Lipids  
Data Base

Grace Accad

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# Overview

A major problem in the field of microbiology is the presence of bacteria that are resistant to antibiotics, which complicates things when it comes to treating bacterial infections.

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|  | Antibiotics work by altering the cell membrane of the bacteria, leading to cell leakage and finally cell death. |

Currently, colistin is considered to be the last resort antibiotic, the only effective agent against multi-drug resistant organisms. However, some bacteria can gain resistance to colistin by employing various strategies, including the modification of a certain lipid (fat molecule) in the outer cell membrane. This lipid is known as Lipid A.

There is a lack of an online database surrounding the forms and modifications of this critical lipid in bacteria. This why, in collaboration with Dr. Sima’s microbiology lab, we propose to build a database (and accompanying website) that contains data about Lipid A and its structural variations in the bacterial species *Klebsiella pneumoniae*. This would allow researchers and drug designers to readily and easily access the aforementioned data in order for them to be able to conduct better experiments, design more efficient drugs, etc. Due to the absolute lack of information about Lipid A, a database focusing on even one bacterial species carries a lot of potential and represents a start.

## The Objectives

* Goal #1: Meet the need for an online database dealing with different structural forms attributed to Lipid A, and provide relevant molecular data about each
* Goal #3: Organize all information that are harvested through utilizing matrix-assisted laser desorption ionization– time of flight mass spectrometry (MALDI-TOF)
* Goal #4: Provide a dataset which represents the major and the minor peaks detected using MALDI-TOF

## The Tables

* A table called ‘lipids’ containing lipid ID, common name, systematic name, formula, mass, public ID, category ID, and structure image ID.
* A table called ‘categories’ containing category ID and category name.
* A table called ‘structures’ containing image ID, image link, image description, and lipid ID.
* A table called ‘lipid references’ containing reference ID, reference name, reference description, reference link, and lipid ID,
* A table called ‘organisms’ containing organism ID and organism name.
* A table called ‘found in’ containing organism ID and lipid ID.
* A table called ‘modifications’ containing lipid ID, lipid ID, and modification type ID.
* A table called ‘modification types’ containing modification type ID and modification type name.
* A table called ‘cross references’ containing cross reference ID, cross reference link, lipid ID, and source ID.
* A table called ‘sources’ containing source ID and source name.