CELL SIGNALING AND APOPTOSIS
MONTSE SOLÉ / JOAN X. COMELLA

PROFILE

MONTSE SOLÉ

Montse Solé obtained her PhD in Neurosciences from the Universitat Autònoma de Barcelona (UAB) in 2009. Immediately after the PhD she started as a postdoc in UAB, and until 2017 she was studying the neurovascular dysfunction present in Alzheimer's disease (AD). Dr. Solé performed a stay in Stanford University (2012) (Ca, USA) to study neurodegeneration associated to stroke in *in vivo* post-stroke dementia models, in the laboratory of Dr. M. Buckwalter. From 2017 to 2020, she was Postdoctoral researcher at the Neurovascular Research group at Vall d'Hebron Institute of Research (VHIR) of Hospital Vall d'Hebron (Barcelona, Spain), with Dr. M. Hernández-Guillamon. There, she studied the protective effect of apolipoproteins in neurodegeneration, and worked with different AD mouse models. During this time, she also performed a short stay (3 months) at the Blood-Brain Barrier laboratory of Dr. F. Gosselet at Faculté des Sciences Jean Perrín, Université d'Artois, (Lens, France) to learn novel *in vitro* blood-brain barrier models. From 2019, Dr. Solé became Adjunct Professor at the Department of Biochemistry and Molecular Biology of UAB, teaching on basic Biochemistry and Molecular Biology to Medicine students. Then, in 2020 she joined Dr. Joan Comella group at VHIR as Senior Researcher, where she started investigating the neurodegenerative process at the molecular level. From 2023, Dr. Solé is a Ramon y Cajal researcher at UAB, where she is starting her independent career, focused in the study of neurovascular system degeneration in different models of neurodegenerative diseases, including AD. In particular, she is interested in elucidating the role of the vascular system in the onset and progression of neurodegeneration, as well as that associated to tau pathology. During her trajectory she has so far co-directed 3

doctoral thesis (plus 2 ongoing), 5 master students (plus 2 ongoing), and several undergraduate and technicians students. She has participated in 36 scientific publications in international journals in the fields of neuroscience and molecular and cellular biology, 6 as first author and 7 as corresponding author, with more than 800 citations and an H index of 16.

ORCID: 0000-0003-4240-6562 R
Researcher ID: D-1133-2011

JOAN X. COMELLA

Joan X Comella holds a degree in Medicine and Surgery and a PhD in Neuroscience (Medicine and Surgery) from the University of Barcelona. He is currently Professor of Cellular Biology at the Universitat Autònoma (on leave for special services), and since September 2009 to September 2022 was Director General of the Vall d'Hebron Hospital Research Institute (VHIR). At present, and since October 1st 2022, he is Director of Research, Innovation and Knowledge Management at Sant Joan de Déu Hospital (HSJD) in Barcelona. Dr Comella started his professional career as an independent researcher in 1991 at the University of Lleida, creating the Cellular Signaling and Apoptosis Research Group. Currently, he continues investigating the molecular mechanisms that regulate neuronal survival in order to understand the development of diseases such as Alzheimer's disease, spinal muscular atrophy, retinal diseases and other neurodegenerative pathologies. Since 2007, his group is part of the CIBERNED Spanish network for the study of neurodegenerative diseases. He has developed more than 25 competitive projects as IP, including several EU funded projects. He has published so far 116 articles (November 2022) in international journals in the fields of molecular and cell biology and neuroscience, with more than 8000 citations and an H index of 51.

In the field of management, his activity includes Vice Chancellor for Research at the University of Lleida (1995-2000), Director of the Agencia Nacional de Evaluación y Prospectiva (ANEP) (2004-2005), General Director of the Fundación Española de Ciencia y Tecnología (FECYT) (2005-2006) and General Director of the Fundació Catalana para la Investigación e Innovacion (FCRI) (2007-2009), as well as having served as the national director of EATRIS (2020-2022).

ORCID: 0000-0002-6218-0786
Researcher ID: D-7333-2012

RESEARCH

RESEARCH INTERESTS

Our work is mainly focused in the study of neurodegeneration in order better understand this extremely difficult process and help finding new treatments that can ameliorate the suffering of patients afflicted by these diseases, especially Alzheimer's disease. One of our aims is to characterize the neurodegenerative process at the molecular level, in order to find new therapeutic targets to prevent neuronal cell death. In this regard, we have been focused in the last years in the study of the physiological and pathological roles of the anti-apoptotic neuronal protein and death receptor antagonist, FAIM-L. We have evidenced its interaction in neurons with XIAP and Siva-1, confirming that FAIM-L is involved in neuronal plasticity processes through stabilization of XIAP and modulating caspases activity. These results, added to our finding that FAIM-L controls neuroinflammation in Alzheimer's disease (AD), allows positioning FAIM-L as an interesting target for the treatment of the disease. We have also demonstrated post-transcriptional regulation of faim gene by miRNAs altered in AD. In addition, we have completed the characterization of the *in vivo* faim knockout model, which has a surprising link with retinopathy. In particular, we have discovered that FAIM, with the two isoforms L and S, is abundantly expressed in retinal tissue, and that its absence in this tissue results in an elevated sensitivity to neurodegeneration, and in a dark adaptation delay, characteristic of several retinal pathologies. We are further characterizing the interaction of FAIM-L with other relevant proteins for neurodegeneration, and its role in human diabetic retinopathy. We are also developing

tools to characterize FAIM-L expression and modulating its levels in different animal models of AD.

STRATEGIC OBJECTIVES

To advance in the knowledge of neurodegenerative diseases from the most basic science, through pre-clinical models, with the objective of finding novel therapeutic targets that can help generating potential therapeutic treatments to prevent or stop these pathologies.

To collaborate with public and private entities with the objective of applying our research to a more translational field, by directly studying human samples or transferring our research and tools to advance in the generation of novel therapies.

MAIN RESEARCH LINES

Study of the physiological and pathological roles of a neuron-specific protein, FAIM-L, in Alzheimer's disease (AD) and in the neurodegeneration associated to diabetic complications.

Study of the role of FAIM in the physiopathology of the retinal tissue.

Role of TNF in cell survival and differentiation, in opposition to its role in apoptosis.

Generation and characterization of transgenic animals overexpressing death receptor antagonists (FAIM, Lifeguard) in the nervous system.

LAB FEATURED PUBLICATIONS

Coccia E, Solé M, Comella JX. "FAIM-L – SIVA-1: two modulators of XIAP in non-apoptotic caspase function" Front Cell Dev Biol (2022) 9:826037. (Review). doi: 10.3389/fcell.2021.826037.

Sirés A & Turch-Anguera M, Bogdanov P, Sampedro J, Ramos H, Ruíz A, Huo J, Xu S, Lam KP, López-Soriano J, Pérez-García MJ, Hernández C, Simó R, Solé M*, Comella JX*. (* Corresponding authors). "Faim knockout leads to gliosis and late-onset neurodegeneration of photoreceptors in the mouse retina" J Neurosci Res (2021) 99(12): 3103-3120. doi: 10.1002/jnr.24978.

Sansa A, de la Fuente S, Comella JX, Garcera A & Soler RM. 2021. Intracellular pathways involved in cell survival are deregulated inmouse and human Spinal Muscular Atrophy motoneurons. Neurobiol Dis. 155:105366.

Coccia E, Masanas M, López-Soriano J, Segura MF, Comella JX & Pérez-García MJ. 2020. FAIM is regulated by miR-206, miR-1-3p and miR-133b. Front Cell Dev Biol. 8:584606.

Coccia E, Planells-Ferrer L, Badillos-Rodríguez R, Pascual M, Segura MF, Fernández-Hernández R, López-Soriano J, Garí E, Soriano E, Barneda-Zahonero B, Moubarak RS, Pérez-García MJ, Comella JX. 2020.SIVA-1 regulates apoptosis and synaptic function by modulating XIAP interaction with the death receptor antagonist FAIM-L. Cell Death Dis. 11(2):82.

Sáez ME, González-Pérez A, Hernández-Olasagarre B, Beà A, Moreno-Grau S, de Rojas I, Monté-Rubio G, Orellana A, Valero S, Comella JX, Sanchís D & Ruiz A. 2019. Genome Wide Meta-Analysis identifies common genetic signatures shared by heart function and Alzheimer's disease. Sci Rep. 9:16665.