Changes in surface sugarlike molecules help cancer metastasize

March 24 2020, by Andy Fell

Professor Carlito Lebrilla, UC Davis Department of Chemistry, in his lab. Lebrilla's team studies glycans, sugarlike molecules attached to proteins on the surface of cells. Changes in these glycans allow cholangiocarcinoma cells to become more aggressive in invading tissues, they found. The work could open new targets for cancer diagnosis and treatment. Credit: Gregory Urquiaga, UC Davis

Changes in a specific type of sugarlike molecule, or glycan, on the surface of cancer cells help them to spread into other tissues, according to researchers at the University of California, Davis. Published March 23 in *Proceedings of the National Academy of Sciences*, the work could lead to diagnostic tests and new therapies to slow or stop the spread of cancers.

The research team led by Professor Carlito Lebrilla, UC Davis Department of Chemistry, worked with cells derived from a human cholangiocarcinoma, or bile duct cancer. Cholangiocarcinoma is relatively rare but becoming more common in the U.S. It metastasizes readily and is often incurable by the time of diagnosis.

Generally, researchers have studied how cancer cells spread by looking at the proteins on their surface membranes. Some of these proteins may serve as receptors that engage with other cells, allowing cancerous cells to attach and move into tissues.

But proteins on living cells are also coated with a wide variety of sugarlike carbohydrate molecules called glycans. These glycans modify how proteins—and therefore the cells—interact with their environment. While DNA dictates the protein's structure, glycans and carbohydrates are made and metabolized by the protein's own machinery. That makes studying these molecules even more challenging.

Lebrilla's laboratory at UC Davis has been studying glycans, glycoproteins and the roles they play in the body for many years, developing new techniques to analyze and characterize them.

How glycans modify proteins

Metastatic cholangiocarcinoma cells had high levels of the glycan mannose on surface proteins, Lebrilla's team discovered. These cancer

cells lacked the gene for an enzyme that breaks down mannose. The presence of mannose was associated with cancer cells being able to spread out on a dish and migrate through pores in a membrane, simulating squeezing through the wall of a blood vessel into surrounding tissue.

"What is interesting here is that it's a new way to look at cancer metastasis. Instead of looking at proteins, we've looked at how protein modifications are affecting the metastatic behavior of cancer cells," Lebrilla said.

If modified glycans are a characteristic of metastatic cancers, that could present a new way to diagnose cancer and perhaps predict which cancers are likely to become invasive. The glycans and the metabolic pathways that make them could also be targets for new drugs.

More information: Diane Dayoung Park el al., "Metastasis of cholangiocarcinoma is promoted by extended high-mannose glycans," *PNAS* (2020). www.pnas.org/cgi/doi/10.1073/pnas.1916498117

Provided by UC Davis

Citation: Changes in surface sugarlike molecules help cancer metastasize (2020, March 24) retrieved 27 April 2024 from https://phys.org/news/2020-03-surface-sugarlike-molecules-cancer-metastasize.html