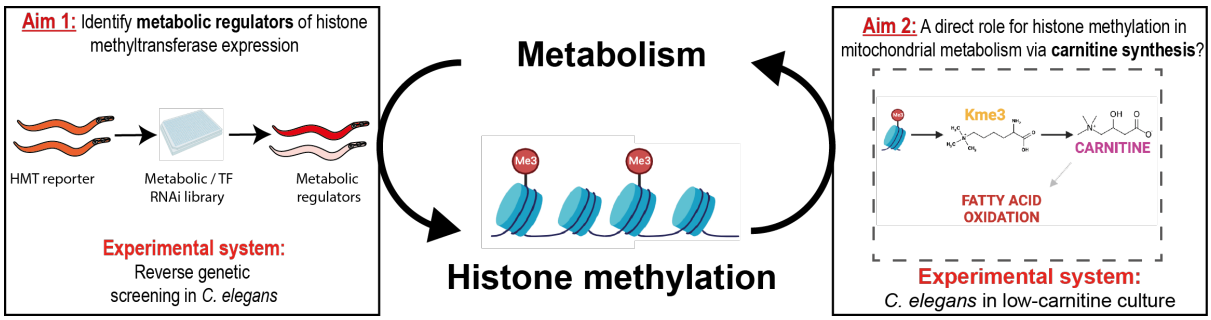
Contract available for doctoral studies on:

A DIRECT METABOLIC ROLE FOR HISTONE METHYLATION



This **4 year fellowship** covers the execution of a doctoral project with two complementary aims:

1) a screen for metabolic co-regulators of histone methyltransferase (HMT) expression; and

2) testing the hypothesis that variation in HMT expression may be related to a direct role in providing precursors for the synthesis of carnitine to support mitochondrial metabolism.

The project will take place at the **Institute for Molecular Biology Barcelona (IBMB),** a centre of CSIC, the Spanish National Research Council, currently located in the Parc Científic de Barcelona (close to Palau Reial Metro).

The student will work with the model organism *C. elegans* and will learn a variety of molecular biology and genetics experimental techniques, including CRISPR transgenesis, transcriptomic-epigenomic assays and fluorescence microscopy. Additionally the student will learn to perform computational/bioinformatic analyses, including analysis of RNA/ChIP-seq data and quantitative image analysis.

The candidate needs to have a university degree with >300 ECTS credits, a Master's degree or equivalent that would allow access to a doctoral programme in the applicant's home country. Ideally the candidate should be qualified in a scientific discipline related to biology, have some laboratory experience and display a good command of English.

On the following pages you can find the student training plan and the PI's CV.

Applicants are requested send an email to mpbbmc@ibmb.csic.es with a CV and a letter of motivation.

PLANNED TRAINING PROGRAM:

The selected student will enrol in the 'Biomedicine' doctoral programme at the Universitat de Barcelona (unless they have a preference for a different university). In the initial trimester of the course´s first year the student will attend lectures, while coming to the lab to start work on development of their project. The PI will meet with the student at least once per week to discuss data collection, processing, analysis and interpretation, in addition to guiding the future direction of the project. The student will regularly present their data in formal biweekly lab meetings and periodically in seminars at the IBMB, including at the outset of their studies to present their project plan. Critical skills for interpretation of research will also be promoted in a biweekly journal club, which we will establish in collaboration with other groups at the IBMB, in which the student will participate in presenting papers. The student will have the opportunity to present their work in national or international conferences. The regular experience of presenting work in front of others, discussing it and incorporating criticism and suggestions will be crucial to the training of a well-rounded scientist with critical thinking skills and a global view of the project which they manage. All meetings, instruction and presentations will be conducted in English, which is the first language of the PI.

At a technical level, the student will learn *C. elegans* husbandry, cell and molecular biology techniques (such as cloning, CRISPR-Cas9 editing, qPCR), genomics techniques (RNA-seq, CUT&RUN), microscopy, quantitative image analysis and statistical analysis. The student will learn to conduct basic bioinformatic analyses of the genomics data they generate; if they desire (or require) this can be bolstered with introductory courses on computational biology available at the Universitat de Barcelona. If required, the student may visit collaborators, either in Spain or abroad, for short stays to learn specific techniques. It is expected that the student will publish their results in a quality scientific journal upon completion. Overall, the goal is to train a well-rounded researcher with a broad range of knowledge and skills in addition to a strong ability to communicate about their research.

The PCB is an enriching environment for a student, in close proximity to researchers from other institutions and with access to shared seminars and training courses. In addition, the IBMB has a strong institutional framework in place for guiding doctoral students and identifying and correcting any problematic issues in a timely manner. Each IBMB doctoral student has a Thesis Advisory Committee, comprised of three members chosen by the student (at least one from the IBMB) which meets annually in September to review progress and offer external advice and guidance. The IBMB has a dedicated PhD Office, which exists to ensure a smooth academic and administrative experience for its students, create a good working environment, promote scientific and social events organised by the students themselves and aid students in solving any problems that might arise during the course of their doctoral studies. Each IBMB department elects a PhD student representative, who acts as an intermediary through which the student community can communicate suggestions and criticism to the head of department.

CURRICULUM VITAE (CVA)

IMPORTANT – The Curriculum Vitae cannot exceed 4 pages. Instructions to fill this document are available in the website.

CV date	27/01/2024

Part A. PERSONAL INFORMATION

First name	Marcos Francisco		
Family name	Pérez Browne		
Gender (*)	Male	**Date of Birth (dd/mm/yyyy)**	30/08/1987
Social Security, Passport, ID number	54862326N		
e-mail	mpbbmc@ibmb.csic.es	**URL Web** https://www.ibmb.csic.es/en/department-of-cells-and-tissues/epigenetics-and-metabolism/	
Open Researcher and Contributor ID (ORCID) (*)	0000-0001-5277-1550		

(*) Mandatory

A.1. Current position

Position	Ramon y Cajal Group Leader		
Initial date	01/01/2023		
Institution	CSIC		
Department/Centre	Instituto de Biología Molecular de Barcelona (IBMB-CSIC)		
Country	Spain	**Phone number**	+34 635311163
Keywords	Metabolism, Epigenetics, Cancer, Bioinformatics, *C. elegans*		

A.2. Previous positions (research activity interruptions)

Period	**Position/Institution/Country/Cause of the interruption**
2022 (Oct-Dec)	Postdoctoral Researcher Epigenetics and Evolution group (Prof. Peter Sarkies) Department of Biochemistry, University of Oxford, UK
2020-2022	Postdoctoral Researcher Transgenerational Epigenetic Inheritance and Evolution group (Dr. Peter Sarkies) MRC London Institute for Medical Sciences (MRC-LMS), UK
2019 (Jun – Sep)	Paternity leave
2018-2020	Postdoctoral Researcher Genetic Systems group (Prof. Ben Lehner) Centre for Genomic Regulation (CRG) Barcelona, Spain

A.3. Education

PhD, Graduate Degree	**University/Country**	**Year**
PhD in Biomedicine	Universitat Pompeu Fabra, Spain	2013-2018
Research Master (MRes): Plant Biotechnology & Molecular Biology	Imperial College London, UK	2012-2013
BA Biological Sciences	Oxford University, UK	2005-2008

Part B. CV SUMMARY *(max. 5000 characters, including spaces)*

My scientific career has been driven by an interest in **how information is encoded and transferred in biological systems**, ignited during my PhD studies in the Genetic Systems group (Prof. Ben Lehner) at the Centre for Genomic Regulation (CRG) in Barcelona. Working on the problem of **inter-individual physiological variation** using the model nematode worm *Caenorhabditis elegans*, it was clear that much variation in genetically identical individuals raised in the same environment came from **inheritance of information from previous generations**. During my doctoral studies I documented physiological effects on progeny inherited as a result of maternal age (published in **Nature in 2017**), while in a short postdoc in the same lab I described a case of intergenerational inheritance of environmental (specifically social) information (**Current Biology, 2021**).

With a solid background in experimentation, I wanted to broaden my experience and learn computational approaches to biology as I progressed towards independence. In November 2020 I started as a **postdoctoral researcher in bioinformatics** in the Epigenetic Inheritance and Evolution group (Dr Peter Sarkies) in the MRC London Institute of Medical Sciences (MRC-LMS) in the United Kingdom. Initially I tackled the problem of information transfer between mitochondria and nuclei to co-ordinate gene expression, and later I discovered links between histone methylation and metabolism which suggest the **exciting hypothesis that histone methylation plays a metabolic role in humans**. These studies were published in **Genome Biology (2021)** and **PLoS Biology (2023)** respectively, both as **first and co-corresponding author**.

In January 2023 I started at the CSIC Barcelona Molecular Biology Institute (CSIC-IBMB) as a **Ramon y Cajal Group Leader** focussing on epigenetics and metabolism. In the proposed project I expand on my previous work, aiming to investigate how histone methylation regulation is integrated into metabolic networks and how histone methylation may have important direct metabolic roles.

To date I have **6 first author peer-reviewed publications** (4 primary research papers & 2 literature reviews), with **5/6 in Q1/D1 journals** (top quartile & decile of the field), **with 464 citations** and an h-index of 6. I have demonstrated my capacity to lead projects, twice publishing as co-corresponding author. My status as an expert in epigenetic inheritance is demonstrated by my highly cited review article and by peer-review activity for multiple high-impact journals. Throughout my research career I have received **awards for excellence**, including a nomination to and Honorable Mention in the International Birnstiel Awards and the 'Premio Extraordinario' of the Universitat Pompeu Fabra for my doctoral studies. My PhD was funded by a Severo Ochoa FPI fellowship, and most recently I was awarded the Ramon y Cajal and LaCaixa Junior Leader (Retaining) fellowships (the latter declined).

As well as publishing my results in excellent scientific journals, I have attended numerous conferences, both national and international, to present both posters and oral presentations, such as the EMBL EvoChromo meeting in Aarhus, Denmark in 2022. I have also been involved in **disseminating my research to the general public, in local (e.g. Youth Mobile Congress) and international fora (Nature podcast).** I also gave a talk in Spanish on behalf of Prof. Lehner for a **lecture series** organised by the Escola Europea d'Humanitats, writing up my talk as a **book chapter** which was published in the anthology *Deu aportacions catalanes a la ciència actual* (Galàxia Gutenberg, 2020). Overall, I have demonstrated an ability to communicate about my research to both an academic audience and to the general public, in writing and speech and in **both English (my first language) and Spanish (my second language)**.

Part C. RELEVANT MERITS *(sorted by typology)*

Perez, M.F*. & Sarkies. P*. (2023). Histone methyltransferase activity affects metabolism in human cells independently of transcriptional regulation. ***PLoS Biology***, 21(10), e300235. doi: 10.1371/journal.pbio.3002354. *co-corresponding author 1 citation

Wilson, R., Le Bourgeouis, M., **Perez, M.F.** & Sarkies. P. 2023. Fluctuations in chromatin state at regulatory loci occur spontaneously under relaxed selection and are associated with epigenetically inherited variation in *C. elegans* gene expression. ***PLoS Genetics***, 19(3), e1010647. doi: 10.1371/journal.pgen.1010647

6 citations

Perez, M.F*. & Sarkies. P*. 2021. Malignancy and NF-κB signalling strengthen coordination between expression of mitochondrial and nuclear-encoded oxidative phosphorylation genes. ***Genome Biology***, 22(1), p1-24. doi: 10.1186/s13059-021-02541-6. *co-corresponding author 7 citations

Perez, M.F., Shamalnasab, M., Mata-Cabana, A., Olmedo M., Francesconi, M. & Lehner, B. 2021. Neuronal perception of the social environment generates an inherited memory that controls the development and generation time of C. elegans. ***Current Biology***, 31(19), p4256-4268. doi: 10.1016/j.cub.2021.07.03 6 citations

Perez, M.F. & Lehner, B. 2019. Intergenerational and transgenerational epigenetic inheritance in animals. ***Nature Cell Biology***, 21(2), p143-151. doi:10.1038/s41556-018-0242-9 297 citations

Perez, M. F., & Lehner, B. 2019. Vitellogenins-yolk gene function and regulation in Caenorhabditis elegans. ***Frontiers in Physiology***, 10, p1067. doi: 10.3389/fphys.2019.01067 44 citations

Perez, M. F., & Lehner, B. 2019. Per què ens interessa la herència no genètica?. In *Deu aportacions catalanes a la ciència actual*. Editorial: Galaxia Gutenberg, ISBN: 9788417747909

Offenburger, S.L., **Perez, M.F.** & Lehner B. 2018. Memory of ancestral mitochondrial stress. ***Nature Cell Biology.*** 21(3), p303-304. doi: 10.1038/s41556-018-0255-4

Perez, M.F.[+], Francesconi, M.[+], Hidalgo-Carcedo, C. & Lehner, B., 2017. Maternal age generates phenotypic variation in Caenorhabditis elegans. ***Nature***, 552(7683), p106-109. doi: 10.1038/nature25012 [+]joint first author 82 citations

Schumacher, J., Waite, C.J., Bennett, M.H., **Perez, M.F.,** Shethi, K. & Buck, M., 2014. Differential secretome analysis of Pseudomonas syringae pv tomato using gel-free MS proteomics. ***Frontiers in Plant Science***, 5, p242. doi: 10.3389/fpls.2014.00242 21 citations

C.2. Congresses

Conference	Date	Place	Int'l?	Mode	Title	Authors
Metabolism Network meeting (MetNet)	17/10/22-18/10/22	Barcelona, Spain	Yes	Poster* (prize winner)	Histone methylation plays a metabolic role as a methyl sink in humans	MF Perez, P Sarkies
Evolutionary approaches to chromatin biology	11/05/22-14/05/22	Aarhus, Denmark	Yes	Poster	Histone methylation plays a metabolic role as a methyl sink in humans	MF Perez, P Sarkies
EMBO YIP sectoral meeting on Evolution	28/10/21-29/10/21	Virtual / online	Yes	Invited short talk	Are expression of mitochondrial and nuclear genomes co-ordinated?	MF Perez, P Sarkies

VII Spanish Worm Meeting	28/03/19-29/03/19	ICFO, Barcelona, Spain	No	Talk	Phenotypic alterations are inherited as a result of parental pheromone exposure	MF Perez, M Francesconi, B Lehner
Ecology, Evolution and Genomics of C. elegans	05/07/18-07/07/18	Wellcome Genome Campus, Hinxton, UK	Yes	Poster	Males influence hermaphrodite physiology to impact progeny phenotypes	MF Perez, B Lehner
European Worm Meeting	13/06/18-17/06/18	World Trade Centre, Barcelona, Spain	Yes	Poster	Maternal age generates physiological variation in C. elegans	MF Perez, M Francesconi, B Lehner
C. elegans International Meeting	24/06/15-28/06/15	UCLA, Los Angeles, USA	Yes	Poster	Nutrient provisioning to embryos links parental life history to variation in progeny phenotypic outcomes	MF Perez, B Lehner
VI Spanish Worm Meeting	05/05/15-06/05/15	IBFG, Salamanca, Spain	No	Poster	Nutrient provisioning to embryos links parental life history to variation in progeny phenotypic outcomes	MF Perez, B Lehner

C.3. Research projects

Reference	**Project title**	**Financing entity**	**Amount granted**	**Duration**	**Lead Researcher**	**Applicant's Role**
RYC2021-034496-I	Epigenetics, metabolism and DNA repair	Ministerio de Economía y Competitividad	€236350	01/2023 - 12/2027	MF Perez	Lead Researcher
ALD00270 - 0011417	Using evolution to find the sources of DNA damage in cancer	John Fell fund	£51643	05/2022 - 05/2023	P Sarkies	Researcher
MC-A652-5PZ80	Epigenetics and Evolution	UK MRC	£1200000	01/2019 - 01/2024	P Sarkies	Researcher

IR-DC_616434	Individual Robustness in Development and Cancer	European Commission	€1996812	06/2014 - 11/2020	B Lehner	Researcher
SVP-2013-067826_MPerez	Interindividual physiological variation in Caenorhabditis elegans	Ministerio de Economía y Competitividad	€83900	01/2014 - 01/2018	B Lehner	Researcher
BFU2011-26206	The genetics of individuals	Ministerio de Economía y Competitividad	€387200	01/2012 - 12/2015	B Lehner	Researcher