A Sweet Surprise: miRNA regulation of the glycome

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Glycans encode cellular information, including cell-cell interactions and cell state. However, glycosylation is often left out of multi'omic analysis. Using our lectin microarray technology, we have brought new insights into glycans as drivers of diseases including cancer, and new understanding to how the glycome is regulated. Integration of glycomic data led to the discovery that miRNA are major regulators of the glycome. Our work defining regulation of glycosylation by microRNA (miRNA) has led to an upending of the dogma of how these small non-coding RNA work. The canonical view is that miRNA are posttranscriptional repressors, binding to the 3'-UTR of mRNA and causing a loss of protein expression. In comprehensively mapped the miRNA regulatory landscape of glycosylation enzymes and other genes, we have discovered, contrary to expectations, miRNA can upregulate protein expression in actively dividing cells. miRNA regulation of glycosylation is coordinated and tuning by these non-coding RNA bidirectional. The miRNA regulatory landscape also identifies key biology that specific glycosylation enzymes are involved in. In this lecture, I will discuss our latest work at the interface of glycomics, medicine and miRNA.