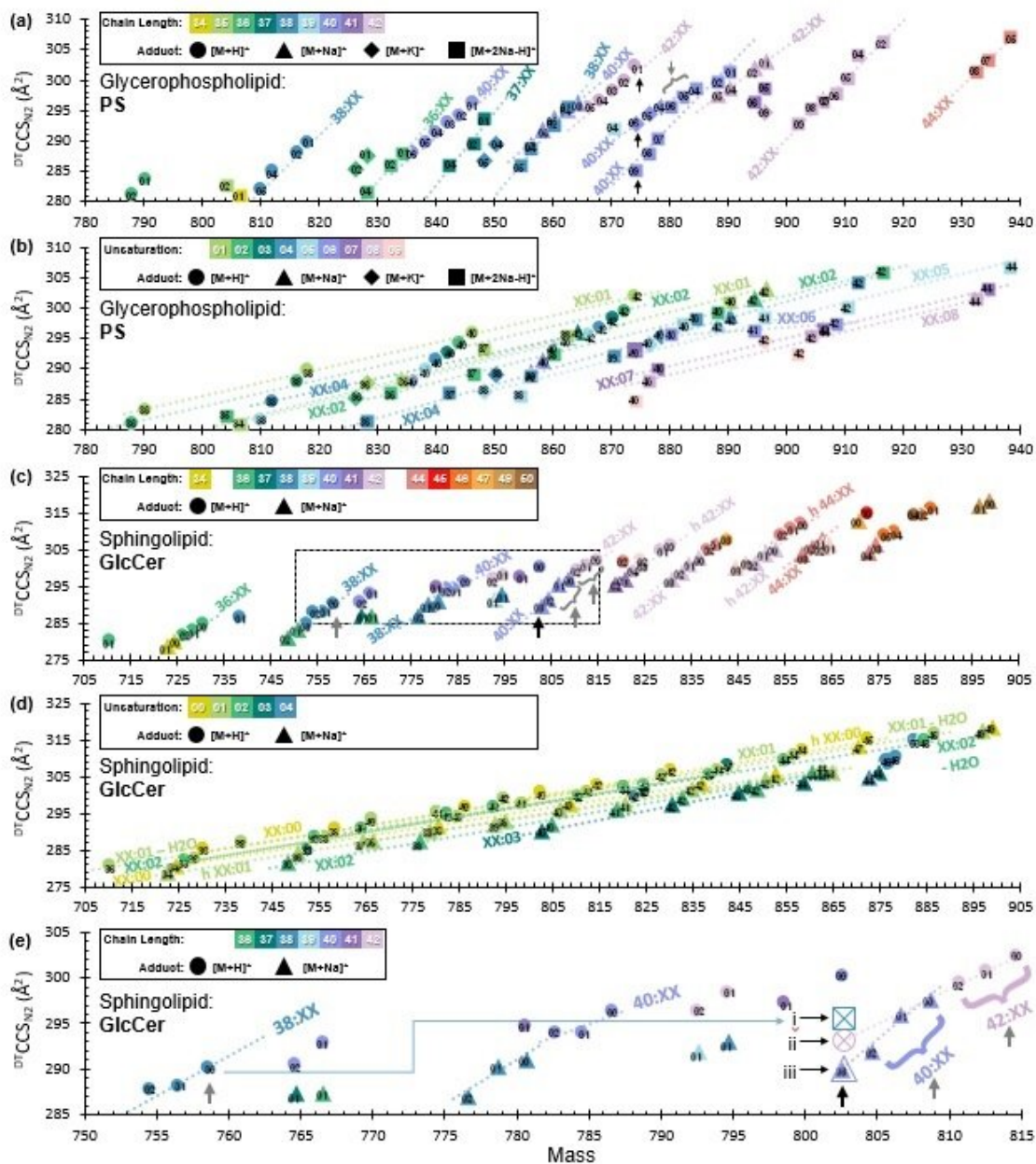


New lipid shape atlas holds key to early disease detection

February 28 2019, by Heidi Hall



The lipid atlas built by Vanderbilt University chemists can be added to as other researchers begin decoding molecule shapes. Credit: The McLean Group

Every bit of information about a person's health—their exposure to chemicals, their inherited risks, their current illnesses—lies within their molecules. That's a diverse array of substances that amounts to a number so long, it doesn't have a name: 1 with 50 zeros after it.

A team of Vanderbilt University chemists started decoding that total molecular picture by examining 456 variations of one class of molecule, lipids, which are vital to cell membrane structure, regulate cell activities and store energy. The role a lipid plays in the body is determined by its shape, and the methods and atlas this team developed, which match individual lipid [molecules](#) to their shapes, holds the key ultimately to early diagnosis of many different disorders.

"Lipids are well known to be the bellwether of disease," said John McLean, Stevenson Professor of Chemistry. "Dysregulation can mean everything from inflammation to very specific disease states. Because lipids subtly change based on what's going on in the body, we can use an analytic strategy to map out what shape that lipids adopt as a means to identify them."

Formerly, a single set of measurements could correspond to many different kinds of lipids, he said, but the Vanderbilt team's atlas of lipid structures greatly narrows the possibilities. Other researchers, such as those who study lipids and their role in diseases, can go to this atlas for clues in their own work, plus add to it.

These results were published online today in *Nature Communications* in a paper titled "Ion Mobility Conformational Lipid Atlas for High Confidence Lipidomics."

Lead author Katrina Leaptrot, a post-doctoral scholar, said the work was made possible by a relatively new technology called ion mobility-mass spectrometry, which allows scientists to analyze molecules with more scrutiny. She spent months looking for patterns in her data and learned that a lipid's shape, and thus its ability to predict dysregulation, was most impacted by the length of its tail and how many double bonds lay in those tails.

A lipid's tail length is a count of the number of carbon atoms it contains, while double bonds determine how strongly each carbon atom is bound to the one next to it. Double bonds create kinks in the lipids that affect normal lipid functions as well as dysregulations. For example, saturated fats are lipids without [double bonds](#), which raises [cholesterol levels](#) in your blood.

"Now that we can better decode how nature assembled these molecules, labs around the world will be able to use this [lipid](#) atlas and contribute their own data to uncharted regions," Leaptrot said.

More information: Katrina L. Leaptrot et al, Ion mobility conformational lipid atlas for high confidence lipidomics, *Nature Communications* (2019). [DOI: 10.1038/s41467-019-08897-5](https://doi.org/10.1038/s41467-019-08897-5)

Provided by Vanderbilt University

Citation: New lipid shape atlas holds key to early disease detection (2019, February 28) retrieved 25 April 2024 from <https://phys.org/news/2019-02-lipid-atlas-key-early-disease.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.