

CURRICULUM VITAE ABREVIADO (CVA)

Part A. PERSONAL INFORMATION

First name	David		
Family name	Balgoma Hernando		
Gender	Male	Birth date (dd/mm/yyyy)	16/11/1981
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A.1. Current position

Position	María Zambrano Fellow (Contract of Excellence)		
Initial date	February 1 st 2022		
Institution	University of Valladolid		
Department/Center	Instituto de Biomedicina y Genética Molecular		
Country	Spain	Teleph. number	+34-983-186-494
Key words	mass spectrometry, lipidomics, metabolomics		

A.2. Previous positions

Period	Position/Institution/Country/Interruption cause
01/2018-01/2022	Researcher at Analytical Pharmaceutical Chemistry, Uppsala University, Sweden.
07/2016-12/2017	Postdoctoral position at Laberca-INRA, Nantes, France.
06/2013-06/2016	Marie Curie Fellowship for Supporting International Mobility and Training in Bizkaia (B-MOB, three years) at OWL Metabolomics, Bizkaia Science and Technology Park, Derio, Biscay, Spain.
05/2010-05/2013	Postdoctoral position for U-BIOPRED at Department of Medical Biochemistry and Biophysics, Karolinska Institute, Stockholm, Sweden.
10/2009-04/2010	Research assistant for CIBERDEM, Valladolid, Spain.

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Ph.D. in Biochemistry	University of Valladolid (research at CSIC), Spain	2009
Master in Chemistry	University of Valladolid, Spain	2005
Degree in Chemistry	University of Valladolid, Spain	2004

Part B. CV SUMMARY

I have a long-standing interest in the **development of new analytical techniques**, with a special focus on **lipidomics and modeling mass spectrometry data**.

Regarding the implementation of **new methodologies** to obtain better biological information about lipids, at Karolinska Institute, I designed and implemented a new method to improve the analysis of lipid mediators in urine [10]. This method avoided the deleterious effects of urine variability and was used in U-BIOPRED (a European consortium for severe asthma). I have also implemented a brand new lipidomics platform at Uppsala University, which expanded the research target of the group Analytical Pharmaceutical Chemistry [3-7].

My recent research efforts have been focused on **statistical learning applied to analytical methods** [1]. For example, I created a new method for the analysis of the regioisomers of triacylglycerols [8]. This method models the behavior of triacylglycerols in mass spectrometers and predicts their fragmentation patterns. This allows **quantifying the regioisomers of triacylglycerols, even when no standards are available**.



At Analytical Pharmaceutical Chemistry at Uppsala University, I have also been part of the development of **Comprehensive Peak Characterization (CPC)**, an algorithm that complements workflows using xcms [2]. This algorithm automatically characterizes mass spectrometric peaks and filters out low quality peaks (typically 35% of the peaks). This accrued experience creating an R package associated with xcms architecture will be used in the proposal associated with this CV.

Regarding **industry**, I worked for OWL Metabolomics, a start-up company at Derio, Biscay. I enjoyed a Marie Curie Fellowship for Supporting International Mobility and Training in Bizkaia. During this period, beyond the internal R&D projects for developing new quantification methods for lipids, I worked on customer-tailored metabolomics projects and the analysis of samples for hepatic diagnosis with patented OWLiver®.

I have also generated **new ideas, opinions, and hypotheses in metabolism and statistical learning in omics**, which I have published as Trends articles at CellPress. By an inductive reasoning, I identified a new group of biomarkers of lipogenesis in the liver [7]. Regarding ferroptosis, I highlighted that others' contradictory results regarding the role of TMEM189 in ferroptosis are logical when the regulation of ether phospholipids is considered [4]. In connection with this proposal, I have recently discussed the current use of statistical learning in omics [1].

During my career, I have been **responsible** for the day-to-day management of a platform with six mass spectrometers at OWL metabolomics. Furthermore, at Uppsala University, I have implemented a lipidomics platform and been **manager of a mass spectrometry platform** including time allocation, management of maintenance, and training new users. Currently, I **lead a group with four researchers** at University of Valladolid: an undergraduate student, a master student, a PhD. student, and a postdoctoral researcher.

In summary, in close connection with biomedical applications, my career and key publications show strong **experience and abilities** in mass spectrometry, multivariate data analysis, and modeling mass spectrometric data.

My long-term research vision intertwines analytical developments with biomedical applications. I have established a line of research about the role of lipid metabolism in ferroptosis, a special type of programmed cell death, for which I have received a María Zambrano Fellowship and a Proyecto de Generación del Conocimiento (Part C.3). This proposal about data processing in omics benefits from my passion for statistical and deep learning, constituting the second pillar of my research vision.

Regarding supervision, I have been main supervisor of **three master students**. I am currently supervisor of **two PhD students**: Jenny Nilsson, a Ph.D. student at Uppsala University (co-supervisor); and Javier Blanco Santero, a Ph.D. student at University of Valladolid (main supervisor). I am also supervisor of a **postdoc** focused on mass spectrometry: Alma Astudillo. Furthermore, I have taken part in a **committee of a Ph.D. defense**.

In total, I have published 34 manuscripts (eight as corresponding author, one as last author). Finally, I would like to highlight that I have been **reviewer for multiple manuscripts about analytical chemistry, lipid metabolism, and ferroptosis** for different journals, including *Journal of Genetics and Genomics*, *BMC Genomics*, *Scientific Reports*, *iScience*, *Cancer Letters*, and *ACS' Analytical Chemistry*.

Part C. RELEVANT MERITS

C.1. Publications (CA stands for corresponding author, the applicant is highlighted in bold)

1. Montero O, Hedeland M, **Balgoma D (CA)**. 2023. Trials and tribulations of statistical significance in biochemistry and omics. *Trends in Biochemical Sciences* 48(6):503-512. DOI: 10.1016/j.tibs.2023.01.009 [LINK](#). Position 3/3
2. Pirttilä K (CA), **Balgoma D**, Rainer J, Pettersson K, Hedeland M, Brunius C. 2022. Comprehensive Peak Characterization (CPC) in Untargeted LC-MS Analysis. *Metabolites* 12(2):137. DOI: 10.3390/metabo12020137 [LINK](#). [R package at GitHub](#). Position 2/6



3. **Balgoma D (CA)**, Kullenberg F, Peters K, Dahlgren D, Heindryckx F, Lennernäs H, Hedeland M. **2022**. Orthogonality in Principal Component Analysis Allows the Discovery of Lipids in the Jejunum That Are Independent of Ad Libitum Feeding. *Metabolites* 12(9):866. DOI: 10.3390/metabo12090866 [LINK](#). Position 1/7
4. **Balgoma D (CA)**, Hedeland M. **2021**. Etherglycerophospholipids and ferroptosis: structure, regulation, and location. *Trends Endocrinol. Metab.* 32(12):960-962. DOI: 10.1016/j.tem.2021.08.005 [LINK](#). Position 1/2
5. **Balgoma D (CA)**, Kullenberg F, Calitz C, Kopsida M, Heindryckx F, Lennernäs H, Hedeland M. **2021**. Anthracyclins Increase PUFAs: Potential Implications in ER Stress and Cell Death. *Cells* 10(5):1163. DOI: 10.3390/cells10051163 [LINK](#). Position 1/7
6. **Balgoma D (CA)**, Zelleroth S, Grönbladh A, Hallberg M, Pettersson C, Hedeland M. **2020**. Anabolic androgenic steroids exert a selective remodeling of the plasma lipidome that mirrors the decrease of the de novo lipogenesis in the liver. *Metabolomics* 16(1):12. DOI: 10.1007/s11306-019-1632-0 [LINK](#). Position 1/6
7. **Balgoma D (CA)**, Pettersson C, Hedeland M. **2019**. Common Fatty Markers in Diseases with Dysregulated Lipogenesis. *Trends Endocrinol. Metab.* 30(5):283-285. DOI: 10.1016/j.tem.2019.02.008 [LINK](#). Position 1/3
8. **Balgoma D (CA)**, Guitton Y, Evans JJ, Le Bizec B, Dervilly-Pinel G, Meynier A. **2019**. Modeling the fragmentation patterns of triacylglycerides in mass spectrometry allows the quantification of the regioisomers with a minimal number of standards. *Anal. Chim. Acta* 30;1057:60-69. DOI: 10.1016/j.aca.2019.01.017 [LINK](#). Position 1/6
9. **Balgoma D**, Yang M, Sjödin M, ..., Wheelock CE (CA). **2016**. Linoleic acid-derived lipid mediators increase in a female-dominated subphenotype of COPD. *Eur. Respir. J.* 47(6):1645-56. DOI: 10.1183/13993003.01080-2015 [LINK](#). Position 1/16
10. **Balgoma D (CA)**, Larsson J, Rokach J, Lawson JA, Daham K, Dahlén B, Dahlén SE, Wheelock CE (CA). **2013**. Quantification of lipid mediator metabolites in human urine from asthma patients by electrospray ionization mass spectrometry: controlling matrix effects. *Anal. Chem.* 2013 20;85(16):7866-74. DOI: 10.1021/ac401461b [LINK](#). Position 1/8

C.2. Congresses

1. Nilsson J, **Balgoma D**, Pettersson C, Hedeland M. Poster. Lipidomics: Improved Chromatographic Separation and MS Detection of Phosphatidic Acid with Ammonium Bicarbonate in RP-UHPLC-ESI-Q-TOF/MS. 70th Conference. Am. Soc. for Mass Spectrom. 2022. Minneapolis, United States of America.
2. Goni FM, Manni MM, Sot J, Arretxe E, Gil-Redondo R, Falcon J, **Balgoma D**; Alonso C, Alonso A. Poster. Fatty Acid Compositions of Ceramides and Sphingomyelins in Mammalian Tissues and Cultured Cells. 63rd Annual Meeting. Biophysical Society. 2019. Baltimore, United States of America
3. **Balgoma D**, Guitton Y, Dervilly-Pinnel G, Meynier A. Oral presentation. Automatic Identification of Triacylglycerols. 15th Congress: New Technologies and Applications for a Healthier Life. Euro Fed Lipid. 2017. Uppsala, Sweden.
4. **Balgoma D**, Castro A, Alonso C, Martinez-Arranz I. Poster. OWL Stat App - An Interactive Web-Application for Univariate and Multivariate Metabolomics Data Analysis. 11th Annual International Conference. The Metabolomics Society. 2015. San Francisco, United States of America.
5. **Balgoma D**, Skold M, Wheelock A, Wheelock CE. Poster. Lipid Mediator Levels Evidence Gender-Specific Increases In Bronchoalveolar Lavage Fluid Of COPD Patients Relative To Healthy Smokers. 2014 International Conference. Am Thoracic Soc. 2014. Sand Diego, United States of America.
6. **Balgoma D**, Schöld M, Grunewald J, Eklund A, Wheelock A, Wheelock CE. Poster. Gender differences in 5-and 12/15-lipoxygenases products in bronchoalveolar lavage



fluid from healthy never-smokers, smoker and COPD patients. 22nd Annual Congress Eur. Resp. Soc. 2012. Vienna, Austria.

7. **Balgoma D**, SKöld M, Grunewald J, Eklund A, Wheelock AM, Wheelock CE. Poster. Quantitative mass spectrometry shows gender differences in lipid mediators in bronchoalveolar lavage fluid from healthy never-smokers, smoker and COPD patients. 60th Conference. Am Soc for Mass Spectrom. 2012. Vancouver, Canada.
8. **Balgoma D**, Lundström SL, Eklund A, Grunewald J, Wheelock CE. Development of mass spectrometry approaches to quantifying lipid mediators in airway disease. 21st Annual Congress Eur. Respir. Soc. 2011. Amsterdam, The Netherlands.
9. **Balgoma D**, Montero O, Balsinde J. Oral presentation. Markers of monocyte activation revealed by lipidomics profiling of arachidonic acid-containing phospholipids. Third European Workshop on Lipid mediators. 2010. Paris, France.
10. **Balgoma D**, Montero O, Balsinde J, Oral Presentation. Lipidomics and diabetes. Annual meeting Centro de Investigación Biomédica en Red de Diabetes y Enfermedades Metabólicas Asociadas (CIBERDEM). 2009. Arnes, Spain.

C.3. Research projects

Project Title and ID	Funding source	Amount	Period	Role David Balgoma	Status
Novel Roles of Ether Lipids in Ferroptotic Cell Death of Macrophages (eLipFerMac)	University of Valladolid (EU Next Generation)	260 200 €	02/2022 to 12/2024	P.I.	Ongoing
New Mechanisms of Ferroptosis in Macrophages and their Role in the Resolution of Inflammation (FerrMacRes, PID2022-140417NB-I00)	Proyectos de Generación del Conocimiento 2022, Ministerio de Ciencia e Innovación (Gobierno de España)	202 500 €	09/2023 to 08/2026	P.I.	Ongoing
Improvements in Structural and Quantitative Lipidomics to Characterize Lipid Metabolism with Applications to Liver Cancer	Swedish Research Council (VR)	3 750 000 SEK (335 000 €)	01/2024 to 12/2027	Investigator	Ongoing
Proyecto de Internacionalización de la Unidad de Excelencia IBGM (CL-EI-2021-09)	Junta de Castilla y León (EU Next Generation)	85 000 €	02/2022 to 09/2023	Investigator	Finished