Scripps Research

Decoding sugar messages to create new diagnostics and therapeutics

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ABOUT THE LECTURE

With a drive to understand life at the molecular level, Mia Huang demonstrated how fundamental carbohydrate building blocks are networked in highly complex ways to keep our tissues healthy. She then revealed new technologies at the interface of chemistry and biology that are giving way to molecular solutions for some of the hardest-to-treat diseases.

TOP TAKEAWAY POINTS

1. Sugars not only constitute a core part of our diet but also act as **information molecules delivering key messages inside the body**. These carbohydrates, also called glycans, are predominantly located on the surface of our cells and relay data about the cell's health status.

2. The makeup of glycans determines biological characteristics, such as our blood type or our vulnerability to infection by different viruses. **Errors in our cells' production or removal of glycans can lead to various congenital disorders**. In addition, changes in glycan abundance or composition are found in the progression of cancer.

3. Huang and her team are understanding the informational complexity of glycans, which has historically been difficult to predict based on the genetic code and existing experimental tools. With new approaches in analytical chemistry and glycobiology, as well as the institute's collaborative research environment, Huang's lab is **revealing how glycan messages dictate health and disease**.

4. The team has engineered a tagging system to gather information on the identity and function of certain glycan-protein molecules (glycoproteins) associated with liver disease. Researchers are **now developing biomolecules to disrupt the glycoprotein signals and prevent the process of liver scarring**.

5. Huang is also advancing small molecules that could be used to target aggressive and metastatic malignancies, such as pancreatic cancer. These tumors are often resistant to existing treatments because of a surrounding layer of glycoproteins that shield against immunotherapy. The lab is **currently investigating precision diagnostics and therapeutics that can intervene in this pathway and provide new hope for clinical patients.**