

Cancer researchers continue quest to enhance chemotherapy

By NANCY DORRANCE
News and Media Services

When Roger Deeley and Susan Cole (both of the Department of Pathology and Molecular Medicine) made their groundbreaking discovery of Multidrug Resistant Proteins (MRPs) in 1992, the Human Genome Project had barely begun.

Today, as a result of human genome sequencing, the focus of their research has greatly expanded, says Dr. Deeley, director of the university's new Cancer Research Institute. "The challenge in genomic science right now is not just to identify the gene or the protein: it's to figure out what they actually do," he explains. "We're moving into a new stage of investigation now."

Funding of \$954,800 to continue the Queen's study was announced recently by the Canadian Institutes of Health Research (CIHR). A total of 27 Queen's health research projects share more than \$10.6 million in CIHR support for 2002-2003.

The gene discovered by Drs. Deeley and Cole in 1992 encodes a protein that sits in the cell membrane and "literally acts as a molecular pump," says Dr. Deeley. "If a particular molecule is recognized by the pump, it's driven from inside to outside the cell, using a form of chemical

energy much in the same way that a mechanical pump might use gasoline."

This can serve a protective role when the compounds being moved are harmful to humans, such as dietary or environmental toxins. But when the protein pumps out chemotherapy drugs, cancer tumours may continue to grow.

Dr. Deeley and his team use a variety of technologies to investigate how multidrug resistance proteins are able to take a compound from one side of the cell membrane and move it out the other. They have been working with industry to try and develop compounds that will de-activate these "pumps" in a selective way.

At the time of their initial findings, the researchers didn't anticipate the number of relatives the protein they discovered would have. "Thanks to completion of sequencing of the human genome, we're up to seven or eight related proteins, each with its own profile, and collectively they're able to pump an absolutely unprecedented number of different molecules and compounds," says Dr. Deeley.

As well as most of the types of molecules currently used for cancer chemotherapy, this also covers many drugs that have been developed for other diseases, he



BERNARD CLARK

Susan Cole and Roger Deeley collaborate on research into improving the effectiveness of chemotherapy treatment.

continues. "There has been growing industrial recognition that these proteins play very important roles in determining how the body deals with drugs of many different types."

Other key funding for this

research program has come from the Terry Fox Foundation through the National Institute of Health, and infrastructure support from Cancer Care Ontario, as well as from industry.

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