Stanford

Michael Eddy F Belloy

Instructor, Neurology & Neurological Sciences

Curriculum Vitae available Online

Bio

BIO

My broad scientific goal is to investigate neurological disorders with the aim of identifying novel mechanisms that improve understanding of disease pathophysiology and that could lead to novel drug development. I pursue this goal by investigating the genetic risk factors of the respective disease under question, studying how they contribute to disruptions of brain function measured by in vivo imaging techniques, and how they correlate with the presentation of disease-sensitive biomarkers. Within this broader scope, my primary interest is to focus specifically on Alzheimer's disease, elucidating the genetic, molecular, and clinical spectrum of the disease, and hopefully, eventually, contributing to the path towards a cure.

I am a highly interdisciplinary scientist with experience in programming (using various scripting languages), advanced data analyses methods, neuroimaging, and studies of preclinical mouse models of Alzheimer’s disease. I also have a long-standing interest in brain function and network dynamics in both health and disease. During my postdoc at Stanford, I have further gained experience into the clinical aspects, imaging approaches, and genetics of Alzheimer’s disease. Altogether, this translates into my current research strategy in which I investigate large-scale multimodal datasets that contain information on genetics, multi-omics, clinical outcome measures, structural and functional brain properties, and other biomarker data.

I am currently an Instructor at Stanford university, in the lab of Dr. Michael D Greicius. My main aims in this lab are to identify genetic factors that may be causative to Alzheimer's disease. Specifically, I aim to uncover genetic risk factors that interact with the Apolipoprotein E (APOE) gene or sex to alter risk for Alzheimer’s disease. Furthermore, I seek to identify how genetic risk associations differ across the intersection of APOE, sex, age, and genetic ancestry. I believe this will allow the identification of novel genes relevant to Alzheimer's disease and contribute to advancing personalized genetic medicine.

During my PhD, supervised by Dr. Marleen Verhoye, Dr. Shella Keilholz and Dr. Georgios A Keliris, I worked on developing dynamic resting state functional (rsf)MRI in mice, which lead to the first observation of mouse Quasi-Periodic patterns, and related applications for Alzheimer's disease research in rodents. I still have an ongoing interest in dynamic rsfMRI research.

ACADEMIC APPOINTMENTS

- Instructor, Neurology & Neurological Sciences

HONORS AND AWARDS

- K99/R00, National Institute of Aging (NIA) (09/01/2022-08/31/2024)
- ADRC Developmental research project, Stanford ADRC (04/01/2022-03/31/2024)
- best virtual postdoc poster, in the theme of Basic and Translational Science, Alzheimer's Association (28 September 2021)

- ADPD21 Junior Faculty Award Winner, International Conference on Alzheimer's and Parkinson's Diseases (14 March 2020)
- Alzheimer's Association 2020 Young Investigators Award, Alzheimer's Association (21 October 2020)
- Alzheimer's Association Research Fellowship, Alzheimer's Association (04/01/2020-03/31/2023)

Publications

PUBLICATIONS

- **Association of African Ancestry-Specific APOE Missense Variant R145C With Risk of Alzheimer Disease.** *JAMA*
  Le Guen, Y., Raulin, A., Logue, M. W., Sherva, R., Belloy, M. E., Eger, S. J., Chen, A., Kennedy, G., Kuchenbecker, L., O'Leary, J. P., Zhang, R., Merritt, V. C., Panizzon, et al
  2023; 329 (7): 551-560
- **APOE effects on regional tau in preclinical Alzheimer's disease.** *Molecular neurodegeneration*
  Young, C. B., Johns, E., Kennedy, G., Belloy, M. E., Insel, P. S., Greicius, M. D., Sperling, R. A., Johnson, K. A., Poston, K. L., Mormino, E. C., Alzheimers Disease Neuroimaging Initiative, A4 Study Team
  2023; 18 (1): 1
- **Decoding the heterogeneity of Alzheimer's disease diagnosis and progression using multilayer networks.** *Molecular psychiatry*
  Avelar-Pereira, B., Belloy, M. E., O'Hara, R., Hosseini, S. M.
  2022
- **GhostKnockoff inference empowers identification of putative causal variants in genome-wide association studies.** *Nature communications*
  He, Z., Liu, L., Belloy, M. E., Le Guen, Y., Sossin, A., Liu, X., Qi, X., Ma, S., Gyawali, P. K., Wyss-Coray, T., Tang, H., Sabatti, C., Candes, et al
  2022; 13 (1): 7209
- **A Fast and Robust Strategy to Remove Variant-Level Artifacts in Alzheimer Disease Sequencing Project Data.** *Neurology. Genetics*
  Belloy, M. E., Le Guen, Y., Eger, S. J., Napolioni, V., Greicius, M. D., He, Z.
  2022; 8 (5): e200012
- **Deep neural networks with controlled variable selection for the identification of putative causal genetic variants** *NATURE MACHINE INTELLIGENCE*
  Kassani, P. H., Lu, F., Le Guen, Y., Belloy, M. E., He, Z.
  2022
- **Association of Rare APOE Missense Variants V236E and R251G With Risk of Alzheimer Disease.** *JAMA neurology*
  Le Guen, Y., Belloy, M. E., Grenier-Boley, B., de Rojas, I., Castillo-Morales, A., Jansen, I., Nicolas, A., Bellenguez, C., Dalmasso, C., Küçükali, F., Eger, S. J., Rasmussen, K. L., Thomassen, et al
  2022
- **Confirming Pathogenicity of the F386L PSEN1 Variant in a South Asian Family With Early-Onset Alzheimer Disease.** *Neurology. Genetics*
  Eger, S. J., Le Guen, Y., Khan, R. R., Hall, J. N., Kennedy, G., Zaharchuk, G., Couthouis, J., Brooks, W. S., Velakoulis, D., Napolioni, V., Belloy, M. E., Dalgard, C. L., Mormino, et al
  1800; 8 (1): e647
- **Challenges at the APOE locus: a robust quality control approach for accurate APOE genotyping.** *Alzheimer's research & therapy*
  Belloy, M. E., Eger, S. J., Le Guen, Y., Damotte, V., Ahmad, S., Ikram, M. A., Ramirez, A., Tsolaki, A. C., Rossi, G., Jansen, I. E., de Rojas, I., Parveen, K., Sleegers, et al
  2022; 14 (1): 22
- **APOE*4-stratified genome-wide association study of Alzheimer's disease in over 350,000 individuals.** *Alzheimer's & dementia : the journal of the Alzheimer's Association*
  Belloy, M. E., Eger, S. J., Guen, Y. L., Kennedy, G., He, Z., Napolioni, V., Greicius, M. D.
  1800; 17 Suppl 3: e055905
- **A Robust Test for Additive Gene-Environment Interaction Under the Trend Effect of Genotype Using an Empirical Bayes-Type Shrinkage Estimator.** *American journal of epidemiology*
  Sanyal, N., Napolioni, V., de Rochemonteix, M., Belloy, M. E., Caporaso, N. E., Landi, M. T., Greicius, M. D., Chatterjee, N., Han, S. S.
  2021

- **A novel age-informed approach for genetic association analysis in Alzheimer's disease.** *Alzheimer's research & therapy*
  Le Guen, Y., Belloy, M. E., Napolioni, V., Eger, S. J., Kennedy, G., Tao, R., He, Z., Greicius, M. D., Alzheimers Disease Neuroimaging Initiative
  2021; 13 (1): 72

- **Common X-chromosome variants are associated with Parkinson's disease risk.** *Annals of neurology*
  Le Guen, Y., Napolioni, V., Belloy, M. E., Yu, E., Krohn, L., Ruskey, J. A., Gan-Or, Z., Kennedy, G., Eger, S. J., Greicius, M. D.
  2021

- **KLVS heterozygosity reduces brain amyloid in asymptomatic at-risk APOE4 carriers.** *Neurobiology of aging*
  Belloy, M. E., Eger, S. J., Le Guen, Y., Napolioni, V., Deters, K. D., Yang, H., Scelsi, M. A., Porter, T., James, S., Wong, A., Schott, J. M., Sperling, R. A., Laws, et al
  2021; 101: 123–29

- **Genome-wide analysis of common and rare variants via multiple knockoffs at biobank scale, with an application to Alzheimer disease genetics.** *American journal of human genetics*
  He, Z., Le Guen, Y., Liu, L., Lee, J., Ma, S., Yang, A. C., Liu, X., Rutledge, J., Losada, P. M., Song, B., Belloy, M. E., Butler, R. R., Longo, et al
  2021

- **Resting Brain Fluctuations Are Intrinsically Coupled to Visual Response Dynamics.** *Cerebral cortex (New York, N.Y. : 1991)*
  Belloy, M. E., Billings, J., Abbas, A., Kashyap, A., Pan, W. J., Hinz, R., Vanreusel, V., Van Audekerke, J., Van der Linden, A., Keilholz, S. D., Verhoye, M., Keliris, G. A.
  2020

- **A Likelihood Ratio Test for Gene-Environment Interaction Based on the Trend Effect of Genotype Under an Additive Risk Model Using the Gene-Environment Independence Assumption.** *American journal of epidemiology*
  de Rochemonteix, M., Napolioni, V., Sanyal, N., Belloy, M. E., Caporaso, N. E., Landi, M. T., Greicius, M. D., Chatterjee, N., Han, S. S.
  2020

- **Association of Klotho-VS Heterozygosity With Risk of Alzheimer Disease in Individuals Who Carry APOE4.** *JAMA neurology*
  Belloy, M. E., Napolioni, V. n., Han, S. S., Le Guen, Y. n., Greicius, M. D.
  2020

- **Bottom-up sensory processing can induce negative BOLD responses and reduce functional connectivity in nodes of the default mode-like network in rats.** *NeuroImage*
  Hinz, R., Peeters, L. M., Shah, D., Missault, S., Belloy, M., Vanreusel, V., Malekzadeh, M., Verhoye, M., Van der Linden, A., Keliris, G. A.
  2019; 197: 167-176

- **Quasi-periodic patterns contribute to functional connectivity in the brain** *NEUROIMAGE*
  Abbas, A., Belloy, M., Kashyap, A., Billings, J., Nezafati, M., Schumacher, E. H., Keilholz, S.
  2019; 191: 193–204

- **Molecular Imaging of Immune Cell Dynamics During De- and Remyelination in the Cuprizone Model of Multiple Sclerosis by [F-18]DPA-714 PET and MRI** *THERANOSTICS*
  Zinnhardt, B., Belloy, M., Fricke, I. B., Orije, J., Guglielmetti, C., Hermann, S., Wagner, S., Schaefers, M., Van der Linden, A., Jacobs, A. H.
  2019; 9 (6): 1523–37

- **A Quarter Century of APOE and Alzheimer's Disease: Progress to Date and the Path Forward.** *Neuron*
  Belloy, M. E., Napolioni, V. n., Greicius, M. D.
  2019; 101 (5): 820–38

- **Dynamic resting state fMRI analysis in mice reveals a set of Quasi-Periodic Patterns and illustrates their relationship with the global signal** *NEUROIMAGE*
  Belloy, M. E., Naeyaert, M., Abbas, A., Shah, D., Vanreusel, V., Van Audekerke, J., Keilholz, S. D., Keliris, G. A., Van der Linden, A., Verhoye, M.
  2018; 180: 463–84

- **Quasi-Periodic Patterns of Neural Activity improve Classification of Alzheimer's Disease in Mice** *SCIENTIFIC REPORTS*
  Belloy, M. E., Shah, D., Abbas, A., Kashyap, A., Rossner, S., Van der Linden, A., Keilholz, S. D., Keliris, G. A., Verhoye, M.
  2018; 8: 10024

PRESENTATIONS

- Klotho-VS heterozygosity reduces risk for Alzheimer’s Disease in APOE4 carriers - B.R.A.I.N. (the Brain’s Resilience and Intelligence Networks) (May 28, 2020)