Comparative Study of Postprandial Lipid Response Between Dry Blood Spots and Plasma Using UHPLC-MS

Stephany Gonçalves Duarte[1], Carlos Mario Donado-Pestana[1], Marcos Yoshinaga[2,3], Adriano de Britto Chaves Filho[4], Maria Luisa Gomes de Carvalho[1], Steffane Ferreira dos Santos[1], Rosa Maria Cerdeira Barros[1], Sayuri Miyamoto[4], Jarlei Fiamoncini[1]

[1.] FCF- USP, Department of Food Science and Experimental Nutrition. Faculty of Pharmaceutical Sciences. University of Sao Paulo. , São Paulo - SP;
[2.] UNICSUL, Cruzeiro do Sul University , São Paulo - SP;
[3.] PinguisLab, PinguisLab, São Paulo - SP;
[4.] IQ - USP, Department of Biochemistry. Institute of Chemistry. University of Sao Paulo, São Paulo - SP;

Dry blood spots (DBS) represent a minimally invasive strategy for sample collection, offering advantages such as low cost and improved sample stability. This technique is effective in preserving several types of metabolites. A dietary challenge allows investigating the postprandial metabolism, involving the ingestion of a standardized meal followed by blood collection at defined intervals. This study aimed to compare the postprandial lipidome of DBS and plasma samples collected simultaneously of healthy women. The study was approved by the Research Ethics Committee of the Faculty of Pharmaceutical Sciences, University of São Paulo (CAAE: 15438019.7.0000.0067), and was conducted with 10 volunteers undergoing a mixed-meal dietary challenge. Capillary blood and DBS samples were collected after a 10-hour fast (t = 0) and at 60, 90, 120, and 150 min after meal intake. Ultra-high performance liquid chromatography coupled with mass spectrometry (UHPLC-MS) was used to assess the lipidome of the DBS and plasma samples. A total of 333 lipids from 13 classes were found in plasma and 303 lipids from 15 classes were identified in DBS. Most metabolites were found in both plasma and DBS samples, with intensity differences. Among these lipid classes, the most responsive metabolites to the intervention were free fatty acids (FFA) and triglycerides (TG). In both plasma and DBS, FFA decreased postprandially, while TG increased. The results validate the use of DBS for lipidome analysis during the postprandial period, providing a practical, cost-effective, and patient-friendly approach to studying postprandial lipid metabolism.

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