

Researcher

First and Family name	Nadine JAGEROVIC	
Researcher numbers	Researcher ID	G-5372-2015
	Orcid code	0000-0003-2642-6969

Current position

Name of University/Institution	Spanish Research Council (Agencia Estatal Consejo Superior de Investigaciones Científicas)
Department	Medicinal Chemistry Institute
Current position	Research Scientist
Palabras clave	Medicinal chemistry; Cannabinoid; GPCR; organic synthesis

JCR articles, h Index, thesis supervised...

- a) Six-year period of research: 5 (last: 2014-19) + Six-year period of transfer: 1 (2013-18)
- b) Supervised PhD thesis: 5 + 2 PhD thesis on going (2021)
- c) Total number of citations: 2,325 (2,170 citations without own citations)
- d) Average number of citations/year during the last 5 years: 125
- e) Total number of publications in the first quartile (Q1): 42 [from which 16 first decile (D1)]
- f) h-index: 27 (Web of Science),
- g) 120 total publications (Web of knowledge); 15 patents (3 currently in national phase applications in different countries, 1 licensed to a biotechnology).

CV SUMMARY

Dr. Jagerovic defended her Ph.D. thesis at the University of Burgundy (France) in 1990. Then she worked as a Research Assistant at the University of California Davis (USA) during two years until she joined the Medicinal Chemistry Institute (Madrid, Spain), with a Marie Curie Fellowship in the program "Human Capital and Mobility", where she was later appointed with a permanent position in 1999. Dr. Jagerovic was technical vice-director of her Institute (IQM) (2015-2019).

Over the last 15 years, her scientific interests are focused on the discovery of modulators of G protein-coupled receptors related to the endocannabinoid system. Her ongoing research support comes from a grant from the Spanish Ministry (RTI2018-095544-B-I00), from the US National Institute of Health (NIH, R01DA045698), and from a biotechnological company (Emerald Health). She has a solid track record in publishing in high impact peer-reviewed journals. Her know-how in technology transfer allowed her to recently license a patent and sign a research contract with a biotech company. She is the director of 5 PhD theses and she currently co-supervises 2 PhD theses. She usually receives national and foreign personnel in training. She very much believes in multi-disciplinary and across institutional collaborative research.

RELEVANT MERITS

Publications (including books) (5 last years)

Full list of publications:

https://www.ncbi.nlm.nih.gov/myncbi/1N_4iyvJMfQAF/bibliography/public/ (08/17/2021)

Rubén Tovar, Ana Luisa Gavito, Antonio Vargas, Laura Soverchia, Laura Hernandez-Folgado, Nadine Jagerovic, Elena Baixeras, Roberto Ciccocioppo, Fernando Rodriguez de Fonseca *, Juan Decara *. Palmitoleoylethanolamide is an efficient anti-obesity endogenous compound: comparison with Oleylethanolamide in Diet-Induced Obesity. *Nutrients* **2021**, 13: 2589. Impact factor: **Q1** (5.1). DOI: 10.3390/nu13082589

Lago-Fernandez A, Zarzo-Arias S, Jagerovic N, Morales P. Relevance of Peroxisome Proliferator Activated Receptors in Multitarget Paradigm Associated with the Endocannabinoid System. *Int J Mol Sci.* **2021**;22(3):1001. Impact factor: **Q1**. DOI: 10.3390/ijms22031001

Morales P,* Jagerovic N.* Synthetic and Natural Derivatives of Cannabidiol. In: Monti J, Pandi-Perumal S, Murillo-Rodríguez E, editors. *Cannabinoids and Sleep advances in Experimental Medicine and Biology* [Internet]. Springer, Cham; **2021**. p. vol 1297. ISBN: 978-3-030-61662-5. DOI: 10.1007/978-3-030-61663-2_2

Jon Arrizabalaga, Francisco Ferrandiz, Rosario González Múñiz, Óscar Herreras, Nadine Jagerovic, Ana Gomis García, Agustín Serrano de Haro, Rafael Serrano, Félix Viana de la Iglesia. Coordinator Javier Moscoso. Chapter "Pain and suffering" in the White Book of CSIC "Challenges in Biomedicine & Health."; **2021**. ISBN: 978-84-00-10745-1. http://libros.csic.es/product_info.php?products_id=1472.

Discovery of Homobivalent Bitopic Ligands of the Cannabinoid CB2 Receptor

P. Morales, G. Navarro, M. Gómez-Autet, J. Fernandez-ruiz, L. Perez-benito, A. Cordomi, L. Pardo, R. Franco, N. Jagerovic

Chem. - A Eur. J. **2020** 26(68):15839-15842. Impact factor: **Q1**. DOI: 10.1002/chem.202003389.

Therapeutic Exploitation of GPR18: Beyond the Cannabinoids?

P. Morales, A. Lago-fernandez, D.P. Hurst, N. Sotudeh, E. Brailoiu, P.H. Reggio, M.E. Abood, N. Jagerovic
J. Med. Chem. **2020**, 63, 14216–14227. Impact factor: **D1**. DOI:10.1021/acs.jmedchem.0c00926

Novel approaches and current challenges with targeting the endocannabinoid system

P. Morales, N. Jagerovic

Expert Opin. Drug Discov. **2020**, 15, 917–930. Impact factor: **Q1**. DOI:10.1080/17460441.2020.1752178.

Antitumor Cannabinoid Chemotypes: Structural Insights

Morales, P.; Jagerovic, N.

Frontiers in Pharmacology **2019**, 10, Article 621. Impact factor: 4.40 **Q1**(33/257). DOI: 10.3389/fphar.2019.00621

Increased expression of cannabinoid CB2 and serotonin 5-HT1A heteroreceptor complexes in a model of newborn hypoxic-ischemic brain damage.

Franco, Rafael; Villa, María; Morales, Paula; Reyes-Resina, Irene; Gutiérrez-Rodríguez, Ana; Jiménez, Jasmina; Jagerovic, Nadine; Martínez-Orgado, José; Navarro, Gemma.

Neuropharmacology **2019**: 152: 58-66. Impact factor: 4.25 **Q1** (35/261). DOI: 10.1016/j.neuropharm.2019.02.004

The Chromenopyrazole Scaffold in the Modulation of the Endocannabinoid System: A Broad Therapeutic Prospect.

Morales, P.; Goya, P.; Jagerovic, N.

An. la Real Acad. Nac. Farm. **2018**, 84 (2), 164–184.

Cannabidiol skews biased agonism at cannabinoid CB1 and CB2 receptors with smaller effect in CB1-CB2 heteroreceptor complexes

Navarro, Gemma; Reyes-Resina, Irene; Rivas-Santisteban, Rafael; Sánchez de Medina, Verónica; Morales, Paula; Casano, Salvatore; Ferreiro-Vera, Carlos; Lillo, Alejandro; Aguinaga, David; Jagerovic, Nadine; Nadal, Xavier; Franco, Rafael.

Biochemical Pharmacology. **2018**: 157: 148-158. Impact factor: 4.23 **Q1** (36/261). DOI: 10.1016/j.bcp.2018.08.046

Emerging strategies targeting CB2 cannabinoid receptor: Biased agonism and allosterism

Morales, Paula; Goya, Pilar; Jagerovic, Nadine

Biochemical Pharmacology. **2018**: 157: 8-17. Impact factor: 4.23 **Q1** (36/261). DOI: 10.1016/j.bcp.2018.07.031

An Overview on Medicinal Chemistry of Synthetic and Natural Derivatives of Cannabidiol

Authors(s): Morales, Paula; Reggio, Patricia H.; Jagerovic, Nadine

Frontiers in Pharmacology. **2017**: 8: 1-18. Impact factor: 4.40 **Q1** (33/257). DOI: 10.3389/fphar.2017.00422

Top 5% most viewed and downloaded articles in the 2nd quarter of 2017 of Frontier in Pharmacology (Q1).

New Methods for the Synthesis of Cannabidiol Derivatives

Lago-Fernandez, Ana; Redondo, Vanessa; Hernandez-Folgado, Laura; Figuerola-Asencio, Laura; Jagerovic, Nadine

Methods in Enzymology. Cannabinoids and Their Receptors **2017**: 237-257

(Eds.). Elsevier Inc. ISBN: 978-0-12-811846-7. DOI: 10.1016/bs.mie.2017.05.006

Synthesis of a novel CB 2 cannabinoid-porphyrin conjugate based on an antitumor chromenopyrazoledione

Morales, Paula; Moreno, Laura; Fernández-ruiz, Javier; Jagerovic, Nadine

Journal of Porphyrins and Phthalocyanines. **2017**: 21: 1-10. Impact factor: 1.4 **Q3**. DOI: 10.1142/S1088424617500092

Chromenopyrazole, a Versatile Cannabinoid Scaffold with in Vivo Activity in a Model of Multiple Sclerosis

P. Morales, M. Gómez-Cañás, G. Navarro, D.P. Hurst, F.J. Carrillo-Salinas, L. Lagartera, R. Pazos, P. Goya, P.H. Reggio, C. Guaza, R. Franco, J. Fernández-Ruiz, N. Jagerovic

Journal of Medicinal Chemistry **2016**: 59 6753-6771. Impact factor: 5.6 Q1 (3/60) **D1**. DOI:10.1021/acs.jmedchem.6b00397

Allosteric Modulators of the CB 1 Cannabinoid Receptor : A Structural Update Review

P. Morales, P. Goya, N. Jagerovic, L. Hernandez-Folgado

Cannabis Cannabinoid Res. **2016**: 1 22-30. Impact factor: 5.8 Q1 .

The fourth highest cited article of Cannabis and Cannabinoid Research (08/16/18).

Identification of Novel GPR55 Modulators Using Cell-Impedance-Based Label-Free Technology

P. Morales, L.S. Whyte, R. Chicharro, M. Gómez-Cañás, M.R. Pazos, P. Goya, A.J. Irving, J. Fernandez-Ruiz, R.A. Ross, N. Jagerovic

Journal of Medicinal Chemistry **2016**: 59 1840-1853. Impact factor: 5.6 Q1 (3/60) **D1**. DOI:10.1021/acs.jmedchem.5b01331

Antichagasic and trichomonacidal activity of 1-substituted 2-benzyl-5-nitroindazolin-3-ones and 3-alkoxy-2-benzyl-5-nitro-2H-indazoles

C. Fonseca-Berzal, A. Ibáñez-Escribano, F. Reviriego, J. Cumella, P. Morales, N. Jagerovic, J.J. Nogal-Ruiz, J.A. Escario, P.B. da Silva, M. de N.C. Soeiro, A. Gómez-Barrio, V.J. Arán

Eur. J. Med. Chem. **2016**: 115 295-310. Impact factor: 4.0 Q1(4/60) **D1**. DOI:10.1016/j.ejmech.2016.03.036.

Biological characterization of PM226, a chromenoisoxazole, as a selective CB2 receptor agonist with neuroprotective profile

M. Gómez-Cañás, P. Morales, L. García-Toscano, C. Navarrete, E. Muñoz, N. Jagerovic, J. Fernández-Ruiz, M. García-Arencibia, M.R. Pazos

Pharmacol. Res. **2016**: 110 205-215.. Impact factor: 4.8 **Q1**(31/257). DOI: 10.1016/j.phrs.2016.03.021

Exploring the Benzimidazole Ring as a Substitution for Indole in Cannabinoid Allosteric Modulators

L. Hernandez-Folgado, L.A. Stevenson, P. Morales, M. Gomez-Cañas, R. Pazos, M.G. Cascio, N. Jagerovic, J. Elguero, P. Goya

Cannabis Cannabinoid Res. **2016**: 1 196-200 . Impact factor: new journal. DOI:10.1089/can.2016.0003

Benzyl-1,2,4-triazoles as CB1 Cannabinoid Receptor Ligands: Preparation and In Vitro Pharmacological Evaluation

L. Hernandez-folgado, J. Decara, F.R. De Fonseca, P. Goya, N. Jagerovic

Int. J. Med. Chem. **2016**: 1257098. Impact factor: new journal. DOI: 10.1155/2016/1257098

A critical review of both the synthesis approach and the receptor profile of the 8-chloro-1-(2',4'-dichlorophenyl)-N-piperidin-1-yl-1,4,5,6-tetrahydrobenzo[6,7]cyclohepta[1,2-c]pyrazole-3-carboxamide and analogue derivatives

Authors(s): P. Lazzari, R. Distinto, I. Manca, G. Baillie, G. Murineddu, M. Pira, M. Falzoi, M. Sani, P. Morales, R. Ross, M. Zanda, N. Jagerovic, G.A. Pinna

Eu. J. Med. Chem. **2016**: 121 194-208. Impact factor: 4.0 Q1(4/60) **D1**. DOI:10.1016/j.ejmech.2016.05.011

Cannabinoid receptor 2 (CB2) agonists and antagonists: a patent update

P. Morales, L. Hernandez-Folgado, P. Goya, N. Jagerovic

Expert Opin. Ther. Pat. **2016**: 26 843-856. Impact factor: 4.6 **Q1**. DOI: 10.1080/13543776.2016.1193157

Advances towards the Discovery of GPR55 Ligands

P. Morales, N. Jagerovic

Curr. Med. Chem. **2016**: 23 2087-2100. Impact factor: 3.5 **Q1** (Medicinal Chemistry). DOI: 10.2174/0929867323666160425113836

Targeting Cannabinoid CB2 Receptors in the Central Nervous System. Medicinal Chemistry Approaches with Focus on Neurodegenerative Disorders

G. Navarro, P. Morales, C. Rodríguez-Cueto, J. Fernández-Ruiz, N. Jagerovic, R. Franco

Front. Neurosci. **2016**: 10 1-11. Impact factor: 3.4 **Q2**. DOI: 10.3389/fnins.2016.00406

Research projects and grants. Selection. (6 last years)

Molecular Determinants for GPR55 Activity.

US National Institute of Health (NIH). R01 DA045698-01.

05/15/2018-05/14/2023

Participation: Spain Principal Investigator N. Jagerovic

Fighting chronic diseases with new therapeutic approaches to modulate the endocannabinoid system. **Spanish Ministry MICINN**. RTI2018-095544-B-I00.

01/2019-12/2021.

Principal Investigator: N. Jagerovic and co-IP A. Castro.

Allosteric modulation of the CB2 cannabinoid receptor (CSIC; University of Aberdeen (UK); University of North Carolina (USA)

I-LINK1242 from the CSIC Programme i-Link+2017.

01/01/2018-01/12/2019.

Participation: Principal Investigator

Targeting CB2 receptors, PPAR, GPR55, and GPR18 with new designed chemical entities.

Spanish Ministry MINECO. SAF2015-68580-C2-2-R.

01/2016-12/2018

Participation: Principal Investigator.

Neuropharmacology of the endocannabinoid system: from the lab to the clinic (CANNAB)

R&D Programs between 14 groups of the Comunidad Autónoma de Madrid. S2011/BMD-2308 [01/01/2012-12/31/2015]

01/2012-12/2016

Participation: co-Investigator (Coordinator: Manuel Guzmán (UCM))

Grupo Multidisciplinar de Investigación y Tratamiento del Dolor la Universidad Rey Juan Carlos DOLEX. Ayudas a Grupos de Excelencia Investigadora URJC-Banco de Santander. 2015-2017 (7325.13 euros). PI: Prof. Carlos Coicoechea (URJC)

Contracts

Synthesis of a library of heterocycles for biological activity.

Emerald Health (VivaCell Biotechnology).

01/2018-04/2020

Participation: Principal Investigator.

Patents (6 last years)

Dr. Jagerovic is co-titular of 14 international patents (3 national phase patent applications in different countries; one licensed to a biotechnology).

- Patent: EP20382324

Inventors: Nadine Jagerovic, Ana Lago-Fernandez, Paula Morales, Mary E. Abood, Eugen Brailoiu, Luciana M. Leo, Pingwei Zhao, Patricia H. Reggio. Dow P. Hurst, Noori Chafi

Title: Pyrazolylbenzene-1,3-diols for Diseases Associated with G Protein-coupled Receptor 18 and in Combination with Transient Receptor Potential Vanilloid 1

Assignees: Consejo Superior de Investigaciones Cientificas, Temple University, University of North Carolina Greensboro. Priority date: 21April2020

- Patent: WO2017/178515; EP20160382165

Inventors: A. Torrens, N Jagerovic, C. Almansa

Title: Piperidinylalkylamide derivatives having multimodal activity against pain

Assignee: Esteve Lab SL. Priority Date: 2016-04-12

- Patent: WO2016/177922; ESP201530608; PCT/ES2016/070314; EP3305794; CN107735397; AU2016257025; CA2985021; KR20180002717; IL255420; IN201717041490; JP2018515499; US20180201620; BR112017023834; MX2017014145; RU2017138563

Inventors: N Jagerovic, P Morales Lazaro, R Ross, L Whyte

Title: Moduladores selectivos de la actividad del receptor GPR55: derivados de cromenopirazol

Assignee: CSIC; University of Toronto. Priority Date: 2015-05-05

Licensed to Emerald Health dic2017

- Patent: WO2015140377; ES P201430372 ; PCT/ES2015/070184

Inventors: N Jagerovic, P Morales Lazaro, P Goya Laza, S Blasco Benito, C M Sánchez García, M Gómez Cañas, J Fernández Ruiz

Title: Nuevas cromenoquinonas moduladoras de receptores cannabinoides CB2 con actividad antitumoral

Assignee: CSIC; UCM. Priority Date: 2014-03-18

PhD. Students. (6 last years)

-2 PhD on going (2020, 2021) *Laura Figuerola Asencio and Ana Lago Fernández*

-PhD student: Paula Morales Lazaro. December 18, 2015. "Exploring the chromenopyrazole scaffold for the modulation of the endocannabinoid system". Universidad Autónoma de Madrid. Currently "Juan de la Cierva" fellowship at Rocasolano Institute.

Awards

Research award from Real Academia Nacional de Farmacia - Colegio Oficial de Farmacéuticos de Madrid 2017 for the work: "The Chromenopyrazole Scaffold in the Modulation of the Endocannabinoid System: A Broad Therapeutic Prospect" from authors: P. Morales; P. Goya; N. Jagerovic.

Research award from Fundación Dr. Antonio Esteve (2017): honorific mention for the best research article of 2016-2017 "J. Med. Chem. 2016, 59, 6753-6771."

Institutional responsibilities

2015-2019. Technical Vice-Director of her Institute (IQM, CSIC).

2005-onwards. Responsible for Scientific Outreach of her Institute (IQM, CSIC).

Scientific outreach. Selection

- Interview **GacetaMédica.com**, July, 17. 2015. <http://www.gacetamedica.com/noticias-medicina/2015-07-17/especializada/una-quinona-cannabinoide-eficaz-en-cmtm-en-ensayos-preclnicos/pagina.aspx?idart=924444>.

- Interview **RTVE-Radio3 Canal-UNED**, July, 2. 2017. <https://canal.uned.es/mmobj/index/id/54633>