Maternal plasma and amniotic fluid sphingolipids profiling in fetal Down syndrome

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Objective

Sphingolipids can be potentially involved in the formation of central and peripheral nervous system which can be involved in the pathogenesis of Down syndrome. The aim of the study was to determine the concentration of selected sphingolipids in plasma and amniotic fluid of pregnant patients with fetal Down Syndrome.

Methods

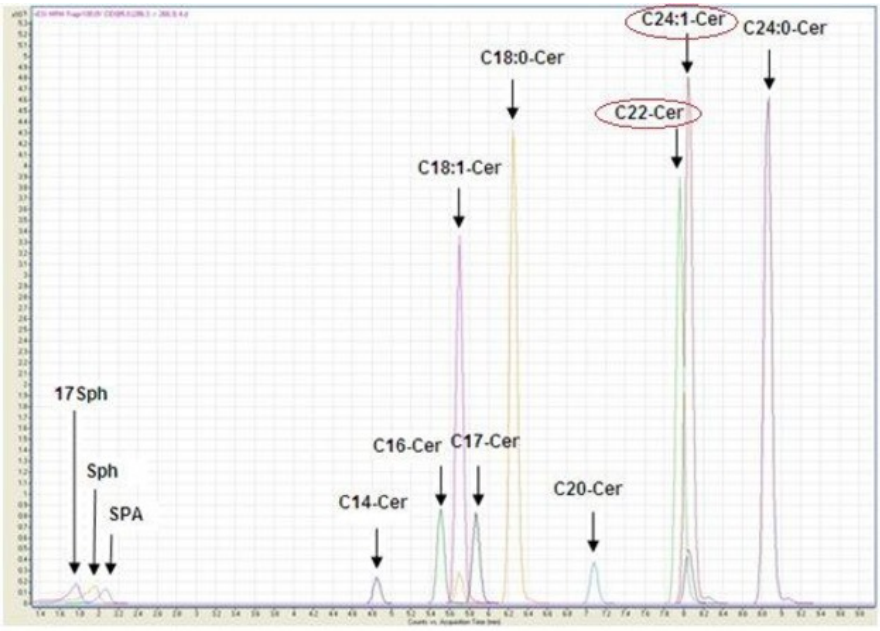
Out of 250 amniocentesis we had 10 patients with confirmed Down syndrome. For the purpose of our control we chose 14 women without confirmed chromosomal aberration. To assess the concentration of sphigolipids (SPA, Sph, S1P, C14: 0-Cer, C16: 0-Cer, C18: 0-Cer, C18: 1-Cer, C20: 0-Cer, C22: 0-Cer, C24: 0-Cer and C24: 1-Cer) in the blood plasma and amniotic fluid we used an ultra high performance liquid chromatography coupled with triple quadrupole mass spectrometry (UHPLC/MS/MS).

Results

We showed significant increase in concentration of 2 ceramides: C22-Cer and C24: 1-Cer in plasma of women with fetal Down Syndrome. Furthermore, we showed decrease in concentration of 7 ceramides: C16-Cer, C18-Cer, C18: 1-Cer, C20-Cer, C22-Cer, C24: 1-Cer, C24-Cer in amniotic fluid of women with fetal Down Syndrome. We created ROC curves for all significant sphingolipids in maternal plasma, which set the threshold values and allowed predicting the likelihood of Down Syndrome in fetus with specific sensitivity and specificity (minimal sensitivity was set to 0. 7). The area under the ROC curve for C22-Cer was 0. 81 and for C24: 1-Cer it was 0. 73. We demonstrated a significantly higher risk of Down Syndrome when the plasma concentration of C22-Cer > 12. 66 ng/100ul (sens. 0. 9, sp. 0. 79, P value= 0. 0007) and C24: 1-Cer > 33, 19 ng/100ul (sens. 0. 6, sp. 0. 86, P value= 0. 0194).

Conclusion

On the basis of our findings, it seems that the sphingolipids may play role in the pathogenesis of Down Syndrome. Defining their potential as biochemical markers of Down Syndrome requires further investigation on larger group of patients.



Chromatographic separation of plasma sphingolipids in the MRM mode.