Researchers assemble library of sugars

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Sugar structures called GAGs are present in almost all tissues in the human body, and have important functions in various diseases. The understanding of these sugar structures is limited, because tools to study them have been lacking. Now, researchers from University of Copenhagen have assembled such a tool—a cellular library of sugars.

Most of us tend to think of sugar as a nutritional hazard. However, sugar is an essential component of the human body; it covers the surfaces of our cells and proteins, and tunes the behaviour and function of our tissues in both health and disease.

Glycosaminoglycans (GAGs) comprise a group of sugars found in almost all tissues of the human body. Some of these sugars are already being used as blood thinning medication or as a means to prevent inflammation. However, a general understanding of what these sugars do is still lacking. This is partly because researchers have not had effective tools to examine sugars one structure at a time.

Now, researchers from the Copenhagen Center for Glycomics at the University of Copenhagen have successfully mapped the sugar structures in a so-called 'library of sugars' in a new study published in *Nature Methods*. The library—which has been named the GAGOme—consists of genetically engineered cells, which display defined variations of GAG structure.

"We know that these structures are important but we are only just beginning to understand just how important they are and in what ways.

So hopefully, our new tool will enable us to gain new knowledge and ways of applying it in various diseases," says author Yen-Hsi Chen, postdoc at Copenhagen Center of Glycomics.

The researchers used the tool CRISPR/Cas9—commonly known as "genetic scissors"—to remove or introduce specific enzymes involved in GAG synthesis. This enabled them to generate a large panel of cells with a nearly complete repertoire of GAG modifications.

The GAGOme will allow researchers to test the biological function of a specific sulfation pattern or a defined length and composition of the sugar chain. The researchers also envision that the library can be applied to synthesize proteins decorated with defined GAG chains, and potentially drugs.

More information: Yen-Hsi Chen et al, The GAGOme: a cell-based library of displayed glycosaminoglycans, *Nature Methods* (2018). DOI: 10.1038/s41592-018-0086-z

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