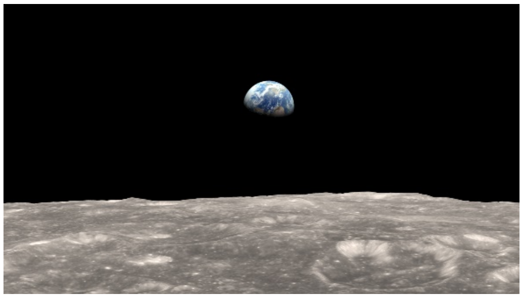
Colorectal Cancer Research: Like Reporting Traffic from the Moon

By: Samuel D. Wilson

 NASA | USA

A demonstration of the scale of the feat achieved by Prof. Boisvert's research group. The image, captured by NASA's Lunar Reconnaissance Orbiter (LRO), depicts the Moon's surface with the Earth seen in the background.

Imagine standing on the Moon, looking back at Earth, and being able to track the movement of thousands of vehicles in traffic.

The equivalent at the molecular level of this traffic reporting feat was recently accomplished in a colorectal cancer study. The research project at the *Université de Sherbrooke* was headed by Prof. François-Michel Boisvert. Prof. Boisvert's group published their findings earlier this year. The findings detail how the researchers tracked the location of thousands of molecules, known as proteins, in colorectal cancer cells.

Colorectal cancer is one of the deadliest forms of cancer in the country according to the Canadian Cancer Society. Survival rates for cancers in general depend on scientists' and doctors' understanding of what causes different types of cancers. Improved understanding of cancer processes allows these professionals to create and apply treatments effectively.

Cellular Changes Due to Cancer

Cells start operating differently when something goes wrong with the way proteins behave. Proteins serve as small molecule-sized machines responsible for running our cells, usually keeping them healthy and alive like microscopic factories. Changes to the activity of these machine-like proteins can often lead to cancer through a breakdown of healthy processes. In the same way that we might get an idea of what a person does based on where they spend most of their time, we can learn a lot about a protein from its placement within the cell.

The Cellular Traffic Report

In this study, researchers analyzed the location of proteins in seven types of colorectal cancer cells increasing in stages of severity. To achieve their goal, the scientists separated different compartments within cancerous cells from one another and analyzed their contents individually. The analysis is made possible using a high-precision instrument known as mass spectrometer that can count, measure, and identify all the proteins present in a sample of cells. The technique is known as proteomic analysis, a term coined from the word “protein” and the suffix of “genomics,” meaning to study something in its entirety.

Proteomic analysis revealed the compartments of each type of colorectal cancer to contain abnormal proteins depending on severity of the cancer. This finding suggests that the movement of proteins within the cell, between compartments, has an important role to play in cancer development and therefore offers insight into cancer progression. This information was catalogued by the team and made available online for everyone to access, free of charge.

What Does It Mean?

We can view this study as a protein traffic report in colorectal cancer. The report was placed online for interpretation by other scientists, who might be able to offer more insight into the phenomena observed and even use the findings in their own research. With information like that generated by this study, doctors should have more of the information that is necessary to make recommendations for specific instances of colorectal cancer—leading to improved outcomes for patients.

Proteomics Used in the Future

Cutting edge technologies like proteomics are heading closer to a doctor near you. Practitioners will soon be able to use proteomics and similar technologies to facilitate “personalized medicine.” For example, personalized medicine could use tools from proteomics to make traffic reports, like those generated in this study, of cancerous cells from any given patient. From these tests would come a comprehensive report of the innermost workings of the diseased cells. The reports could then be interpreted by doctors to understand precisely what is happening in the cancer of that patient. These discoveries could be immensely powerful to help doctors individually tailor the best course of treatment to optimize patient outcomes.

About the author

Samuel Wilson has always had a curiosity for the way things work, a fondness that lead him to science. He discovered his love for biology while completing his Honours degree in Health Science at Bishop’s University. Samuel is currently working towards a Master’s degree in Cell

Biology. The focus of his Master's project is to study the molecular mechanisms of DNA repair that could be exploited for colorectal cancer treatment.

Samuel is passionate about biology and health. Coming from a family of teachers, he learned to value knowledge sharing. Naturally, he has been interested in popular science for a long time and enjoys sharing scientific discoveries. In addition to his academic endeavours, Samuel has volunteered his time to the Service des bénévoles of the CHUS for several years. The young scientist hopes to pursue a career in translational medicine.