Targeting the proteins that trigger cancer metastasis

OV C research that is connecting the dots between the expression of certain proteins, cancer metastasis and patient survival may one day help scientists develop new drugs that fight cancer by targeting those proteins.

Professor Alicia Viloria-Petit is investigating how to control the effects of transforming growth factor beta (TGFb), a protein molecule that previous research has linked to changes in breast cancer cells that promote the cancer's spread other parts of the body. TGFb also plays a key role in angiogenesis, the process that enables a tumour to sprout new blood vessels that supply nutrients and oxygen needed to grow.

“Most patients don't die of the primary tumour but after the tumour migrates to and colonizes distant organs,” says Viloria-Petit, who joined the Department of Biomedical Sciences in 2009.

Viloria-Petit worked on breast cancer metastasis as a post-doc at Mount Sinai Hospital's Samuel Lunenfeld Research Institute. There, researchers discovered how TGFb changes the cell’s shape to promote metastasis. Last year, she was part of the team that found proteins produced by normal cells near a tumour affect the cancer’s ability to spread to other parts of the body. Their findings, published in the journal Cell, were a breakthrough in the field of breast cancer metastasis.

Many researchers work on one process or the other, but Viloria-Petit aims to understand both metastasis and angiogenesis. She hopes to figure out how to disrupt the entire signalling network controlled by TGFb in breast cancer as well as colon and prostate cancer. She works with cell lines from the tumour bank established by the U of G Institute for Comparative Cancer Investigation, and collaborates with researchers in Toronto to identify molecules associated with TGFb.

Viloria-Petit is also investigating the role of TGFb in bone cancer, which is a particular problem in large-breed dogs and is highly metastatic and resistant to therapy. Only 30 per cent of dogs treated with surgery and chemotherapy will survive for two years.

Working with Drs. Geoff Woods, Pathobiology, and Tony Mutsaers, Biomedical Sciences / Clinical Studies, she is studying the proteins expressed in canine bone cancer cell lines and their connection to the cancer’s spread and resistance to therapy.

“I hadn't been exposed to veterinary patients before I came to Guelph,” says Viloria-Petit., whose grandfather died of cancer when she was 14. “That was my first contact with metastatic disease; it intrigued me a lot. I couldn't understand how something that started in the lung ended up in his brain.”