The functions of endogenous lipids in living organisms go far beyond the storage of energy and the assembly of cell membranes. Thus they play important roles in complex signalling pathways of e.g. apoptosis, cell differentiation and inflammation. As a consequence, several states of diseases are associated with changes of the lipid composition. Therefore it is of great interest to provide methods for the analytical determination of the lipidome as a condition precedent to the discovery of lipid biomarkers. Here we apply the “targeted” approach, which is based on validated MRM methods, in contrast to the “profiling” approach that uses primarily scanning methods.

**Method and Materials**

Our current portfolio of analyzable endogenous lipids via flow injection ESI-MS/MS covers phospholipids (phosphatidylcholines (PC), -serines (PS), -ethanolamines (PE), -glycerols (PG), sphingomyelins) and ceramides (ceramides, 2-hydroxyacyl ceramides, dihydroceramides).

**Mass spectrometry:**

All these lipid classes show a characteristic fragmentation behaviour that can be used for the mass spectrometric analysis of the individual classes. We tested the different possibilities concerning selectivity and sensitivity to find out the best neutral loss or precursor ion scan for each class.

**Sample preparation:**

We established a sample preparation procedure comprising methanol-chloroform extraction that needs only 20 µL of biological sample (e.g. plasma, tissue homogenate) which is very useful in cases of sample scarcity. The dried extracts are finally reconstituted in 200 µL of the mobile phase for direct analysis.

**Results**

As an example of the usability of our targeted lipidomics methods preliminary results of a stroke study are presented.

In this study we analyzed brains of mice that were undergone a manipulative stroke. Comparing affected parts of the brains (ipsi) with unaffected ones (contra) we found significant differences in the lipidome (Fig. 1 and 2).

Fig. 1: Several ceramides, 2-hydroxyacyl ceramides and dihydroceramides that showed significant differences between contra and ipsi parts of the brains.

Fig. 2: Several phosphatidylserines and -cholines that showed significant differences between contra and ipsi parts of the brains.

**Conclusion**

These results demonstrate the potential of our lipidomic methods in analyzing challenging biological samples like for example brain tissue.