Abstract

Lipidomics as a part of metabolomics is a fast-growing area of research due to the improvement in analytical techniques. This master thesis is focused on lipid extraction techniques optimization, using liquid liquid extraction and solid phase extraction as pre-separation methods and ultra performance liquid chromatography coupled with mass spectrometry for extraction and subsequent identification of branched-chain fatty acid esters (FAHFA – branched-chain Fatty Acid esters of Hydroxy Fatty Acids). This newly discovered class of lipid molecules is associated with insulin secretion, which could improve whole body and local glucose metabolism, providing potential for diabetes 2 type treatment.

Solid phase extraction of biological samples was optimized on columns regarding to sorbent composition using reversed phase columns with modified styrene divinylbenzene polymer or octadecyl-bonded polymer and normal phase columns packed with silica gel. Column Strata SI-1 Silica was the most effective for FAHFA separation from biological samples. Chromatographic separation of FAHFA was performed on UPLC Ultimate 3000 RSLC equipped with Kinetex C18 1,7 µm, 2,1 x 150 mm column using gradient program. UPLC was coupled to QTRAP 5500/SelexION, a hybrid, triple quadrupole, linear ion trap mass spectrometer equipped with ion mobility cell. Final method optimized for the analysis of FAHFA was used to measure quantity of selected PAHSA in white adipose tissue and plasma of mice.