

# Raúl R. Cruces

*PhD in Science, Medical Degree*

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## PERSONAL INFORMATION

Work address Neuro - Montreal Neurological Institute and Hospital, 3801 University Street, WB-2014B, Montreal, QC H3A2B4, Canada

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ORCID [0000-0002-2917-1212](https://orcid.org/0000-0002-2917-1212)

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## CURRENT POSITION

2019–present **Postdoctoral researcher**, *MICA lab, Montreal Neurological Institute and Hospital, McGill University, Canada.*

Lab head: Boris Bernhardt PhD

## EDUCATION

2014–2019 **PhD Program in Biomedical Sciences, *Graduated with Honors***,  
*National Autonomous University of Mexico UNAM, Institute of Neurobiology, Campus Juriquilla, Queretaro, Mexico.*

**Project:** Cognitive performance and brain connectivity abnormalities in temporal lobe epilepsy. Thesis doi: [RG.2.2.31090.04801](https://doi.org/10.21203/rs.3.rs-10900480/v1)

Advisor: Luis Concha PhD

2006–2014 **Medical School, Surgeon Physician Degree, *Laurate Recognition***,  
*Department of Medicine and Nutrition, León, Guanajuato, Mexico. FAIMER school ID: F0001877.*

**Project:** GABAergic modulation of synaptic transmission and differential transmission in superior cervical ganglia. Thesis doi: [RG.2.2.13111.88481](https://doi.org/10.21203/rs.3.rs-1311188481/v1)

Advisor: Miguel A. Morales PhD

2007 **Diploma of History and Philosophy of Medicine**,  
*College of History and Philosophy of Medicine, Universidad de Guanajuato, Department of Medicine and Nutrition, Leon, Guanajuato. Mexico.*

## PUBLICATIONS, H-Index: 11, Citations: 514

Rodríguez-Cruces R, Royer J, Larivière S, Bassett DS, Caciagli L, Bernhardt BC. (2022). **Multimodal connectome biomarkers of cognitive and affective dysfunction in the common epilepsies**. Network Neuroscience (In press)

Preprint available at PsyArXiv: [osf.io/edbax](https://osf.io/edbax)

Park B, Larivière S, Rodríguez-Cruces R, Royer J, Tavakol S, Wang Y, et al. (2021). **Topographic divergence of atypical cortical asymmetry and atrophy patterns in temporal lobe epilepsy**; Brain, awab417.

doi: [10.1093/brain/awab417](https://doi.org/10.1093/brain/awab417)

Park B, Bethlehem RAI, Paquola C, Larivière S, Rodríguez-Cruces R, Vos de Wael R, Neuroscience in Psychiatry Network (NSPN) Consortium, Bullmore ET, Bernhardt B. (2021). **An expanding manifold characterizes adolescent reconfiguration of structural connectome organization**; Elife, 10, e64694.

doi: [eLife.64694](https://doi.org/10.1101/64694)

Manno FA, Rodríguez-Cruces R, Kumar R, Ratnanather JT, Lau C. (2021). **Hearing loss impacts gray and white matter across the lifespan: Systematic review, meta-analysis and meta-regression**; NeuroImage 000 117826.

doi: [j.neuroimage.2021.117826](https://doi.org/10.1006/j.neuroimage.2021.117826)

Gleichgerricht E, Munsell BC, Alhusaini S, Alvim MKM, Bargalló N, ... Rodríguez-Cruces R..., Wiest R. (2021). **Artificial intelligence for classification of temporal lobe epilepsy with ROI-level MRI data: A worldwide ENIGMA-Epilepsy study**; NeuroImage: Clinical 31, 102765.

doi: [j.nicl.2021.102765](https://doi.org/10.1016/j.nicl.2021.102765)

Park B, Vos de Wael R, Paquola C, Larivière S, Benkarim O, Royer J, Tavakol S, Rodríguez-Cruces R, Li Q, Valk SL, Margulies DS, Mišić B, Bzdok D, Smallwood J, Bernhardt B. (2021). **Signal diffusion along connectome gradients and inter-hub routing differentially contribute to dynamic human brain function**; Neuroimage. 224 117429.

doi: [j.neuroimage.2020.117429](https://doi.org/10.1016/j.neuroimage.2020.117429)

Altmann A, Ryten M, Di Nunzio M, Ravizza T, Tolomeo D, Reynolds RH, ... Rodríguez-Cruces R..., Sisodiya SM. (2021). **A systems level analysis highlights microglial activation as a modifying factor in common epilepsies**; Neuropathology and applied neurobiology.

doi: [nan.12758](https://doi.org/10.1016/j.nan.2021.12758)

Garcia Santos RA, Arauz A, Valdés-Galván RE, Rodríguez-Cruces R. (2020). **Prognosis on Admission of Aneurysmal Subarachnoid Hemorrhage (PAASH) scale validation in Mexican Population (2795)**; Neurology, April 14, 2020; 94 (15 Supplement).

link: [neurology.94.15.2795](https://doi.org/10.1212/NEO.0000000000000795)

Casey Paquola C, Seidlitz J, Oualid Benkarim O, Royer J, Klimes P, Bethlehem RAI, Larivière S, Vos de Wael R, Raul Rodríguez-Cruces R, Hall JA, Frauscher B, Smallwood J, Bernhardt BC. (2020). **A multi-scale cortical wiring space links cellular architecture and functional dynamics in**

*the human brain*; *PLOS Biology* 18(11): e3000979.

doi: [journal.pbio.3000979](https://doi.org/10.1371/journal.pbio.3000979)

Sisodiya SM, Whelan CD, Hatton SN, **Rodríguez-Cruces R** ... , Weber B, Clarissa Lin Yasuda CL, Zhang J, Thompson PM, McDonald C. (2020). ***The ENIGMA-Epilepsy working group: mapping disease from large datasets***; *Human Brain Mapping*, 2020 1–16.

doi: [hbm.25037](https://doi.org/10.1002/hbm.25037)

Weng Y, Larivière S, Caciagli L, Vos de Wael R, **Rodríguez-Cruces R**, Royer J, Bernasconi A, Bernasconi N, Yeo T, Xu Q, Zhang Z, Bernhardt B. (2020). ***Macroscopic and microcircuit disorganization of focal and generalized human epilepsies***. *Commun Biol* 3, 244.

doi: [s42003-020-0958-5](https://doi.org/10.1038/s42003-020-0958-5)

Larivière S, **Rodríguez-Cruces R**, Royer J, Caligiuri ME, Gambardella A, Concha L, Keller SS, Cendes F, Yasuda C, Bonilha L, Gleichgerrcht E, Focke NK, Domin M, von Podewills F, Langner S, Rummel C, Wiest R, Martin P, Kotikalapudi R, O'Brien TJ, Sinclair B, Vivash L, Desmond PM, Alhusaini S, Doherty CP, Cavalleri GL, Delanty N, Kälviäinen R, Jackson GD, Kowalczyk, Mascalchi M, Semmelroch M, Thomas RH, Soltanian-Zadeh H, Davoodi-Bojd E, Zhang J, Lenge M, Guerrini R, Bartolini E, Hamandi K, Foley S, Weber B, Depondt C, Absil J, Carr SJA, Abela E, Richardson MP, Devinsky O, Severino M, Striano P, Tortora Domenico, Hatton SN, Vos SB, Duncan J, Whelan C, Thompson P, Sisodiya S, Bernasconi A, Labate A, McDonald C, Bernasconi N, Bernhardt B. (2020). ***Network-based atrophy modeling in the common epilepsies: A worldwide ENIGMA study***; *Science advances*, 6(47), eabc6457.

doi: [10.1126/sciadv.abc6457](https://doi.org/10.1126/sciadv.abc6457)

Hatton SN, Huynh KH, Bonilha L, Abela E, Alhusaini S, Altmann AN, ...**Rodríguez-Cruces R**... & Bender B. (2020). ***White matter abnormalities across different epilepsy syndromes in adults: an ENIGMA Epilepsy study***; *Brain* 143; 2454–2473.

doi: [brain/awaa200](https://doi.org/10.1093/brain/awaa200)

**Rodríguez-Cruces R**, Bernhardt BC, Concha L. (2020). ***Multidimensional associations between cognition and connectome organization in temporal lobe epilepsy***; *Neuroimage*, 213, 116706.

doi: [j.neuroimage.2020.116706](https://doi.org/10.1016/j.neuroimage.2020.116706)

Martínez L, **Rodríguez-Cruces R**, Cifuentes F, Morales M. (2020). ***Long-term potentiation is differentially expressed in rostral and caudal neurons in the superior cervical ganglion of normal and hypertensive rats***; *Autonomic Neuroscience: Basic and Clinical*.

doi: [j.autneu.2020.102641](https://doi.org/10.1016/j.autneu.2020.102641)

Khan MS, **Rodríguez-Cruces R**, Cheng SH, Lau C. (2020). ***Glymphatic clearance of simulated silicon dispersion in mouse brain analyzed by laser induced breakdown spectroscopy***; *Heliyon* (6) e03702.

doi: [j.heliyon.2020.e03702](https://doi.org/10.1016/j.heliyon.2020.e03702)

Manno FA, **Rodríguez-Cruces R**, Lau C, & Barrios FA. (2019). ***Uncertain Emotion Discrimination Differences Between Musicians and Non-musicians Is Determined by Fine Structure***

**Association: Hilbert Transform Psychophysics**; Frontiers in Neuroscience, 13, 902.

doi: [fnins.2019.00902](https://doi.org/10.3389/fnins.2019.00902)

Whelan CD, Altmann A, Botía JA, Jahanshad N, Hibar DP, Absil J,... **Rodríguez-Cruces R** ... & Bergo FP. (2018). **Structural brain abnormalities in the common epilepsies assessed in a worldwide ENIGMA study**; Brain, 141(2), 391-408.

doi: [brain/awx341](https://doi.org/10.1093/brain/awx341)

**Rodríguez-Cruces R**, Velázquez-Pérez L, Rodríguez-Leyva I, Velasco AL, Trejo-Martínez D, Barragán-Campos HM, Camacho-Tellez V, Concha L. (2018). **Association of white matter diffusion characteristics and cognitive deficits in temporal lobe epilepsy**; Epilepsy & Behavior, 2018, 79, 138-145.

doi: [j.yebeh.2017.11.040](https://doi.org/10.1016/j.yebeh.2017.11.040)

Elinos D, **Rodríguez-Cruces R**, Martínez LA, Zetina ME, Cifuentes F and Morales MA. (2016). **Segregation of Acetylcholine and GABA in the Rat Superior Cervical Ganglia: Functional Correlation**; Frontiers in Cellular Neuroscience, April 2016, Vol.10, Pag.1-1.

doi: [fncel.2016.00091](https://doi.org/10.3389/fncel.2016.00091)

**Rodríguez-Cruces R**, Concha L. (2015). **White matter in temporal lobe epilepsy: clinico-pathological correlates of water diffusion abnormalities**; Quantitative Imaging in Medicine and Surgery, April 2015, Vol 5, No 2.

doi: [j.issn.2223-4292.2015.02.06](https://doi.org/10.1186/j.issn.2223-4292.2015.02.06)

## **PUBLICATIONS SUBMITTED AND PRE-PRINTS**

**Rodríguez-Cruces R**, Royer J, Herholz P, Larivière S, Vos de Wael R, Paquola C, Benkarim O, Park B, Degré-Pelletier J, Nelson M, DeKraker J, Tardif C, Poline JB, Concha L, Bernhardt B. (2022). **Micapipe: a pipeline for multimodal neuroimaging and connectome analysis** bioRxiv/2022/478189

Preprint available at: [10.1101/2022.01.31.478189](https://doi.org/10.1101/2022.01.31.478189)

Vos de Wael R, Bayrak Ş, Benkarim O, Herholz P, Lariviere S, **Rodríguez-Cruces R**, Paquola C, Hong SJ, Misic B, Evans A, Valk S, Bernhardt B. (2022). **BrainStat: A toolbox for brain-wide statistics and neuroscientific contextualization**. bioRxiv, January 25, 2022.

Preprint available at: [10.1101/2022.01.18.476795](https://doi.org/10.1101/2022.01.18.476795)

Paquola C, Garber M, Frässle S, Royer J, Tavakol S, **Rodríguez-Cruces R**, Jeffries E, Smallwood J, Bernhardt, B. (2021). **The unique cytoarchitecture and wiring of the human default Mode network**. bioRxiv, November 22, 2021. Submitted to *Nature*, February 7, 2022

Preprint available at: [10.1101/2021.11.22.469533](https://doi.org/10.1101/2021.11.22.469533)

Royer J, **Rodríguez-Cruces R**, Tavakol S, Lariviere S, Herholz P, Li Q, Vos de Wael R, Paquola C, Benkarim Q, Park B, Lowe AJ, Margulies DS, Smallwood J, Bernasconi A, Bernasconi N, Frauscher B, Bernhardt BC. (2021). **An Open MRI Dataset for Multiscale Neuroscience**. bioRxiv, August 5, 2021.

Preprint available at: [2021.08.04.454795](https://doi.org/10.1101/2021.08.04.454795)

Zhang M, Bernhardt B, Wang X, Varga D, Krieger-Redwood K, Royer J, **Rodríguez-Cruces R**, Vos de Wael R, Margulies DS, Smallwood J, Jefferies E. (2021). ***Perceptual coupling and decoupling of the default mode network during mind-wandering and reading*** bioRxiv, August 3, 2021.

Preprint available at: [10.1101/2020.10.03.324947](https://doi.org/10.1101/2020.10.03.324947)

Benkarim Q, Paquola C, Park B, Royer J, **Rodríguez-Cruces R**, Vos de Wael R, Misic B, Piella G, Bernhardt BC. (2021). ***A Riemannian approach to predicting brain function from the structural connectome***. bioRxiv, October 28, 2021.

Preprint available at: [2021.10.27.465906](https://doi.org/10.1101/2021.10.27.465906)

Wang Y, Royer J, Park B, Vos de Wael R, Larivière S, Tavakol S, **Rodríguez-Cruces R**, Paquola C, Hong S, Margulies DS, Smallwood J, Valk S, Evans A, Bernhardt BC. (2021). ***Long-range connections mirror and link microarchitectural and cognitive hierarchies in the human brain***. bioRxiv, October 26, 2021.

Preprint available at: [2021.10.25.465692](https://doi.org/10.1101/2021.10.25.465692)

Larivière S, Royer J, **Rodríguez-Cruces R**, Caligiuri ME, Gambardella A, Concha L., ..., Bernhardt BC. (2021). ***Structural network alterations in focal and generalized epilepsy follow axes of epilepsy risk gene expression: An ENIGMA study***. bioRxiv, October 19, 2021.

Preprint available at: [2021.10.18.464713](https://doi.org/10.1101/2021.10.18.464713)

Hart BM, Achakulvisut T, Akrami A, Alicea B, Beierholm U, Blohm G, ... **Rodríguez-Cruces R**, Wyble B. (2021). ***Neuromatch Academy: a 3-week, online summer school in computational neuroscience***. OSF preprints.

Preprint available at: [osf.io/9fp4v](https://osf.io/9fp4v).

## CONFERENCE ABSTRACTS

Garcia Santos RA, **Rodríguez-Cruces R** (2021). ***Neuropsychiatric symptoms in post COVID-19 (2191)*** 25th World Congress of Neurology, 3-7 October, 2021.

Garcia Santos RA, **Rodríguez-Cruces R** (2021). ***Insomnia in post COVID-19 hospitalized patients (2996)*** 25th World Congress of Neurology, 3-7 October, 2021.

Raul Anwar Garcia Santos RA, **Rodríguez-Cruces R** (2021). ***Neurological manifestations after COVID-19 illness: Observations in one of the largest COVID-19 centers in México (A-21-00969)*** 27th EAN Congress, 19-22 June 2021.

Raul Anwar Garcia Santos RA, **Rodríguez-Cruces R** (2021). ***Cognitive impairment detected by MoCA (Montreal Cognitive Assessment) test after COVID-19 in Mexico (A-21-00974)*** 27th EAN Congress, 19-22 June 2021.

Vos de Wael R, Benkarim O, **Rodríguez-Cruces R**, Paquola C, Bernhardt BC. (2020). ***Structural connectivity manifolds of the human temporal lobe***. Submitted to the 26th Annual Meeting

of the Organization of Human Brain Mapping, Montreal, QC, Canada.

Royer J, Tavakol S, Li Q, Lowe AJ, Larivière S, Vos de Wael R, Paquola C, Benkarim O, Park B, **Rodriguez-Cruces R**, Bernhardt BC. (2020). ***Introducing MICs: An open dataset for Microstructure-Informed Connectomics in health and epilepsy***. Submitted to 26th Annual Meeting of the Organization of Human Brain Mapping, Montreal, QC, Canada.

Weng Y, Lariviere S, Caciagli L, Vos de Wael R, **Rodriguez-Cruces R**, Xu Q, Bernasconi N, Bernasconi A, Yeo BTT, Lu G, Zhang Z, Bernhardt BC. (2020). ***Macroscale and Microcircuit Dissociation of Focal and Generalized Human Epilepsies***. Submitted to the 26th Annual Meeting of the Organization of Human Brain Mapping, Montreal, QC, Canada.

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## MEETING PRESENTATIONS AND FIRST AUTHOR POSTERS

- 2021 ***Invited talk. Open neuroinformatics to study healthy & epileptic brains across multiple scales***, Bernhardt BC, RODRIGUEZ-CRUCES R, American Epilepsy Society annual meeting, Chicago, USA. December 3 - 7.
- 2020 ***Poster. Presenting the micapipe: Processing pipeline for multimodal imaging and connectome analysis***, RODRIGUEZ-CRUCES R, Royer J, Herholz P, Larivière S, Vos de Wael R, Paquola C, Benkarim O, Park B, Degré-Pelletier J, Concha L, Bernhardt BC, Organization for Human Brain Mapping, Virtual conference. June 21 - 25.
- 2020 ***Poster. Robustness of structural network metrics across parcellations schemes in healthy and epileptic brains***, RODRIGUEZ-CRUCES R, Larivière S, Royer J, Benkarim O, Concha L, Bernhardt BC, American Epilepsy Society meeting, Virtual conference. December 4-8.  
[Selected for Better Patient Outcomes Poster Session](#)
- 2020 ***Poster. Robustness of structural network metrics across parcellations schemes in healthy and epileptic brains***, RODRIGUEZ-CRUCES R, Larivière S, Concha L, Bernhardt BC, Organization for Human Brain Mapping, Virtual conference. June 23 - July 3.
- 2019 ***Poster. Multivariate links between cognition and structural-level connectomics in temporal lobe epilepsy***, RODRIGUEZ-CRUCES R, Bernhardt BC, Concha L, Organization for Human Brain Mapping, Rome, Italy. June 9-13.  
[Top ranked abstract and travel award](#)
- 2019 ***Oral Presentation. Epilepsy, cognition and brain connectivity***, RODRIGUEZ-CRUCES R, Asociación de Médicos Egresados del Instituto Nacional de Neurología y Neurocirugía, Irapuato, Guanajuato, México. May 23-25.  
[Invited lecture](#)
- 2018 ***Poster. Links between brain connectivity and cognitive performance in temporal lobe epilepsy***, RODRIGUEZ-CRUCES R, Bernhardt BC, Concha L, Annual Meeting of the Society for Neuroscience, San Diego California, USA. November 3-7.

- 2018 **Oral Presentation. Temporal lobe epilepsy: From cognitive performance to brain connectivity**, RODRIGUEZ-CRUCES R, Taller multidisciplinario - Redes Multidisciplinarias, Hacienda Cocoyoc, Cocoyoc, Morelos, México. October 24-26.
- 2018 **Poster. Multidimensional cognitive subtyping in temporal lobe epilepsy: brain morphology and connectomics**, RODRIGUEZ-CRUCES R, Bernhardt BC, Concha L, 25 Jornadas Académicas, Instituto de Neurobiología, Querétaro, Querétaro. September 24-28.
- 2018 **Oral Presentation. Multidimensional cognitive subtyping in temporal lobe epilepsy: brain morphology and connectomics**, RODRIGUEZ-CRUCES R, Bernhardt BC, Concha L, Organization for Human Brain Mapping, Singapur. June 17-21.  
[Top ranked abstract, selected as platform presentation and travel award](#)
- 2017 **Oral Presentation. Relationship between integrity of the white matter and cognitive abilities in temporal lobe epilepsy**, RODRIGUEZ-CRUCES R, Multidisciplinary Workshop - Complex Networks, Hacienda Cocoyoc, Cocoyoc, Morelos, México. October 25-27.
- 2017 **Oral Presentation. Brain structural integrity and cognitive phenotypes in temporal lobe epilepsy**, RODRIGUEZ-CRUCES R, Jornadas Académicas, Instituto de Neurobiología, Querétaro, Querétaro. September 26.
- 2017 **Poster. Relating white matter integrity and cognitive performance in temporal lobe epilepsy**, 1<sup>st</sup> Emory - UNAM Binational Forum: Mechanisms of Learning, Instituto de Neurobiología, UNAM Campus Juriquilla. Querétaro, Querétaro, Mexico. May 3-5.
- 2016 **Poster. Association between white matter changes and cognitive deficits in patients with temporal lobe epilepsy**, 46<sup>th</sup> Annual Meeting of the Society for Neuroscience, San Diego California, USA. November 12-17.  
[Latin American Training Program Fellow and travel award](#)
- 2016 **Oral Presentation. Analysis of brain structural differences in Temporal Lobe Epilepsy: a multivariable, multimodal and quantitative approach**, 7<sup>th</sup> National Meeting of Mathematical Biology, UNAM Campus Morelia, Morelia Michoacan, Mexico. October 10-14.
- 2016 **Oral Presentation. Determination of differences in brain structures correlations obtained with MRI: Application of a stochastic process**, 18<sup>th</sup> Neuroimaging Meeting, Mathematics Research Center (CIMAT), Guanajuato, Guanajuato, Mexico. October 6 – 7.
- 2015 **Poster. White Matter, Subcortical Gray Matter and Cognitive Changes in Temporal Lobe Epilepsy with and without Mesial Temporal Sclerosis**, 69<sup>th</sup> Annual Meeting of the American Epilepsy Society, Pennsylvania Convention Center, Philadelphia, USA. December 4 – 8.  
[CAMELICE/AES travel award](#)
- 2015 **Poster. Correlates of cognitive impairments with hippocampal volume and T2 relaxometry in temporal lobe epilepsy**, 9<sup>th</sup> Latin American Congress of Epilepsy, Cancún, Quintana Roo, Mexico. August 20 – 23.



- 2015 **Poster. Quantitative Analysis of Hipocampal Sclerosis in Temporal Lobe Epilepsy with Magnetic Resonance Imaging**, 39<sup>th</sup> Meeting of the Mexican Academy of Neurology, Puerto Vallarta, Jalisco, México. October 26 – 31.  
[2<sup>nd</sup> place in poster contest](#)
- 2015 **Poster. Correlates of cognitive impairments with hippocampal volume and T2 relaxometry in temporal lobe epilepsy**, 38<sup>th</sup> Annual Meeting of the Mexican League Against Epilepsy (CAMELICE), Mexico City, Mexico. July 29 – August 2th.  
[3<sup>rd</sup> place in poster contest](#)
- 2013 **Poster. GABAergic modulation of differential synaptic transmission in the superior cervical ganglia**, 56<sup>th</sup> National Meeting of Physiological Sciences, Tlaxcala, Tlaxcala, Mexico. September 1-5.
- 2009 **Poster. 6<sup>th</sup> International Meeting for Research in Natural Products, Evaluation of the effect of co-administration of aqueous extract of loquat and vitamin C on glutathione levels of Diabetic rats.**  
Irapuato, Guanajuato Mexico. October 21 - 23.
- 2009 **Poster. 15<sup>th</sup> Summer of Scientific Research, Evaluation of the effect of co-administration of aqueous extract of loquat and vitamin C on glutathione levels of Diabetic rats**, Universidad de Guanajuato Universidad de Guanajuato.  
Guanajuato, Guanajuato, Mexico, July 28.

## COURSES

- 2017 **Machine Learning for neuroimage analysis**, Universidad de Buenos Aires.  
Buenos Aires, Argentina. 20 – 25 March
- 2016 **VI Latin American School on Computational Neuroscience**, Center of Research, Innovation and Dissemination for Neuromathematics (NeuroMAT).  
Sao Paulo, Brazil. 3 – 29 January
- 2016 **XVII Mathematical Biology Autumn School, Evolution and biodiversity; From molecules to the biosphere**, Center of Mathematical Sciences, National Autonomous University of Mexico (UNAM)..  
Morelia, Michoacan, Mexico October 10 – 14
- 2015 **Image Processing and Statistical Pattern Recognition Workshop**, Mathematics Research Center (CIMAT), Guanajuato, Guanajuato, Mexico. 5-6 November.
- 2015 **Latin American Training Program Fellow, Imaging the Brain, Visualizing structure and function in the CNS**, Institute of Neurobiology, National Autonomous University of Mexico (UNAM).  
Queretaro, Mexico. August 10 – 29
- 2015 **38<sup>th</sup> Annual Meeting of the Mexican League Against Epilepsy, Workshop: "Epilepsy: From laboratory to clinic".**  
Mexico City, Mexico. July 29 – 30
- 2015 **8<sup>th</sup> Industrial Issues Solution, Workshop, presenting: "A System for medical imaging processing".**  
Mathematics Research Center (CIMAT), Guanajuato, Guanajuato, Mexico. 12-16 January



- 2014 **10<sup>th</sup> Image Processing Workshop and 16th Neuroimaging Meeting**, Mathematics Research Center (CIMAT), Guanajuato, Guanajuato, Mexico. 15-17 October.
- 2014 **Bioethics Workshop**, *Institute of Neurobiology, National Autonomous University of Mexico*.  
Campus Juriquilla, Queretaro, Mexico. August 2014
- 2013 **56<sup>th</sup> National Meeting of Physiological Sciences**, *Advances techniques for combined structural and functional analysis of central neurons*.  
Tlaxcala, Tlaxcala, Mexico. September, 1-5
- 2012 **Physical models for biology**, *Institute of Cellular Physiology, National Autonomous University of Mexico*.  
Mexico city, Mexico, University City, October 1-5

## RECOGNITIONS

- 2019 **Graduated with honors**, PhD in Science .
- 2015 **2<sup>nd</sup> place in poster contest**, 39th Meeting of the Mexican Academy of Neurology.
- 2015 **3<sup>rd</sup> place in poster contest**, 38th Annual Meeting of the Mexican League Against Epilepsy.
- 2014 **Laurate Recognition**, Medical School Graduated.

## RESEARCH FUNDING & AWARDS

- 2020-2022 **FRQS Programme de bourse de formation postdoctorale**, Fonds de recherche du Québec - Santé, Canada.  
No dossier: 291486; \$90,000 CAN
- 2020 **Simon Groom award**, *Montreal Neurological Institute*, McGill University, Canada, January.
- 2014-2019 **PhD Program Grant**, National Council of Science and Technology (CONACYT, Mexico). ID number: 329866.
- 2019 **Stimulus for Timely Graduation**, *Programa de Estímulos para la Graduación Oportuna (PEGO)*, UNAM, Postgraduate program in biomedical sciences, June 24, Mexico.
- 2019 **OHBM travel stipend award**, Organization for Human Brain Mapping, to assist to meeting at Rome, Italy, June.
- 2019 **PAEP travel award**, Support program for postgraduate studies, UNAM, to assist to Organization for Human Brain Mapping annual meeting at Rome, Italy, June. Reference: 10221-515012255.
- 2018 **OHBM travel stipend award**, Organization for Human Brain Mapping, to assist to oral presentation at Singapore, June.
- 2018 **PAEP travel award**, Support program for postgraduate studies, UNAM, to assist to Organization for Human Brain Mapping annual meeting at Singapore, June. Reference: 10098-515012255.
- 2017 **PAEP travel award**, Support program for postgraduate studies, UNAM, Research intership at McGill University, Reference: 10053-515012255.

- 2017 **CONACYT Becas-Mixtas travel award**, National Council of Science and Technology (CONACYT). ID number: 329866, CVU: 380561.
- 2017 **CELFi travel award**, Centro de Estudios Latinoamericanos para Formación Interdisciplinaria, Argentina.
- 2016 **LATP (Latin American Training Program) Fellow & Travel award**, to assist to "Neuroscience 2016 – Society for Neuroscience" Annual Meeting 2016, San Diego, CA, USA.
- 2016 **PAEP travel award**, Support program for postgraduate studies, UNAM, Annual Meeting of the Society for Neuroscience. Reference: 10037-515012255.
- 2016 **PAEP travel award**, Support program for postgraduate studies, UNAM, Latin American School on Computational Neuroscience. Reference: 10037-515012255.
- 2015 **CAMELICE travel award**, Capitulo Mexicano de la Liga internacional en Contra de la Epilepsia to assist to American Epilepsy Society.
- 2015 **PAEP travel award**, Support program for postgraduate studies, UNAM, American Epilepsy Society meeting. Reference: 10005-515012255.
- 2013 **SUBES Social Service Grant**, Secretary of Public Education, ID number: 218451.
- 2012 - 2013 **Under-graduated Grant**, National Council of Science and Technology (CONACYT). Reference: CB-2009/128332. ID number 18068.
- 2010 **Student Mobility Program Scholarship**, Universidad de Guanajuato.
- 2009 **Department of Research and Graduate Studies Scholarship**, 15<sup>th</sup> Summer of Scientific Research, Universidad de Guanajuato.

## PROFESSIONAL EXPERIENCE

- 2017 **Research Internship**, McGill University, McCornell Imaging Center, Montreal Neurological Institute and Hospital, Canada, March to June.  
Project: Relating structural integrity and cognitive phenotypes in temporal lobe epilepsy.  
Advisor: Boris Bernhardt PhD
- 2013 **Rural Community Service**.  
Mexican Secretariat of Health (Secretaría de Salud), Primary medical health care unit 'UMAPS Cañada de Bustos', Guanajuato, Guanajuato, Mexico
- 2012 **Research Internship**, Instituto de Investigaciones Biomédicas, Universidad Nacional Autónoma de México (UNAM), Mexico City, Mexico.  
Project: GABAergic modulation of synaptic transmission and differential transmission in superior cervical ganglia.  
Advisor: Miguel A Morales PhD
- 2011 **Medical Internship**.  
Mexican Social Security Institute (IMSS), General Hospital Subzone 10, Guanajuato, Guanajuato, Mexico
- 2010 **Academic Internship**.  
Medical School, Universidad de Granada, Granada, Spain, February to July

## SCIENCE COMMUNICATION

- Invited talk *"Sensory perception"*. CREA-Centro Regional de Expresión Artística, Irapuato, Guanajuato, México, September 6 2019 [Video](#)
- Invited talk *"Confusing the sense: illusion and perception"*. Brain awarnes week, Science Diffusion Committee of the Instituto de Neurobiología, Universidad Nacional Autónoma de México, March 12 2019
- Invited talk *"Network theory and brain connectivity"*. College of History and Philosophy of Medicine, Universidad de Guanajuato. Leon, Guanajuato, Mexico, November 26, 2018
- Activity Brain Awareness Week, *"The cells of the Mind"* Science Diffusion Committee of the Instituto de Neurobiología, Universidad Nacional Autónoma de México, March 20-24 2018
- Activity Brain Awareness Week, *"Neurons from A to Z: What does the microscope show us?"* Science Diffusion Committee of the Instituto de Neurobiología, Universidad Nacional Autónoma de México, March 2017
- Invited talk *"Cognitive impact of temporal lobe epilepsy and its relationship with brain connectivity and function"*. Centro Estatal de Salud Mental (CESAM), Secretaría de Salud del Estado de Querétaro, Querétaro, October 14, 2016
- Activity Brain Awareness Week, *"Move ... Keep Your Brain Active!"*. Science Diffusion Committee of the Instituto de Neurobiología, Universidad Nacional Autónoma de México, March 2016
- Radio *"What is epilepsy?"*. News "Panorama Informativo de Radio Acir", December 8, 2015
- Participation Sciences and Humanities Gathering, Science Diffusion Committee of the Universidad Nacional Autónoma de México, October 5, 2015
- Invited talk *"Brain Conectivity"*. Bachelor of biology cultural week, Faculty of Natural Sciences, Universidad Autónoma de Querétaro. September 11, 2015
- Activity Brain Awareness Week, *"Working while sleeping, Sleep!...Reconnecting your brain!"*. Science Diffusion Committee of the Instituto de Neurobiología, Universidad Nacional Autónoma de México, March 2015
- Invited talk *"The history of time"*. College of History and Philosophy of Medicine, Universidad de Guanajuato. Leon, Guanajuato, Mexico, October 10, 2010
- Invited talk *"Infections and Art"*. Neurological and Specialties Hospital Medical Center. Irapuato, Guanajuato, Mexico, September 10, 2010

## TEACHING

- 2020 Neuromatch Academy Teacher Assistant. Online school for Computational Neuroscience. <https://www.neuromatchacademy.org>. 29 June - 31 July
- 2018 Supervisor of student Juan Daniel Espinosa Toledo. *Student internship of the biomedical engineering bachelor*, Instituto de Neurobiología, UNAM, Querétaro, Querétaro, September to December
- 2015 Supervisor of student Elizabeth González Olvera. *Social service of BA in Criminology* from the Autonomous University of Querétaro, Mexico. From April to September

2012 Advisor and supervisor of student Fatima Sofia Ávila Cascajares. *Youth into Research Program*, Instituto de Investigaciones Biomédicas, UNAM, Mexico City, Mexico, June

2007 TA of molecular, cellular and tissue biology  
Department of Medicine and Nutrition, Universidad de Guanajuato, Leon, Guanajuato, Mexico, December

## MEMBERSHIPS

2021- American Epilepsy Society, ID: 582298

2018- Organization for Human Brain Mapping

2016- Society of Neuroscience

2015- Enhancing Neuro Imaging Genetics through Meta-Analysis (ENIGMA)-epilepsy

2009-2010 College of History and Philosophy of Medicine, Universidad de Guanajuato

## LANGUAGES

Spanish Mothertongue

English Full professional proficiency

French Limited working proficiency

Finnish Limited working proficiency

## OTHER SKILLS

Data Analysis Biomedical statistics and interpretation, multivariate and longitudinal analysis.  
Database organization.

Image Processing and analysis of structural and functional Magnetic Resonance Imaging  
Analysis (T1, T2-relaxometry, BOLD, DWI) and Positron Emission Tomography Images

Programming R, MATLAB, PYTHON, bash,  $\LaTeX$ , GitHub (git and markdown)  
languages

Operating GNU/Linux, Mac OS X  
Systems