory research to study and understand the illnesses they treat in the Hospital. This melding of the clinic with research in the one person has led to brilliant and transformative insights.

An example is SickKids’ neurosurgeon Dr. Peter Dirks. Dr. Dirks performs surgery on children with brain tumours, a leading cause of cancer mortality in children. As a neurosurgeon Dr. Dirks knew he could carefully cut out every sign of a brain tumor, but new cancer cells could quickly appear in the original tumour’s place. Because he is also a research scientist in the Developmental Biology Program at SickKids’ Research Institute, Dr. Dirks turned to his laboratory to try to discover why.

It was while he was reviewing the latest research on stem cell development that he was inspired with a new idea.

Brain tumours are composed of a variety of kinds of cells, including a small number of stem cells. Stem cells are remarkable. They can ‘learn’ to grow into *any* kind of tissue – including cancer. Dr. Dirks reasoned that while as a surgeon he was able to remove the mass of a tumour, what if some of the

stem cells remained? Could they enable it to grow back? That was the question that he took to his lab.

In the laboratory, Dr. Dirks and his colleagues were able to establish that indeed stem cells can cause tumour re-growth, and that many current cancer therapies may fail because they do not kill the cancer-sustaining stem cells.

This discovery is helping to disseminate a new way of thinking about cancer cell growth, and will radically change the way we treat brain tumours. Dr. Dirks' accomplishment attests to the outstanding value of the Clinician-Scientist program.



Research Accomplishments Enabled by SickKids' Donors

SickKids' reputation for leadership owes much to the ongoing support of generous donors. Gifts to SickKids' priorities help support key initiatives, leading to a number of discoveries that transform children's health in Toronto, across Canada and around the world. Here are some recent examples from key areas of treatment and research:

Cardiac

Researchers in cardiac care are continually making important discoveries and improving the world's understanding of the factors that can lead to, or affect paediatric heart disease and disorders. Recently, SickKids doctors became the Canadian pioneers for the use of *cold cryotherapy*, a procedure that freezes small pieces of heart muscle to treat children with abnormal heartbeats. Arrhythmia (slow, fast or irregular heartbeats) affects one in every 200 children and can be a debilitating condition. Previously, treatment for this condition was very risky and would occasionally permanently damage the surrounding muscle. Cold cryotherapy is less risky because it allows doctors to be more precise.

Neuroscience

Members of the Brain and Behaviour Research Program are actively involved in research collaborations with partners within the hospital, as well as with local, national and international partners. In one such collaboration, a mutant mouse model has been generated that exhibits many of the properties of the human condition called Trisomy 21, more commonly known as Down Syndrome. This mouse model has been shown to express many of the characteristics of human Down Syndrome, including early-onset dementia, which is also associated with Alzheimer's disease.

Studies of such animal models help researchers generalize their findings to humans and can aid in the development of appropriate therapeutics, to improve patient outcomes in the long run.

Genetics and Genomics

The most intensive effort currently in Genetics and Genomics goes to the Chromosome 7 Project. This project aims to generate the most comprehensive description possible of the medically important Chromosome 7, which carries the cystic fibrosis gene and genes associated with diseases such as autism and leukemia.

Through their work on Chromosome 7 researchers at SickKids are learning a great deal about the genetic roots of autism in children, an area in which they lead the world. They are also acquiring valuable background knowledge for research into diabetes, epilepsy, developmental diseases, and even the early signs and genetic causes of breast cancer. It's a far-reaching project whose benefits are being felt in just about every field of medicine.
