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Researchers discover new path to stop the spread of cancer

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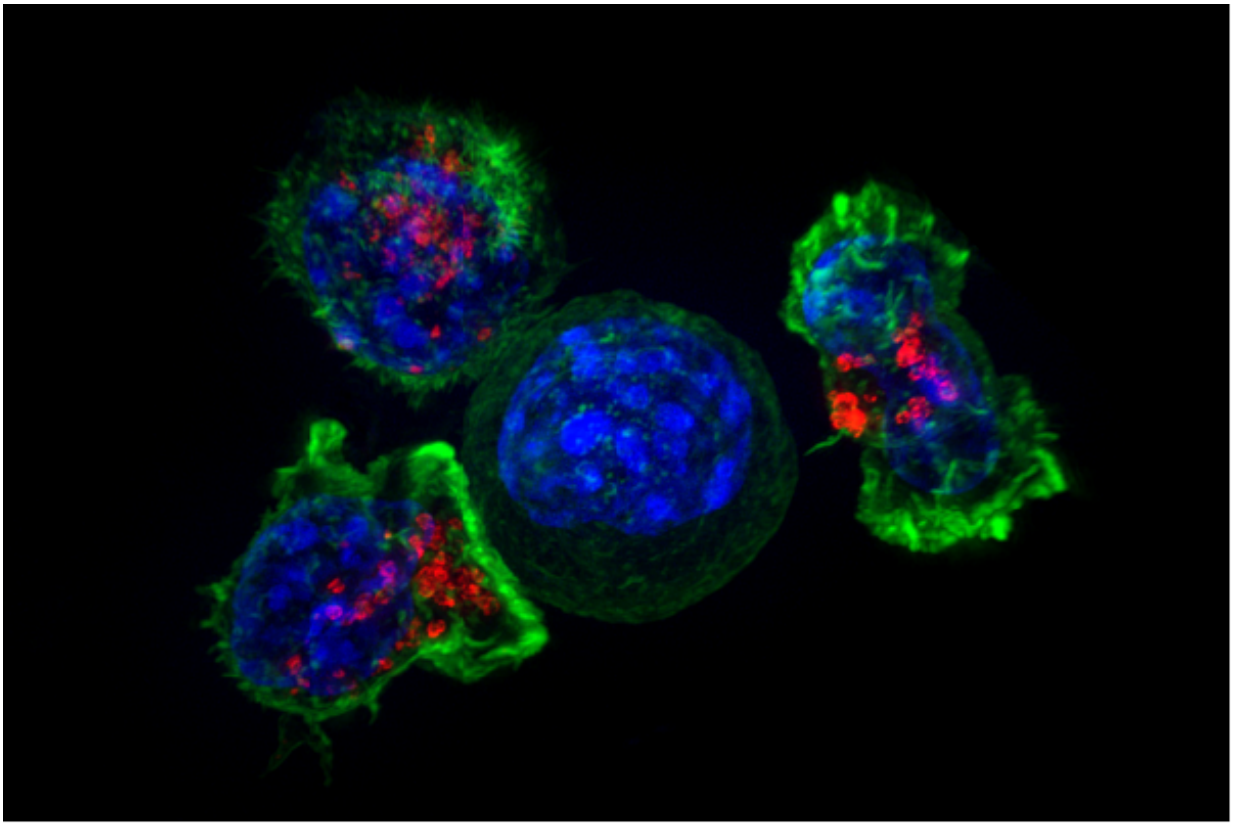

Killer T cells surround a cancer cell. Credit: NIH

Investigators from the Research Institute of the McGill University Health Centre (RI-MUHC), and the Institute of Cancer Research, London (UK), have discovered that some cancer cells can draw blood

from existing mature blood vessels allowing them to continue to spread. These findings, published in the journal *Nature Medicine*, will immediately improve the lives and prognosis of patients with colon cancer, which has metastasized to the liver. The team of researchers is continuing its efforts to better understand the mechanisms behind this discovery in order to develop new targeted therapies aimed at stopping the cancer from spreading.

Cancers are often managed by surgical removal of the tumour. However, as many as half the patients who undergo this procedure to treat colon cancer will develop liver metastasis. Metastasis occurs when cancer cells break away from the primary tumour site and enter the bloodstream, spreading to other parts of the body. It is usually this recurrence of cancer that is fatal for patients.

"Metastatic cancer is harder to treat than primary cancer—about 80 per cent of patients diagnosed with colon cancer that metastasizes to the liver are inoperable," explains Dr. Peter Metrakos, lead author of the study and director of the Multi-Organ Transplant Program and of Hepatopancreatobiliary Surgery. "Chemotherapy has been able to prolong the lives of these patients, but it has not been able to provide a cure. If we can stop the metastasis, we have a better chance of curing patients."

In an attempt to stop metastatic growth, scientists have focused on angiogenesis—a well-known mechanism by which cancer cells generate new blood vessels in order to grow. In the last decade, researchers have developed drugs to target this process. It seemed obvious that if you block the ability of the tumour to obtain blood—its oxygen and nutrients - you would be able to slow the tumour growth, if not kill it completely. Surprisingly, these drugs, called anti-angiogenic treatments, have succeeded in slowing the growth of some cancers, but they have not successfully increased patient survival.

"We were treating all patients as if they were generating new blood vessels, but our research has revealed that roughly 40-45 per cent of tumours derive their blood supplies from new blood vessels, and another 40-45 per cent derive their blood supplies by co-opting existing blood vessels of the liver to draw their blood, which explains why existing therapies that target new blood vessels are not working as well as predicted," says Dr. Metrakos. "We thought tumours always generated the growth of new blood vessels but in some cases what they are doing is a little sneakier: the cancer cells surround the existing blood vessels of the liver to draw their blood supply. We need to select our patients based on how their cancers obtain their blood supply and stratify them for the right treatment, essentially personalizing medicine."

Dr. Metrakos's team has also done some preliminary work on other solid tumours. More research is needed, but the initial data show that the same observations of access to blood supply could be true in other tumours such as brain and lung cancer, renal cell carcinoma and many others.

More information: "Vessel co–option mediates resistance to anti–angiogenic therapy in liver metastases" *Nature Medicine*, 2016.

Provided by McGill University Health Centre