Team discovers a piece of the puzzle for individualized cancer therapy via gene silencing

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In a major cancer-research breakthrough, researchers at the McGill University, Department of Biochemistry have discovered that a small segment of a protein that interacts with RNA can control the normal expression of genes - including those that are active in cancer.

The research, published online on May 26, 2010 by the prestigious journal *Nature,* has important immediate applications for laboratory research and is another step toward the kind of individualized cancer therapies researchers are pursuing vigorously around the world.

Human cells need to produce the correct proteins at the right time and in the appropriate quantities to stay healthy. One of the key means by which cells achieve this control is by "RNA interference", a form of gene silencing where small pieces of RNA, called micro RNAs, obstruct the production of specific proteins by interacting with their genetic code. However, not any piece of RNA can do this. Dr. Bhushan Nagar and graduate student Filipp Frank, in collaboration with Dr. Nahum Sonenberg at McGill's new Life Sciences Complex, used structural biology to unravel how a small segment in the Argonaute proteins, the key molecules of RNA interference, can select the correct micro RNAs.

In doing so, the team has discovered that Argonaute proteins can potentially be exploited to enhance gene silencing. "RNA interference could be used as a viable therapeutic approach for inhibiting specific

genes that are aberrantly active in diseases such as cancer", Nagar said. "We now have a handle on being able to rationally modify micro RNAs to make them more efficient and possibly into therapeutic drugs."

While therapeutic applications are many years away, this new insight provides an avenue to specifically control the production of proteins, which in cancer cells for example, are abnormal.

"This is fantastic news," said Dr. David Thomas, Chair of McGill's Department of Biochemistry. "You've seen stories lately about how we may see the end of chemotherapy? Well, this is part of that path in developing genetically based therapies that can be tailored to individual patients' particular illnesses. It's a great step forward."

Provided by McGill University