

Novel Approaches for the Analysis of Organoids and Organ-on-Chip Samples Using Liquid Chromatography and Mass Spectrometry

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Summary

Organoids and organ-on-chip (OoC) systems are emerging as alternatives to animal experiments in disease modeling and drug studies. However, samples for these organ models can be both limited in size and complex. We are currently developing analytical approaches for analyzing such samples, with a focus on automated and miniaturized sample preparation coupled on-line to liquid chromatography and mass spectrometry [1]. Two approaches will be focused upon: electromembrane extraction (EME), and automated filtration/filter backflush (AFFL) based systems. We find that EME is promising for chip-format sampling of liver organoids [2], allowing for fully automated drug metabolism studies. The AFFL system has been applied for sterol biomarker discovery studies of non-alcoholic fatty liver disease (NAFLD) [3] and is currently being developed for monitoring drug metabolism in both organoids and OoCs. We find that both of these approaches are suited for efficient sample clean-up of limited samples, and are focusing on method validation following FDA-guidelines. Taken together, efficient and miniaturized sample preparation and separation systems allow for LC-MS-based analysis of organoids and OoCs.

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