

Analysis of cholesterol in the tissue sections by MALDI MSI approach

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Cholesterol is a very crucial molecule from a biochemical point of view. For example, about 25% of the whole-body cholesterol is present in our brain, where it is synthesized *de novo*. Therefore, it means that the changes in the level of this molecule may be responsible for different pathological conditions such as Alzheimer's disease, Niemann-Pick disease, or Rett syndrome [1].

The brain is a very complex organ with a lot of different structures. It means that the possibility of retaining spatial information during the analysis is exceptionally important in the case of this organ. MALDI mass spectrometry imaging offers such an opportunity. Still, in the case of cholesterol, there could be a problem with such analysis, mainly because cholesterol is characterized by low proton affinity and low acidity.

Cholesterol may be derivatized with the aid of betaine aldehyde [2]. This compound reacts selectively with the hydroxyl group of alcohols. In this reaction, hemiacetal salt is formed, and the obtained product is labeled with charge. In our work, we have optimized the way of cholesterol derivatization by betaine aldehyde with the use of the SunCollect® system, which is recognized as the wet-interface technique. Two parameters that are crucial for this system – the sputtering nozzle position over the sample and the number of betaine aldehyde solution layers were optimized. Moreover, in our study, we were able to perform quantitative cholesterol analysis in the rat brain cerebellum based on the calibration curve obtained with the aid of rat brain homogenate. We hope that our study will be helpful for those interested in cholesterol analysis.

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References

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