Keynote Speakers

IDENTITY

First Name	Myriam
FAMILY NAME	TAVERNA
Title	Professor
Employer	Université Paris-Saclay and CNRS
Laboratory name	Institut Galien Paris Saclay
Website	https://www.institut-galien.universite-par
Email	myriam.taverna@universite-paris-saclay

Short Biography

Myriam Taverna was appointed full professor in analytical chemistry and pharmaceutical biotechnology in 2005 and senior member at the Institut Universitaire de France (IUF) in 2017. She is currently the director of the Institut Galien Paris-Saclay (IGPS-CNRS) at the university of Paris-Saclay, a CNRS-research unit composed of 6 teams. She is the head of one team strongly dedicated to analytical developments with a focus on miniaturized techniques (including microsystems, biosensors and capillary electrophoresis) for the analysis of peptides, (glyco)proteins being biopharmaceuticals, drug targets or disease biomarkers. She is particularly recognized for her expertise in capillary 190 international scientific papers, a dozen of international chapters. She is a member of the editorial board of Analytica Chimica Acta. Her research work in the field of biomarkers of Alzheimer's disease, led her to co-found in 2014 the start-up Alzohis. She started exploring extracellular vesicles and in particular new miniaturized techniques to characterize them in depth in 2018. Recently her research focuses on the exploration of Extracellular vesicles for diagnostic and therapeutic applications.

Title of Oral Presentation

Advancing Extracellular Vesicle Characterization with Capillary Electrophoresis

Keywords (5 words max)

Characterization, capillary electrophoresis, isoelectric focusing, Taylor dispersion analysis, extracellular vesicles

Abstract of Oral Presentation

Extracellular vesicles (EVs) have recently emerged as a source of prognostic or diagnostic molecular biomarkers. Their isolation and enrichment from biological fluids remains however a challenging prerequisite prior to their exploration. To provide sufficient physical and biological information on the isolated EVs, many complementary techniques have to be carried out (e.g. microscopy-based methods, DLS, NTA, TRPS, or flow cytometry…) (1). Although some of them offer indisputable advantages, there is a great need for new techniques allowing accurate detection and characterization of EVs, in suspension, over their entire size range, with minimal calibration requirements and the ability to distinguish EV subtypes or to discriminate them from non-EV contaminants.

Over the last few years, our team has developed innovative analytical techniques for the detection and characterisation of EVs (2), most of which exploit capillary electrophoresis (CE) by using its various separation modes or the technique's ability to perform electrokinetic preconcentrations to obtain either better resolution between subpopulations or improved sensitivity for detecting EVs.

In this talk the different investigated CE-separation modes (capillary zone electrophoresis, isoelectric focusing) for characterizing EVs isolated from bovine milk or animal plasma will be presented as well as their advantages, limits and the kind of information they provide (3,4)
We have also explored Taylor dispersion analysis (TDA) conducted using CE as an alternative technique to assess the size and purity of EVs. We provided recently the first proof of concept of TDA applicability to this kind of bio-nanoparticles (5). The coupling of two separation modes into a 2D configuration (unpublished data) or of an electrokinetic preconcentration (isotachophoresis) (6) allowed us also recently to push forward the sensitivity limits of the technique for EVs.

Acknowledgement

This work has been supported as part of France 2030 program “ANR-11-IDEX-0003” (PSiNano Interdisciplinary program, University of Paris-Saclay) and has received financial support from the CNRS through the MITI inter disciplinary program 2021–2023 “Evenements Rares”. We would also thank Bio-Techne for their partnership in this project.

References (6 lines max)

1-Alexandre L., Sun J. Taverna M, Zhong W., Anal Bioanal Chem; Advances in extracellular vesicles analysis (2023) 415(7):1235.
2-M. Morani, T.D. Mai, et al. Recent electrokinetic strategies for isolation, enrichment and separation of extracellular vesicles, Trends Anal. Chem. 135 (2021) 116179.
3- M. Morani, T.D. Mai, Z. Krupova, et al. Electrokinetic characterization of extracellular vesicles with capillary electrophoresis: A new tool for their identification and quantification, Anal Chim Acta 1128 (2020) 42.
4- D. Zohouri et al, Talanta (submitted) (2025)
5- Obeid S, Chamieh J, Mai TD, Morani M, et al. Fast, simple and calibration-free size characterization and quality control of extracellular vesicles using capillary Taylor dispersion analysis, J Chromatogr A. (2023), 705:46418
6-D. Zohouri, M. Taverna, et al. Investigation of on-line electrokinetic enrichment strategies for capillary electrophoresis of extracellular vesicles, J. Chromatogr. A 1730 (2024) 465116