Biomarkers and Diagnostics for Niemann-Pick Disease

Background:
Niemann-Pick (NP) disease is a lethal neurovisceral lysosomal storage disorder caused by genetic mutations that disrupt the metabolism and trafficking of sphingolipids. NP-A and NP-B are caused by a mutation in the SMPD1 gene which results in the loss of sphingomyelinase activity and the accumulation of sphingolipids and cholesterol in the lysosomes. Mutations in NPC1 and NPC2 genes result in a defect of lipid transporters and are the cause of NP-C. NP-A is typically lethal during early childhood while individuals with NP-B and NP-C can survive into adulthood. There is currently no FDA approved therapeutic for NP disease which is further complicated by diversity in the age, severity, and stage of disease in addition to the limited number of patients with the disease. Another challenge to the development of therapeutics is the difficulty of evaluating the efficacy of treatments and the lack of biomarkers to establish and track the status of the disease.

Technology Description:
Researchers at Washington University have developed and validated biomarkers to screen, diagnose, and monitor the progression of Niemann-Pick disease. Novel N-acyl-O-phosphocholineserine (APCS) lipids have been identified as a biomarker to diagnose and follow the progression of the disease by utilizing tandem mass spectrometry. A panel of oxysterols and novel bile acids were developed as sensitive and specific biomarkers to screen for and diagnose NP-C disease. Levels of 24(S)-HC in the plasma were determined to be a peripheral, non-invasive biomarker for monitoring the central nervous system effects of cholesterol related disorders such as NP-C and Alzheimer’s disease.

Key Advantages:
- High sensitivity
- Easily implemented in clinical laboratories
- Biomarkers for both diagnosis and monitoring of disease progression
- Rapid diagnostics for screening infants


Lead Inventor:
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