GBC Working Groups activities report after Varadero 2020

Papers/ Work/ Meetings

1. EEG Standards, Best Practices, and Integrated Technologies

Chairs: Jorge Bosch, Christine Rogers and Scott Makeig

1. **Valdes-Sosa, P.A.***; Galan, L.*; **Bosch-Bayard, J.***; Bringas-Vega, M.L. *****; Aubert-Vazquez, E. *****; Rodriguez-Gil, I.; Das, S.; Madjar, C.; Virues-Alba2, T.; Mohades, Z.; MacIntyre, L.C.; Rogers, C.; Brown, S.; Valdes-Urrutia, L.; Evans, A.C.; **Valdes-Sosa, M.J**. The Cuban Human Brain Mapping Project, a young and middle age population-based EEG, MRI, and cognition dataset. Sci Data 8, 45 (2021). https://doi.org/10.1038/s41597-021-00829-7
(* Equal contribution as first author)
2. **Bosch-Bayard,** J.; Aubert-Vazquez, E.; Brown, S.T.; Christine, Kiar, G.; Glatard, T.; Scaria, L.; Galan-Garcia L.; Bringas-Vega, M.L.; Virues-Alba, T.; Taheri, A.; Das, S.; Madjar, C.; Mohaddes, Z.; MacIntyre, L.; CHBMP, Evans, A.C.; **Valdes-Sosa, P.A.** A Quantitative EEG Toolbox for the MNI Neuroinformatics Ecosystem: Normative SPM of EEG Source Spectra. Frontiers in Neuroinformatics. VOLUME 14, pages 33, 2020.
https://www.frontiersin.org/article/10.3389/fninf.2020.00033, doi: 10.3389/fninf.2020.00033, ISSN:1662-5196
3. **Bosch-Bayard**, J.; Galan, L.; Aubert, E.; Virues, T.; **Valdes-Sosa, P.A**.* Resting state healthy EEG: the first wave of the Cuban normative database. Data Report, Front. Neurosci. - Brain Imaging Methods, 2020, 14:555119. doi: 10.3389/fnins.2020.555119.
4. **Pernet C,** Garrido MI, Gramfort A, Maurits N, Michel CM, Pang E, …. **Valdes-Sosa PA.** et al. Issues and recommendations from the OHBM COBIDAS MEEG committee for reproducible EEG and MEG research. Nature Neurosci. 2020;1–11.
5. WeBrain: a Web-based Brainformatics Platform of Computational Ecosystem for EEG Big Data Analysis, Li Dong, Jianfu Li, Yufan Zhang, Lingling Zhao, Xin Wen, Jinnan Gong, Fali Li, Tiejun Liu, Alan C. Evans, Pedro A. Valdes-Sosa and Dezhong Yao*, Neuroimage, 2020 submitted.
6. Loris/Cbrain integration: incorporated mechanisms for bidirectional data exchange and speed up storage and processing.
7. Biomarkers toolbox in CBRAIN (in integration phase)
8. Integrated various EEG tools in WeBrain (China)

In preparation

　　i.　　"Multi-national EEG norms", for Neuroimage special issue in Global Health.
　　ii.　　 "Barbados 45 years follow up EEG development in malnourished children", for Neuroimage special issue in Global Health.
　　iii.　　"Quantitative signal quality assessment for scalp EEG", for the International Journal of Psychophysiology

2. Global Public Health

Chairs: Tarun Dua, WHO

1. **Neuroimaging and Global Health. Special Issue in NEUROIMAGE**
   Edited by Pedro Antonio Valdés-Sosa, Shekhar Saxena, Christoph Michel, Tonya White. 11 papers already published, 9 under review.
2. **Neurodevelopmental effects of childhood malnutrition: a neuroimaging perspective.**
   Janina R Galler a*, Maria L Bringas-Vega b, c*, Qin Tang b , Arielle G Rabinowitz d, Kamarul Imran Musa e, f, g, Wen Jia Chai e, f, Hazim Omar e, f, g, Muhammad Riddha Abdul Rahman e, f, h, Aini Ismafairus Abd Hamid e, f, g , Jafri Malin Abdullah e, f, g** and Pedro Valdes-Sosa b, c** **NEUROIMAGE 2021** .
3. **Embracing diversity and inclusivity in an academic setting: Insights from the Organization for Human Brain Mapping**. Dr. Athina Tzovara, Ishmael Amarreh; Valentina Borghesani; M. Mallar Chakravarty; Elizabeth DuPre; Christian Grefkes; Amelie Haugg; Lee Jollans; Hyang Woon Lee; Sharlene D. Newman; Rosanna K. Olsen; J. Tilak Ratnanather; Gina Rippon; Lucina Q. Uddin; **Maria L. Bringas Vega**; Michele Veldsman; Tonya White; AmanPreet Badhwar. **NEUROIMAGE 2021.**

To quote:

- **Mitchell Valdes-Sosa: Cuban integrated scientific-public health model**
- **Galler Barbados Nutrition study**

3. GBC Governance and Operational Model

Alan Evans, *Jessica Stone*

4. Studying Dynamic Brain States with EEG Models

Chairs: Pedro Valdes-Sosa & Christoph Michel

Methodological Papers:

1. Fusión de neuroimágenes de PET/CT utilizando un esquema basado en Wavelet y la transformada discreta de Haar. Orellana, A., Rodríguez, R., Yanes, D., & **Valdés-Sosa**, P. (2021) Revista Iberoamericana de Automática e Informática Industrial, 18(1), 75–81. https://doi.org/10.4995/riai.2020.12977   IF=1.54.
2. **Valdes-Sosa**, P.A., Galan-Garcia, L., **Bosch-Bayard**, J., Bringas-Vega, M.L., Aubert-Vazquez, E., Rodriguez-Gil, I., Das, S., Madjar, C., Virues-Alba, T., Mohades, Z., MacIntyre, L.C., Rogers, C., Brown, S., Valdes-Urrutia, L., Evans, A.C., Valdes-Sosa, M.J., 2021. The Cuban Human Brain Mapping Project, a young and middle age population-based EEG, MRI, and cognition dataset. Sci. Data 8. https://doi.org/10.1038/s41597-021-00829-7. IF: 4.68

3. Yajing Si, Fali Li, Keyi Duan, Qin Tao, Cunbo Li, Zehong Cao, Yangsong Zhang, Bharat Biswal, Peiyang Li, **Dezhong Yao**, Peng Xu. Predicting individual decision-making responses based on single-trial EEG, NeuroImage,2020, 206, 116333

4. C Yi, C Chen, L Jiang, Q Tao, F Li, Y Si, T Zhang, **D Yao**, P Xu, Constructing EEG Large-scale Cortical Functional Network Connectivity Based on Brain Atlas by S Estimator, IEEE Transactions on Cognitive and Developmental Systems, 2020, doi: 10.1109/TCDS.2020.2991414.

5. F Li, C Yi, Y Liao, Y Jiang, Y Si, L Song, T Zhang, **D Yao**, Y Zhang, Z Cao and P Xu, Reconfiguration of Brain Network between Resting-state and P300 task, IEEE Transactions on Cognitive and Developmental Systems, 2020, doi: 10.1109/TCDS.2020.2965135.

6. Li Dong, Lingling Zhao, Yufan Zhang, Xue Yu, Fali Li, Jianfu Li, Yongxiu Lai, Tiejun Liu and **Dezhong Yao***, Reference Electrode Standardization Interpolation Technique (RESIT): a Novel Interpolation Method for Scalp EEG, Brain Topography, 2021, revised.

Thesis of PhD students:

1. **Thesis of Deirel Paz Linares**: title "Control of Leakage in Brain Electrophysiological Responses and Connectivity". **Valdes-Sosa, P.**

2. **Thesis of Shiang Hu**（胡世 昂）: title "Study of reference and spectral analysis techniques in quantitative EEG". **Valdes-Sosa, P.**

3. **Thesis of Xiaobo Liu**（刘晓波）**:** title "EEG Rhythms in Action Video Game Players with Different Game Levels." **Dezhong Yao**

Masters' thesis:

1. **Thesis of Les Huang**（黄孙培）: title "Analysis of a causal model of brain dynamics based on a cloud platform". **Valdes-Sosa, P.**

2. **Thesis of Rigel Wang**（王颖）**:** title: "Improving the accuracy of electrophysiological connectivity estimates in the brain using structural sparsity". **Valdes-Sosa, P.**

3. **Thesis of Nancy Liu**（刘胜男）: title "Study of crystal intelligence and fluid intelligence based on multimodal neuroimaging. **Valdes-Sosa, P.**

4. **Thesis of Cathy Zhang**（张敏）**:** title "Study of neuroprotective biomarkers for Parkinson's disease based on brain power analysis." **Valdes-Sosa, P.**

5. Neurodevelopment and Educational Neurosciences

Chairs: Mmantsetsa Marope

1. Martínez-Briones, B.J.; Fernández-Harmony, T.; Garófalo-Gómez, N.; Biscay-Lirio, R.J.*; **Bosch-Bayard, J.*** Working Memory in Children with Learning Disorders: An EEG Power Spectrum Analysis. Brain Sci. **2020**, 10, 817; doi:10.3390/brainsci10110817.
   (* Corresponding authors)

2. **Bosch-Bayard**, J.*; Girini, K.; Biscay, R.L.; Valdes-Sosa, P.; Evans, A.C.; Chiarenza, G.A.* Resting EEG effective connectivity at the sources in developmental dysphonetic dyslexia. Differences with nonspecific reading delay. International Journal of Psychophysiology. Vol 153, pages 135-147, July

2020. https://doi.org/10.1016/j.ijpsycho.2020.04.021
(* Corresponding authors)

6. EEG Paradigms, Clinical Applications and Validation

Chairs: Dirk Smit, Mitchell Valdes and Claudio Babiloni

Paper Valdes-Sosa "Multi-national norms" in preparation

7. Aging and Neurodegenerative diseases: Disease Progression Modeling

Chair: Yasser Iturria-Medina (Precision Medicine)

1. **Wen, X.,** et al., Alterations of local functional connectivity in lifespan: A resting-state fMRI study. Brain and Behavior, 2020. 10(7). （IF = 2.091）

2. **Wen, X.**, et al., Detecting the Information of Functional Connectivity Networks in Normal Aging Using Deep Learning from a Big Data Perspective. Frontiers in Neuroscience, 2020. 13. IF = 3.707）

3. Yasser **Iturria-Medina**, Felix M. Carbonell, Atousa Assadi, Quadri Adewale, Ahmed F. Khan, Robert Baumeister and Lazaro Sanchez-Rodriguez, for ADNI. NeuroPM-box software: integrating Molecular, Neuroimaging and Clinical data for Characterizing Neuropathological Progression and Individual Therapeutic Needs. Under-review. medRvix preprint: medrxiv.org/cgi/content/short/2020.09.24.20200964v1

4. Ahmed Faraz Khan, Quadri Adewale, Tobias R. Baumeister, Felix Carbonell, Karl Zilles, Nicola Palomero-Gallagher, Yasser **Iturria Medina**, Personalized Multi-scale Brain Model Identifies Key Neurotransmitter Receptor Alterations in Alzheimer's Disease Progression. Brain (under-review, January 2021).

5. Quadri Adewale, Ahmed Faraz Khan, Felix Carbonell, Yasser **Iturria-Medina**, Integrated Transcriptomic and Neuroimaging Brain Model Decodes Biological Mechanisms in Aging and Alzheimer's Disease. eLife (under-revision, February 2021).

6. Christophe Lenglos, Sue-Jin Lin, Yashar Zeighami, Tobias Baumeister, Felix Carbonell and Yasser **Iturria-Medina**. Multivariate Genetic Determinants of Personalized Therapeutic Needs and Response in Parkinson's Disease. (under-review, January 2021).

7. Javier Santonja, Francisco J. Román, Kenia Martínez, Sergio Escorial, Juan Álvarez-Linera, Jesús Privado, Mª Ángeles Quiroga, Emiliano Santarnecchi, Yasser **Iturria-Medina**, Roberto Colom. Neocortical age and fluid ability in high cognitive ability individuals. (Submitted, March, 2021).

8. Tremblay-Mercier J, Madjar C, Das S, Dyke S, Étienne P, Lafaille-Magnan ME, Bellec P, Collins L, Rajah N, **Iturria-Medina** Y, Kat J, Hoge R, Chakravarty M, Rosa-Neto P, Villeneuve S, Poirier J, Evans AC, Breitner J & the PREVENT-AD Research Group, 2020. PREVENT-AD: An Open Science Dataset for the Characterization of Pre-symptomatic Alzheimer's Disease. Scientific Data (submitted). Available at: https://www.biorxiv.org/content/10.1101/2020.03.04.976670v1

9. Melissa Savard, Tharick A. Pascoal, Thijs Dhollander, Yasser **Iturria-Medina**, Paolo Vitali, Joseph Therriault, Sulantha Mathotaarachchi, Andrea L. Benedet, Serge Gauthier, Pedro Rosa-Neto, for the Frontotemporal Lobar Degeneration Neuroimaging Initiative, 2020. Impact of long- and short-range fiber depletion on the cognitive deficits of fronto-temporal dementia. Submitted. Available at: https://www.biorxiv.org/content/10.1101/2020.05.01.064576v1

10. Jacob W Vogel, Alexandra L Young, Neil P Oxtoby, Ruben Smith, Rik Ossenkoppele, Olof T Strandberg, Renaud La Joie, Leon M Aksman, Michel J Grothe, Yasser **Iturria-Medina**, Michael J Pontecorvo, Michael D Devous, Gil Rabinovici, Daniel C Alexander, Chul Hyoung Lyoo, Alan C Evans, Oskar Hansson, ADNI. Characterizing the spatiotemporal variability of Alzheimer's disease pathology. Nature Medicine (under-review).
Preprint: https://www.medrxiv.org/content/10.1101/2020.08.20.20176883v1.

11. Javier Santonja, Kenia Martínez, Francisco J. Román, Sergio Escorial, Mª Ángeles Quiroga, Juan Álvarez-Linera, Yasser **Iturria-Medina**, Emiliano Santarnecchi, Roberto Colom, 2021. Brain resilience across the general cognitive ability distribution: Evidence from structural connectivity. Brain Structure and Function. Brain Struct. Funct. https://doi.org/10.1007/s00429-020-02213-4.

12. Abdelrahman Zayed, Yasser **Iturria-Medina**, Arno Villringer, Bernhard Sehm, Christopher J Steele, 2020. Rapid Quantification of White Matter Disconnection in the Human Brain. Annu Int Conf IEEE Eng Med Biol Soc. 2020 Jul;2020:1701-1704. PMID: 33018324. DOI: 10.1109/EMBC44109.2020.9176229.

13. Sanchez-Rodriguez LM, **Iturria-Medina** Y, Mouches P, Roberto C., 2020. Detecting brain network communities: Considering the role of information flow and its different temporal scales. Neuroimage. Volume 225, 117431

14. Yasser **Iturria-Medina**, Ahmed F. Khan, Quadri Adewale, Amir H. Shirazi, ADNI, 2020. Blood and Brain Gene Expression Trajectories Mirror Neuropathology and Clinical Decline in Neurodegeneration. Brain, 143(2):661-673, https://doi.org/10.1093/brain/awz400. PMID: 31989163

15. Jacob Vogel, Yasser **Iturria-Medina**, Olof T. Strandberg, Ruben Smith, Alan C Evans, Oskar Hansson, for the Alzheimer's Disease Neuroimaging Initiative, the Swedish BioFINDER Study, 2020. Pathological tau spreads through communicating brain regions in human Alzheimer's disease. Nature Communications, 11, # 2612.

Awards

- 11/09/2020: Yasser Iturria-Medina awarded among the Azrieli Future Leaders in Canadian Brain Research!

Software

- **Yasser Iturria-Medina NeuroPM-toolbox:** a free cross-platform multitool software for advanced integration of molecular, histopathological, multimodal neuroimaging, and therapeutic data.

8. Neuropsychiatric Diseases: Novel and Scalable Treatment Strategies

Chairs: Klaus Mathiak and Giuseppe Chiarenza

A Special Issue on Oscillatory Dynamics: In memoriam of Erol Başar. International Journal of Psychophysiology. January 2021. Edited by Giuseppe Chiarenza, Sirel Karakas, Christoph Herman. A collection of 12 papers:

1. Jorge Gulín-Gonzalez, Liu Qiang, Chen Yunwei,Giuseppe Augusto Chiarenza, Min Li, **Pedro Valdes-Sosa** *. Erol Başar and the scientific revolution in nonlinear brain dynamics: A selective review. Int J Psychophysiol [Internet]. 2020 Oct; Available from: https://linkinghub.elsevier.com/retrieve/pii/S0167876020302300 IF=2.631

2. **Bosch-Bayard**, J.*; Girini, K.; Biscay, R.L.; Valdes-Sosa, P.; Evans, A.C.; Chiarenza, G.A.* Resting EEG effective connectivity at the sources in developmental dysphonetic dyslexia. Differences with nonspecific reading delay. International Journal of Psychophysiology. Vol 153, pages 135-147, July 2020. https://doi.org/10.1016/j.ijpsycho.2020.04.021
   (* Corresponding authors)