An Introduction To Lipidomic Workflows

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Course Outline

- Introductory Level

- Goal is to provide information and resources on current lipidomic workflows, from the experimental design stage to data dissemination, so that attendees can learn how to adequately design, perform, and analyze data from lipidomics experiments.

- Course taught with up-to-date guidelines regarding proper lipid measurement and dissemination, as defined by LIPID MAPS and the more recent Lipidomics Standards Initiative

- Basic knowledge of analytical chemistry and mass spectrometry is required
~7000 fatty acyls alone in Lipid Maps
100,000’s of structures – Structure informs Biology
MS Workflows

Targeted Lipidomics (NL, MRM...)

Untargeted Lipidomics (DDA, DIA)

Structural Identification (HRMS, MSn)

Isomer Differentiation (ozID, Paterno-Buchi)
Stephen Blank: “every time you think you have one lipid you actually have 3 or 4”

3 Challenges: sn-position, double bond position, and stereochemistry

<table>
<thead>
<tr>
<th>Structural Resolution</th>
<th>Example</th>
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</thead>
<tbody>
<tr>
<td>Carbons and Double Bonds</td>
<td>PC(34:2)</td>
</tr>
<tr>
<td>Fatty Acid Constituents</td>
<td>PC(16:0_18:2)</td>
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<tr>
<td>Positional Isomers</td>
<td>PC(16:0/18:2)</td>
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<tr>
<td>Double Bond Position</td>
<td>PC(16:0/18:2(9,12))</td>
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<tr>
<td>Double Bond Cis vs Trans</td>
<td>PC(16:0/18:2(9Z, 12Z))</td>
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</tbody>
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https://www.thermofisher.com/order/catalog/product/OPTON-30880
http://secim.ufl.edu/secim-tools/
Other Topics

Unique Lipidomic Applications

Quality Control

Lipidomic Harmonization Efforts

Lipidomic Initiatives and Resources

Other Software of Note

https://mobile.twitter.com/___ils___
https://lipidomics-standards-initiative.org/
https://www.lipidmaps.org/
https://www.researchgate.net/publication/267374168_Improving_the_Analysis_of_Fatty_Acid_Methyl_Esters_Using_Retention_Time_Locked_Methods_and_Retention_Time_Databases