# Discovering cell surface proteins' behaviour

February 6 2013

(Phys.org)—A Simon Fraser University chemist is the lead author on a new paper that advances scientific understanding of the structure and function of glycoproteins, in particular the number and positioning of sugars on them.

PLOS ONE, an international, peer-reviewed, open-access, online, scientific research journal, has just published the paper, *N-glycoproteome of E14.Tg2a Mouse Embryonic Stem Cells.*

Glycoproteins are membrane proteins and are often involved in human diseases. They facilitate communication between cells, and interactions with pathogens, such as viruses and bacteria, and communication with external environments.

SFU chemist Bingyun Sun and her colleagues have discovered how nature can vary the amount of a dominant sugar type (N-Glycan) on membrane proteins on a cell surface. The variation helps stabilize these proteins and facilitate their functioning.

The researchers verified their observation of a correlation between the number of sugars on a glycoprotein and its function in five animal species—worms, flies, fish, mice and humans. This led to their realization that the correlation has been conserved through evolution.

To obtain the number of N-Glycans on proteins, the researchers used proteomics—a combination of mass spectrometry (MS) and high-performance liquid chromatography (HPLC). In less than an hour, high-

throughput technique identifies the exact place where N-Glycans attach on hundreds of glycoproteins.

The scientists analyzed cell surface glycoproteins in one type of mouse embryonic stem cells by genetically shutting down the Hypoxanthine Phosphoribosyltransferase (HPRT) gene in the cells.

As an aside, HPRT deficiency causes Lesch-Nyhan syndrome in humans, a metabolic disorder characterized by mental retardation and self-mutilation.

Sun says this deeper understanding of the correlation between sugars' positioning on glycoproteins and the proteins' functions will benefit medical researchers and the pharmaceutical industry.

"As membrane proteins, glycoproteins are biologically important," explains Sun, who is fluent in Mandarin and English, and is originally from Mailand China.

"They mediate cells' communication to their environment, thus governing a plethora of cellular processes and functions, including growth, development, immunity and aging.

"Understanding how membrane proteins adapt to better protect themselves will help us design better, less toxic drugs to treat diseases."

**More information:** dx.plos.org/10.1371/journal.pone.0055722

Provided by Simon Fraser University

from https://phys.org/news/2013-02-cell-surface-proteins-behaviour.html