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Christy M. Kelley

Recent Work History

Research Fellow, Neurodegenerative Disease and Aging Research — 2017–current
Barrow Neurological Institute
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Research Molecular Biologist, Immunology and Genetics — 2013–2016
United States Department of Agriculture
US MARC, Clay Center, NE, 68901, USA, (402) 762-4370

Postdoctoral Research Associate, Neuroscience and Genetics — 2013–2013
Rush University Medical Center, Graduate College
1735 West Harrison Street, Chicago, IL 60612, USA, (312) 563-2563

Education

Doctorate of Philosophy, Neuroscience, Molecular — 2013
Rush University Medical Center
1735 West Harrison Street, Chicago, IL 60612, USA, (312) 563-2563

Bachelor of Arts, Psychology — 2005
California State University, San Bernardino
5500 University Parkway, San Bernardino, CA 92407, USA, (909) 537-5000

Associate of Arts — 2002
San Bernardino Valley College
701 South Mount Vernon Avenue, San Bernardino, CA 92410, USA, (909) 888-6511

Biosketch

At BNI I study molecular alterations to the temporal lobe in chronic traumatic encephalopathy (e.g., deceased NFL athletes) and the posterior cortex in elderly humans who were "successful agers," develop software for bioinformatics workflows and three-dimensional treatment modeling in Parkinson disease, and offer support for various bioinformatics projects that I do not have the time to process myself. The latter includes training neophytes as well as developing pipelines, writing code, and offering data visualization solutions for large-scale data analysis. Currently I am moving my focus more into software development with a focus on automating largescale analysis of sundry datasets in a menu- and button-based interface with which the user can interact. My philosophy for this work is to contribute to a future of science where we, as researchers, will look at disease with an open approach to problem solving grounded in scholarship instead of always searching for what has already been studied (i.e. scholarship driving logic instead of supporting it, or the "Streetlight Effect" in research). Briefly put, I use various dimensional scaling, network, graph theory and divers mathematical models to deliver a new way of looking at data that is grounded in classical mathematical theory taken across disciplines. This delivers "cool" progressive graphics (there really is no better word than "cool," if you'll pardon me) as well as user friendly interfaces with hard science and solid math behind the scenes. I publish everything I do.

Prior to coming to BNI, I worked with NGS and SMRT output on projects including but not limited to, building prokaryotic and eukaryotic genomes, analyzing humoral responses to vaccination and disease using RNA extraction from blood, developing pipelines for looking into environmental prevalence of antimicrobial resistance in metaphylactic vs non-metaphylactic exposed environs, and analyzing a possible evolutionary progression for species specificity to retroviruses (ex. HIV). Regarding this period and the span of projects, I was hired to analyze a set of samples that were lost prior to my arrival; so I ended up spending two and a half years getting involved with every project I could find. Prior to NGS work, I employed membrane microarrays to study gene expression in a maternal intervention nutritional model (choline supplementation from conception to weaning) for improvement of molecular alterations imposed on trisomy 21 offspring (murine model of Down syndrome, Ts65Dn). In addition, I have participated in sundry Alzheimer disease and Down syndrome histological studies; and in grad school, I taught study sessions (20-50 students) to first and second year medical neurobiology students, focusing on pathological neurology.

Knowledge Base

- Neuroscience - theoretical (biology underlying top-to-bottom processing), clinical (anatomy and disease)
- Molecular biology - expression and control of genes, transcripts, and peptides
- Statistics - simple analysis and large data processing
- Data visualization - traditional and novel ways of looking at quantitative results
- Computer programming - Java, R, Python 3.X, HTML

(Note: I am currently picking up JavaScript and PHP for a project and after that SQL and a natural language pipeline if needed for a planned project involving gene ontology and disease. I can learn anything but have become attached to Java over the past few years. I would likely choose a Java servlet with JS or HTML frontage for any software development for internal use, and a Java GUI or the aforementioned for something to sell.) Other - psychology, immunology. mathematics, English language

Computer Aptitude

- Microsoft Word and PowerPoint
- Microsoft Excel
- R
- Java
- SPSS
- EndNote
- NCBI databases Python 3.X
- HTML
- Command line (Linux preferred)
- Various web-based applications and free-ware
- ImageJ
- Geneious (license needed, annual)

Publications

Kelley CM, Gautier MK, Zhang, J, Ginsberg SD, Mufson EJ. (2021) Coansi: A free alternative for stereological measurements in microscope z stacks.

Kelley CM, Liang W, Ginsberg SD, Mufson EJ. (2021) Posterior cingulate cortex RNA-Seq reveals a signature of resilience in cognitively intact elders. [Prepared for submission to Brain]

Mufson EJ, **Kelley CM**, Perez SE. (2021) Chronic traumatic encephalopathy and the nucleus basalis of Meynert in Handbook of Clinical Neurology. Eds. Swaab DF, Lucassen PJ, Salehi A.

Kelley CM, Perez SE, Mufson EJ. (2019) Tau pathology in the medial temporal lobe of athletes with chronic traumatic encephalopathy: A chronic effects of neurotrauma consortium study. Acta Neuropathol Commun. 7(1):207.

Mufson EJ, Perez S, **Kelley CM**, Chu S, Galarza A, Blakely S, Ginsberg SD (2020) Fixation Protocols for Neurohistology: Neurons to Genes. In: Neurohistology and Imaging: Basic Techniques, eds. W Walz and R Doucette. Humana Press, NJ.

Kelley CM, Ginsberg SD, Alldred MJ, Strupp BJ, Mufson EJ. (2019) Maternal choline supplementation alters basal forebrain cholinergic neuron gene expression in the Ts65Dn mouse model of Down syndrome. *Dev Neurobiol*

Bickhart DM, Rosen BD, Koren S, Sayre BL, Hastie AR, Chan S, Lee J, Lam ET, Liachko I, Sullivan ST, Burton JN, Huson HJ, Nystrom JC, **Kelley CM**, Hutchison JL, Zhou Y, Sun J, Crisà A, Ponce de León FA, Schwartz JC, Hammond JA, Waldbieser GC, Schroeder SG, Liu GE, Dunham MJ, Shendure J, Sonstegard TS, Phillippy AM, Van Tassell CP, Smith TP. (2017) Single-molecule sequencing and chromatin conformation capture enable de novo reference assembly of the domestic goat genome. *Nat Genet.* 49(4):643-650.

Powers BE, **Kelley CM**, Velazquez R, Ash JA, Strawderman MS, Alldred MJ, Ginsberg SD, Mufson EJ, Strupp BJ. (2017) Maternal choline supplementation in a mouse model of Down syndrome: Effects on attention and nucleus basalis/substantia innominata neuron morphology in adult offspring. *Neuroscience*.340:501-514.

Powers BE, Velazquez R, **Kelley CM**, Ash JA, Strawderman MS, Alldred MJ, Ginsberg SD, Mufson EJ, Strupp BJ. (2016) Attentional function and basal forebrain cholinergic neuron morphology during aging in the Ts65Dn mouse model of Down syndrome. *Brain Struct Funct*. 221(9):4337-4352

Nguyen SV, Harhay DM, Bono JL, Smith TP, Fields PI, Dinsmore BA, Santovinia M, **Kelley CM**, Wang R, Bosilevac JM, Harhay GP. (2016) Complete, Closed Genome Sequences of Ten *Salmonella enterica* subsp. *enterica* Serotype *Typhimurium* Isolated from Human and Bovine Sources. *Genome Announc*. 4(3). pii: e00447-16.

Massilamany C, Mohammed A, Loy JD, Purvis T, Krishnan B, Basavalingappa RH, **Kelley CM**, Guda C, Barletta RG, Moriyama EN, Smith TPL, Reddy J. (2016) Whole genomic sequence analysis of Bacillus infantis: defining the genetic blueprint of strain NRRL B-14911, an emerging cardiopathogenic microbe. *BMC Genomics.* 17 Suppl 7:511.

Nguyen SV, Harhay DM, Bono JL, Smith TP, Fields PI, Dinsmore BA, Santovenia M, **Kelley CM**, Wang R, Bosilevac JM, Harhay GP. (2016) Complete and Closed Genome Sequences of 10 *Salmonella enterica* subsp. *enterica* Serovar *Anatum* Isolates from Human and Bovine Sources. *Genome Announc*. 4(3). pii: e00447-16.

Harhay DM, Bono JL, Smith TP, Fields PI, Dinsmore BA, Santovenia M, **Kelley CM**, Wang R, Harhay GP. (2016) Complete Closed Genome Sequences of *Salmonella enterica* subsp. enterica Serotypes Anatum, Montevideo, Typhimurium and Newport, Isolated from Beef, Cattle and Humans. *Genome Announc*. 4(1). pii: e01683-15.

Hamlett E, Boger HA, Ledreux A, **Kelley CM**, Mufson EJ, Falangola MF, Guilfoyle DN, Nixon RA, Patterson D, Duval N, Granholm AE. (2016) Cognitive Impairment, Neuroimaging, and Alzheimer Neuropathology in Mouse Models of Down Syndrome. *Curr Alzheimer Res*. 13(1):35-52.

Strupp BJ, Powers BE, Velazquez R, Ash JA, **Kelley CM**, Alldred MJ, Strawderman M, Caudill MA, Mufson EJ, Ginsberg SD. (2016) Maternal choline supplementation: A potential prenatal treatment for Down syndrome and Alzheimer's disease. *Curr Alzheimer Res*. 13(1):97-106.

Nguyen SV, Harhay DM, Bono JL, Smith TP, Fields PI, Dinsmore BA, Santovinia M, **Kelley CM**, Wang R, Bosilevac JM, Harhay GP. (2016) Complete, Closed Genome Sequences of Ten *Salmonella enterica* subsp.

enterica Serotype *Typhimurium* Isolated from Human and Bovine Sources. *Genome Announc*. 4(3). pii: e00447-16.

Massilamany C, Mohammed A, Loy JD, Purvis T, Krishnan B, Basavalingappa RH, **Kelley CM**, Guda C, Barletta RG, Moriyama EN, Smith TPL, Reddy J. (2016) Whole genomic sequence analysis of Bacillus infantis: defining the genetic blueprint of strain NRRL B-14911, an emerging cardiopathogenic microbe. *BMC Genomics.* 17 Suppl 7:511.

Nguyen SV, Harhay DM, Bono JL, Smith TP, Fields PI, Dinsmore BA, Santovenia M, **Kelley CM**, Wang R, Bosilevac JM, Harhay GP. (2016) Complete and Closed Genome Sequences of 10 *Salmonella enterica* subsp. *enterica* Serovar *Anatum* Isolates from Human and Bovine Sources. *Genome Announc*. 4(3). pii: e00447-16.

Harhay DM, Bono JL, Smith TP, Fields PI, Dinsmore BA, Santovenia M, **Kelley CM**, Wang R, Harhay GP. (2016) Complete Closed Genome Sequences of *Salmonella enterica* subsp. enterica Serotypes Anatum, Montevideo, Typhimurium and Newport, Isolated from Beef, Cattle and Humans. *Genome Announc*. 4(1). pii: e01683-15.

Hamlett E, Boger HA, Ledreux A, **Kelley CM**, Mufson EJ, Falangola MF, Guilfoyle DN, Nixon RA, Patterson D, Duval N, Granholm AE. (2016) Cognitive Impairment, Neuroimaging, and Alzheimer Neuropathology in Mouse Models of Down Syndrome. *Curr Alzheimer Res*. 13(1):35-52.

Strupp BJ, Powers BE, Velazquez R, Ash JA, **Kelley CM**, Alldred MJ, Strawderman M, Caudill MA, Mufson EJ, Ginsberg SD. (2016) Maternal choline supplementation: A potential prenatal treatment for Down syndrome and Alzheimer's disease. *Curr Alzheimer Res*. 13(1):97-106.

Kelley CM, Ash JA, Powers BE, Velazquezc R, Alldred MJ, Ikonomovic MD, Ginsberg SD, Strupp BJ, Mufson EJ. (2016) Effects of Maternal Choline Supplementation on the Septohippocampal Cholinergic System in the Ts65Dn Mouse Model of Down Syndrome. *Curr Alzheimer Res*. 13(1):84-96.

Ash JA, Velazquez R, **Kelley CM**, Powers BE, Ginsberg SD, Mufson EJ, Strupp BJ. (2014) Maternal choline supplementation improves spatial mapping and increases basal forebrain cholinergic neuron number and size in aged Ts65Dn mice. *Neurobiol Dis*. 70:32-42.

Kelley CM, Powers BE, Velazquez R, Ash JA, Ginsberg SD, Strupp BJ, Mufson EJ. (2014) Maternal choline supplementation differentially alters the basal forebrain cholinergic system of young-adult Ts65Dn and disomic mice. *J Comp Neurol* 522(6):1390-410.

Kelley CM, Powers BE, Velazquez R, Ash JA, Ginsberg SD, Strupp BJ, Mufson EJ. (2014) Sex differences in the cholinergic basal forebrain in the Ts65Dn mouse model of Down syndrome and Alzheimer's disease. *Brain Pathol* 24(1):33-44.

Velazquez R, Ash JA, Powers BE, **Kelley CM**, Strawderman M, Luscher ZI, Ginsberg SD, Mufson EJ, Strupp BJ. (2013) Maternal choline supplementation improves spatial learning and adult hippocampal neurogenesis in the Ts65Dn mouse model of Down syndrome. *Neurobiol Dis* 58:92-101.

Perez SE, Nadeem M, Sadleir KR, Matras J, **Kelley CM**, Counts SE, Vassar R, Mufson EJ. (2012) Dimebon alters hippocampal amyloid pathology in 3xTg-AD mice. *Int J Physiol Pathophysiol Pharmaco*l 4(3):115-27.

Kelley CM, Perez SE, Overk CR, Wynick D, Mufson EJ. (2011) Effect of neocortical and hippocampal amyloid deposition upon galaninergic and cholinergic neurites in AβPPswe/PS1ΔE9 mice. *J Alzheimers Dis* 25(3):491-504.

Kelley CM (2011) Book Review for Solomon Carter Fuller: Where My Caravan Has Rested by Mary Kaplan. *J Hist Neurosci* 20(2), 166-168.

Kelley CM (2011) Book Review for Consciousness and Mental Life by Daniel N. Robinson. *J Hist Neurosci* 20(2), 168-169.

Overk CR, **Kelley CM**, Mufson EJ. (2009) Brainstem Alzheimer's-like pathology in the triple transgenic mouse model of Alzheimer's disease. *Neurobiol Dis* 35(3):415-25.

Awards and Memberships

- John E. Trufant, Ed.D. Award for Excellence in Graduate College Research from the Rush University Medical Center Graduate College, 2013
- Travel award from the Education and Training Committee of the American Society for Neural Therapy and Repair (ASNTR), Clearwater, Florida, April 25-27, 2013
- Ruth L. Kirschstein Institutional National Research Service Award—NIH Training Grant T32 AG 269, Rush University Medical Center Graduate College, Chicago IL, 2007–2012
- Accepted as a member of Psi Chi, The International Honor Society in Psychology as an undergraduate, 2004