UPLC-MS/MS Determination of Phosphatidylethanol in Dried Blood with Volumetric Microsampling - validation and comparison with venous blood sampling

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INTRODUCTION

Volumetric microsampling technology offers many practical advantages for blood collection, particularly when conventional venous blood sampling is uncomfortable or inconvenient for patients. In this study, based on our routine LC-MS/MS method for phosphatidylethanol (PEth) 16:0/18:1 (Fig.1) determination in venous blood, we developed and validated a clinical LC-MS/MS method for dried blood (DB) samples with the use of two finger prick microsampling devices: Capitainer® B Vanadate and Mitra® Clamshell, and compared with the conventional venous blood sampling.

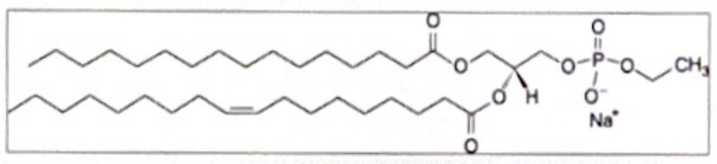


Figure 1. The chemical structure of PEth 16:0/18:1.

METHOD

PEth-calibrators (0.025, 0.05, 0.1, 0.5, 1.0, 2.5 and 5.0 µM) and QC samples (0.05 and 1.2 µM) for dried blood in Capitainer® - and Mitra® - device: prepared in house using venous blood samples with known concentrations determined by our routine method (ISO15189 accredited).

All samples were anonymised.

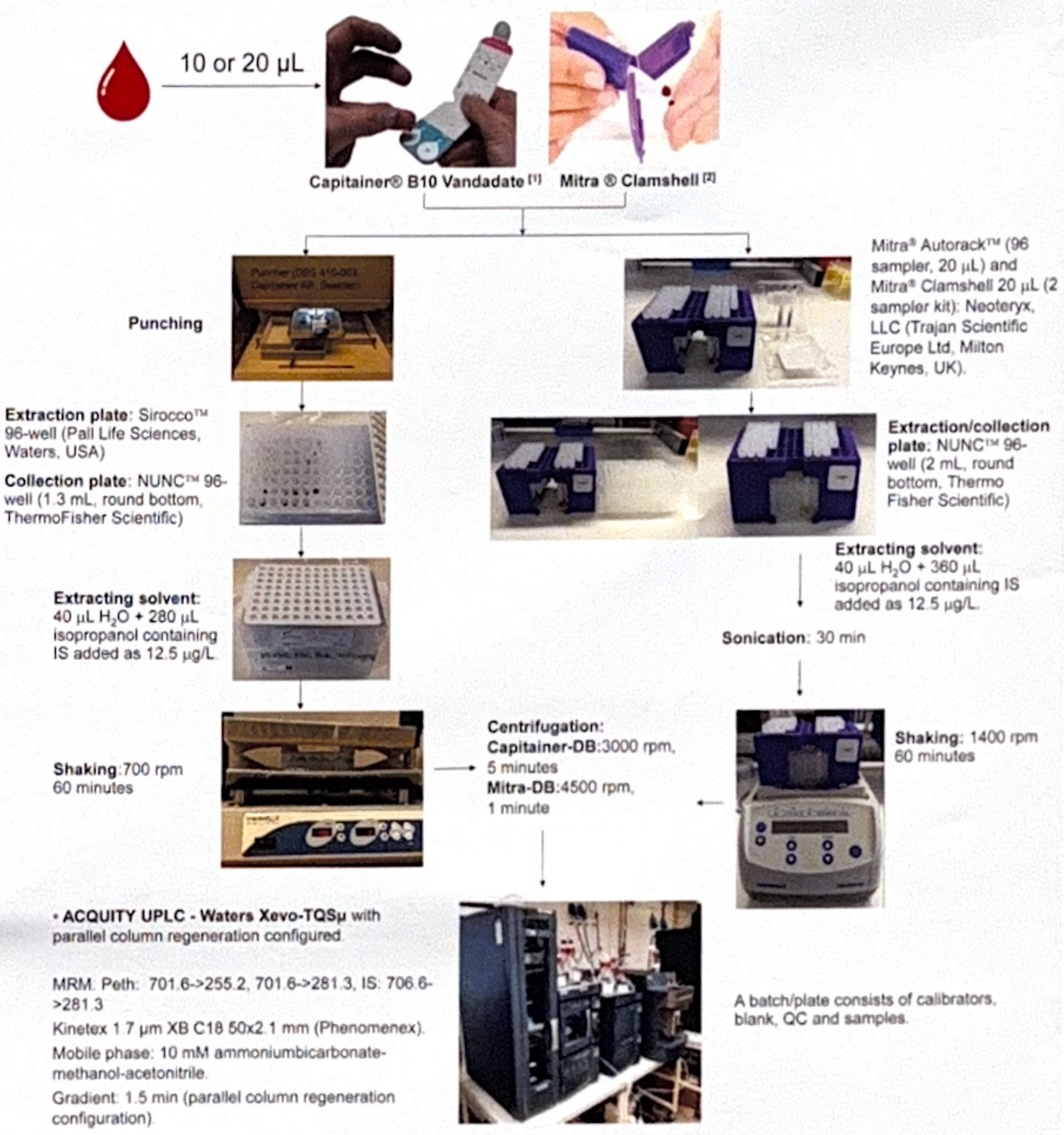


Figure 2. Overview of the microsampling, sample preparation and LC-MS/MS measurement.

RESULTS

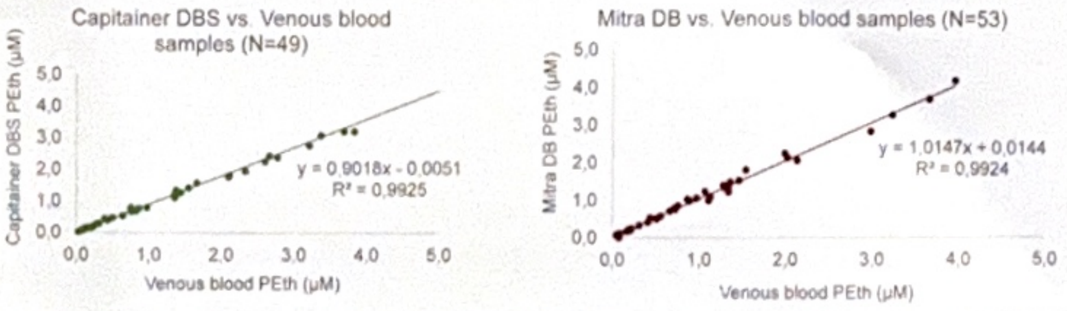


Figure 3. Method validation: correlation of PEth concentrations between methods of dried blood sampling and conventional venous blood sampling.

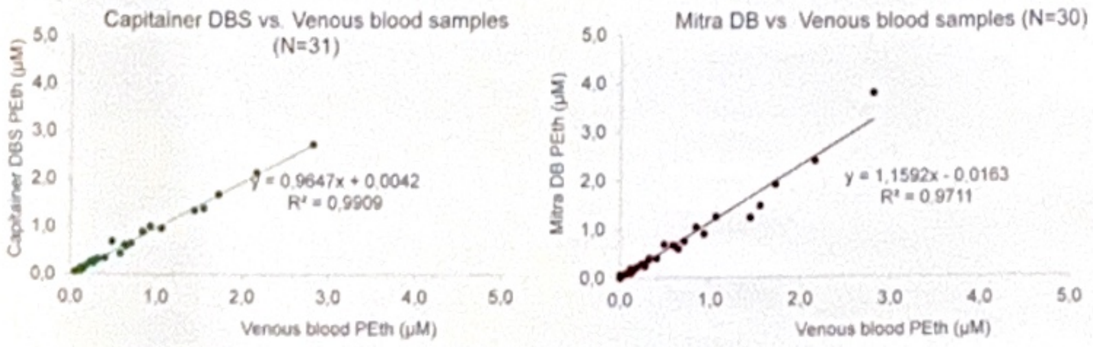


Figure 4. Correlation of PEth concentrations between methods of dried blood sampling and conventional venous blood sampling in a recent study (manuscript under preparation).

Capitainer® B Vanadate DBS card



Mitra® Clamshell tips

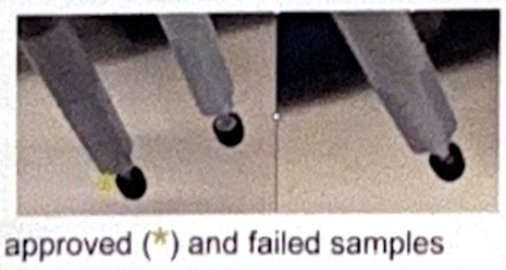


Figure 5. Importance of correct sampling: approved (*) and failed samples received in our laboratory.

CONCLUSIONS

- We have developed a sensitive and robust LC-MS/MS method for the determination of PEth 16:0/18:1 in dried blood samples, which combine volumetric microsampling techniques and effective sample preparation procedures.
- Our study demonstrates the suitability of Capitainer® and Mitra® microsampling in clinical labs for convenient and reliable PEth testing.
- Methods were successfully applied in a collaborative study between the Centre for Dependency Disorders (Stockholm) and our department (manuscript under preparation).

References:
1) Capitainer® B10Vandadate device (source: https://capitainer.com).
2) Mitra ® device based on VAMS technology (source: https://www.neoteryx.com/microsampling-news/topic/microsampling and https://www.statnews.com/sponsor/2018/02/14/four-ways-microsampling-changing-world/).

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