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Researchers identify 'carbohydrates in a coal mine' for cancer detection

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Researchers at New York University and the University of Texas at Austin have discovered that carbohydrates serve as identifiers for cancer cells. Their findings, which appear in the journal *Proceedings of the National Academy of Sciences*, show how these molecules may serve as signals for cancer and explain what's going on inside these cells, pointing to new ways in which sugars function as a looking glass into the workings of their underlying structures.

"Carbohydrates can tell us a lot about what's going on inside of a cell, so they are potentially good markers for disease," said Lara Mahal, an associate professor in NYU's Department of Chemistry and the study's corresponding author. "Our study reveals how cancer cells produce certain 'carbohydrate signatures' that we can now identify."

Carbohydrates, or glycans, are complex cell-surface molecules that control multiple aspects of cell biology, including cancer metastasis. But less understood is the link between categories of cells and corresponding carbohydrate structures. That is, what do certain carbohydrates on a cell's surfaces tell us about its characteristics and inner workings or, more succinctly, how do you read a code backwards?

In the *PNAS* study, the researchers examined the role of microRNA, non-coding RNA that are regulators of the genome. Specific miRNAs—such as miR-200—play a role in controlling tumor growth. Using microarray technology developed by NYU's Mahal, the team examined cancer cells in an effort to see how they generated a carbohydrate signature.

Specifically, they mapped how miRNA controls carbohydrate signatures.

In their analysis, the researchers could see that miRNA molecules serve as major regulators of the cell's surface-level carbohydrates—a discovery that showed, for the first time, that miRNA play a significant regulatory role in this part of the cell, also known as the glycome. Moreover, they could see which regulatory process was linked to specific carbohydrates.

"Carbohydrates aren't just telling you the type of cell they came from, but also by which process they were created," explains Mahal. "Our results showed that there are regulatory networks of miRNAs and that they are associated with specific carbohydrate codes."

More information: Mapping posttranscriptional regulation of the human glycome uncovers microRNA defining the glycocode, www.pnas.org/cgi/doi/10.1073/pnas.1321524111

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