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Analysis of microRNA and modified oligonucleotides with the use of ultra high performance liquid chromatography coupled with mass spectrometry

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Highlights

- UHPLC ESI-MS/MS and Q-TOF-MS are effective for miRNA and modified miRNA analysis.
- CCD was used for optimization of MS parameters enhancing sensitivity of determination.
- The best results of miRNA separation were obtained for polar-endcapped C18 column.
- Mixture of 5mM DMBA/100mM HFIP/MeOH allowed for separation and sensitive detection.
- LOQ values were in the range of 49-63 nM (3.4 – 4.2 pg on column) for serum samples.
- There is a need for development of new sample preparation methods of miRNA.

Abstract

The present study highlights the application of ultra high performance liquid chromatography coupled with mass spectrometry for the selective separation and sensitive quantification of microRNAs and modified phosphorothioate oligonucleotide. The Central Composite Design was used for comprehensive optimization of mass spectrometer parameters (for tandem mass spectrometer and quadrupole–time-of-flight mass spectrometer). Ion pair chromatography was used in order to separate the studied compounds. Furthermore, the optimization of concentration of ion pair reagents in the mobile phase was done with respect to mass spectrometry sensitivity and liquid chromatography separation. The greatest