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Hospital a hotbed for breakthroughs

SickKids scientists are conducting thousands of projects every day. Here's a look at some

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Over a span of six days last month, researchers at The Hospital for Sick Children announced three major discoveries that will improve the health of children around the world:

- Dr. Gideon Koren proved that the incidence of some early childhood cancers can be reduced by taking a prenatal multivitamin before and during pregnancy.

- Dr. Stephen Scherer led an international consortium of autism researchers that conducted the largest genome scan ever attempted – leading to the discovery of a chromosomal region containing autism-causing genes.

- Dr. David Malkin reported research findings identifying predictive markers for early-onset cancer in people with cancer-predisposition syndromes.

These three doctors are among the 437 researchers and 961 trainees at SickKids who are conducting 1,482 funded projects and 1,971 clinical protocols.

Research has been a big part of SickKids as far back as 1931, when three doctors at the hospital invented Pablum, an infant cereal critical to preventing crippling childhood diseases.

Today, the SickKids Research Institute occupies 500,000 square feet in six locations, including the Elizabeth McMaster Building (across Elizabeth St. from the hospital).

It had a total research budget of $143 million last year, 23 per cent of

which came directly from community support.

Among the thousands of projects are seven major programs that are at the forefront of Canadian and worldwide research into child health. Here's a brief summary of what a few of those researchers are doing:

Genetics & Genome Biology

Dr. Stephen Scherer is trying to understand the composition of the human genome for studies of genetic disease.

His research includes the study of human chromosome 7 as a model of the chromosomal basis of disease, and building genomics infrastructure to facilitate biomedical research.

Scherer is working on more than 10 research projects, including the Autism Genome Project, which involves collaboration with 137 researchers from eight countries.

A daily conference call with his research partners helps bring focus to their work centred on autism-causing genes.

Cell Biology

Dr. Rae Yeung, a clinician scientist, sees a number of patients through the emergency department each year.

When patients come in with a persistent fever, Yeung will check for Kawasaki disease, the No. 1 cause of acquired heart disease in young children.

She is studying DNA in the heart and blood of an animal model, which will help her determine which patients with Kawasaki disease will develop heart disease.

Her research group has the ability to take these predictors from the lab and almost immediately test them in clinic through clinical trials with patients.

Child Health Evaluative Sciences

Dr. Katherine Boydell is interviewing kids from ages 7 to 17 through video conferencing.

The current focus group is exploring what kids think about receiving psychiatric treatment this way, which fits with the research Boydell has been conducting on access to mental health services for children in remote areas.

Molecular Structure & Function

The key to understanding and treating disorders such as Alzheimer's and Parkinson's diseases lies in a basic understanding of protein structures.

This is what drives the research of Dr. Régis Pomès and Dr. Fred Keeley. In his lab, Pomès has 88 computers building models of protein structures.

Keeley then takes the computer structures and designs proteins from scratch, using DNA incorporated into bacteria to produce the proteins.

Neurosciences & Mental Health

Dr. Karen Gordon is studying auditory deprivation in patients who are deaf and use cochlear implants to hear.

Although some children can't express if or how the cochlear implant is working, the small disks inside the electrode cap can measure how the auditory nerves and brain respond to the implant.

With the help of their parent and a research assistant, the child plays quietly or relaxes and watches a movie during the recording. Up to four patients a day visit the lab to participate in the study.

Developmental & Stem Cell Biology

As a senior scientist in developmental and stem cell biology, Dr. Cynthia Guidos is analyzing data, working with post-doctoral students, trainees and technicians to interpret data and drafting manuscripts for publication.

She studies the mechanisms of leukemia to find better treatments for patients with acute lymphoblastic leukemia.

Physiology & Experimental Medicine

Dr. Sylvain Baruchel is a clinician investigator in hematology/oncology and a senior associate scientist in the Research Institute.

His focus is on experimental therapies in children with cancer and serious blood disorders.

Baruchel spends much of his time each day counselling patients who haven't responded to regular cancer treatments.