Stanford

Katrin Andreasson

Professor of Neurology

Bio

ACADEMIC APPOINTMENTS

- Professor, Neurology
- Member, Bio-X
- Member, Cardiovascular Institute
- Member, Wu Tsai Neurosciences Institute

PROFESSIONAL EDUCATION

- B.A.S., M.S., Stanford University , Biology Comparative Literature
- M.D., Columbia University College of Physicians & Surgeons , Medicine

LINKS

- Neurology: http://med.stanford.edu/neurology/index.html
- Andreasson Lab Site: http://neurology.stanford.edu/labs/andreassonlab/
- Stanford Alzheimer's Disease Research Center: http://med.stanford.edu/adrc.html

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

We are investigating the role that innate immune responses play in the initiation and progression of neurological diseases. Recent advances in human genetics, particularly for neurodegenerative disorders like Alzheimer’s disease, have highlighted a causal role for a disrupted immune response in disease pathogenesis. An injurious immune response may be a common denominator across many neurological disorders, both acute (brain trauma or stroke) and chronic (epilepsy, Parkinson’s disease, Alzheimer's for eg.). An understanding of how innate immune responses cause neurological disease will be essential if we are to develop disease-modifying therapies for our patients.

Through a systems biology approach, we are identifying novel immune pathways that may play critical roles in maladaptive brain inflammation, and we are working to understand how these responses cause neurodegeneration and circuit disruption. Some of these new pathways are relevant to immune cell metabolism and the effect of metabolic regulators of immune function. Our objectives are (1) to understand how aberrant CNS and/or peripheral innate immune responses cause synapse loss and contribute to the vulnerability of selected circuits in different neurodegenerative disorders, and (2) to develop preventive and therapeutic strategies targeting these inflammatory pathways in patients with neurologic diseases.

Teaching

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Karen Bradshaw, Amelia Farinas, Gabriella Muwanga, Rahul Nagvekar

Postdoctoral Faculty Sponsor

Chinyere Agbaegbu Iweka, Travis Conley, Joshua Crapser, Hannah Ennerfelt, Yuting Tan, Fuwen Yao

Doctoral Dissertation Advisor (NonAC)

Paras Minhas

Doctoral Dissertation Co-Advisor (AC)

Jolie Huang, Yoo Jin Jung

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Immunology (Phd Program)
- Neurosciences (Phd Program)

Publications

PUBLICATIONS

- **Aging disrupts circadian gene regulation and function in macrophages.** *Nature immunology*
  Blacher, E., Tsai, C., Litichevskiy, L., Shipony, Z., Iweka, C. A., Schneider, K. M., Chuluun, B., Heller, H. C., Menon, V., Thaiss, C. A., Andreasson, K. I.
  1800
- **Restoring metabolism of myeloid cells reverses cognitive decline in ageing.** *Nature*
  Minhas, P. S., Latif-Hernandez, A., McReynolds, M. R., Durairaj, A. S., Wang, Q., Rubin, A., Joshi, A. U., He, J. Q., Gauba, E., Liu, L., Wang, C., Linde, M., Sugiura, et al
  2021
- **Soluble TREM2 is elevated in Parkinson's disease subgroups with increased CSF tau.** *Brain : a journal of neurology*
  Wilson, E. N., Swarovski, M. S., Linortner, P. n., Shahid, M. n., Zuckerman, A. J., Wang, Q. n., Channappa, D. n., Minhas, P. S., Mhatre, S. D., Plowey, E. D., Quinn, J. F., Zabetian, C. P., Tian, et al
  2020
- **Peripheral TREM1 responses to brain and intestinal immunogens amplify stroke severity** *Nature Immunology*
  Liu, Q., Johnson, E., et al
  2019
- **Macrophage de novo NAD+ synthesis specifies immune function in aging and inflammation.** *Nature immunology*
  Minhas, P. S., Liu, L., Moon, P. K., Joshi, A. U., Dove, C., Mhatre, S., Contrepois, K., Wang, Q., Lee, B. A., Coronado, M., Bernstein, D., Snyder, M. P., Migaud, et al
  2018
- **Targeting innate immunity for neurodegenerative disorders of the central nervous system.** *Journal of neurochemistry*
  Andreasson, K. I., Bachstetter, A. D., Colonna, M., Ginhoux, F., Holmes, C., Lamb, B., Landreth, G., Lee, D. C., Low, D., Lynch, M. A., Monsonego, A., O'Banion, M. K., Pekny, et al
  2016; 138 (5): 653-693
- **Cyclooxygenase inhibition targets neurons to prevent early behavioural decline in Alzheimer's disease model mice** *BRAIN*
  Woodling, N. S., Colas, D., Wang, Q., Minhas, P., Panchal, M., Liang, X., Mhatre, S. D., Brown, H., Ko, N., Zagol-Ikapitte, I., Van der Hart, M., Khroyan, T. V., Chuluun, et al
  2016; 139: 2063-2081

- **Microglial Malfunction: The Third Rail in the Development of Alzheimer's Disease.** *Trends in neurosciences*
  Mhatre, S. D., Tsai, C. A., Rubin, A. J., James, M. L., Andreasson, K. I.
  2015; 38 (10): 621-636

- **Prostaglandin signaling suppresses beneficial microglial function in Alzheimer's disease models** *JOURNAL OF CLINICAL INVESTIGATION*
  Johansson, J. U., Woodling, N. S., Wang, Q., Panchal, M., Hang, X., Trueba-Saiz, A., Brown, H. D., Mhatre, S. D., Loui, T., Andreasson, K. I.
  2015; 125 (1): 350-364

- **PET imaging of TREM1 identifies CNS-infiltrating myeloid cells in a mouse model of multiple sclerosis.** *Science translational medicine*
  Chaney, A. M., Cropper, H. C., Jain, P., Wilson, E., Simonetta, F., Johnson, E. M., Alam, I. S., Patterson, I. T., Swarovski, M., Stevens, M. Y., Wang, Q., Azevedo, C., Nagy, et al
  2023; 15 (702): eabm6267

- **Myeloid deficiency of the intrinsic clock protein BMAL1 accelerates cognitive aging by disrupting microglial synaptic pruning.** *Journal of neuroinflammation*
  Iweka, C. A., Seigneur, E., Hernandez, A. L., Paredes, S. H., Cabrera, M., Blacher, E., Pasternak, C. T., Longo, F. M., de Lecea, L., Andreasson, K. I.
  2023; 20 (1): 48

- **Performance of a fully-automated Lumipulse plasma phospho-tau181 assay for Alzheimer's disease.** *Alzheimer's research & therapy*
  Wilson, E. N., Young, C. B., Ramos Benitez, J., Swarovski, M. S., Feinstein, I., Vandijck, M., Le Guen, Y., Kasireddy, N. M., Shahid, M., Corso, N. K., Wang, Q., Kennedy, G., Trelle, et al
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- **Limited proteolysis-mass spectrometry reveals aging-associated changes in cerebrospinal fluid protein abundances and structures (vol 2, pg 379, 2022)** *NATURE AGING*
  Shuken, S. R., Rutledge, J., Iram, T., Losada, P., Wilson, E. N., Andreasson, K. I., Leib, R. D., Wyss-Coray, T.
  2022; 2 (5): 455

- **Publisher Correction: Limited proteolysis-mass spectrometry reveals aging-associated changes in cerebrospinal fluid protein abundances and structures.** *Nature aging*
  Shuken, S. R., Rutledge, J., Iram, T., Losada, P. M., Wilson, E. N., Andreasson, K. I., Leib, R. D., Wyss-Coray, T.
  2022; 2 (5): 455

- **Odorant receptors in macrophages: potential targets for atherosclerosis.** *Trends in immunology*
  Wang, C., Andreasson, K. I.
  2022

- **Group 3 innate lymphoid cells produce the growth factor HB-EGF to protect the intestine from TNF-mediated inflammation.** *Nature immunology*
  Zhou, L., Zhou, W., Joseph, A. M., Chu, C., Putzel, G. G., Fang, B., Teng, F., Lyu, M., Yano, H., Andreasson, K. I., Mekada, E., Eberl, G., Sonnenberg, et al
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- **Limited proteolysis–mass spectrometry reveals aging-associated changes in cerebrospinal fluid protein abundances and structures** *Nature Aging*
  Shuken, S. R., Rutledge, J., Iram, T., Moran Losada, P., Wilson, E. N., Andreasson, K. I., Leib, R. D., Wyss-Coray, T.
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- **Plasma Biomarkers of Tau and Neurodegeneration During Major Cardiac and Noncardiac Surgery.** *JAMA neurology*
  Feinstein, I., Wilson, E. N., Swarovski, M. S., Andreasson, K. I., Angst, M. S., Greicius, M. D.
  2021

- **A mitochondrial membrane-bridging machinery mediates signal transduction of intramitochondrial oxidation.** *Nature metabolism*
  Li, L., Conradson, D. M., Bharat, V., Kim, M. J., Hsieh, C., Minhas, P. S., Papakyrikos, A. M., Durairaj, A. S., Ludlam, A., Andreasson, K. I., Partridge, L., Cianfrocco, M. A., Wang, et al
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- **Association of CSF Biomarkers with Hippocampal-dependent Memory in Preclinical Alzheimer Disease.** *Neurology*
  Trelle, A. N., Carr, V. A., Wilson, E. N., Swarovski, M. S., Hunt, M. P., Toueg, T. N., Tran, T. T., Channappa, D. n., Corso, N. K., Thieu, M. K., Jayakumar, M. n., Nadiadwala, A. n., Guo, et al
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- **TAM-ping down amyloid in Alzheimer's disease.** *Nature immunology*
  Wilson, E. N., Andreasson, K. I.

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- **The Dueling Duo: IL10 and TNF Face Off in Microglial Recovery from Endotoxin Challenge.** *Immunity*
  Minhas, P. S., Durairaj, A. S., Andreasson, K. I.
  2020; 53 (5): 897–99

- **TREM1-PET imaging of pro-inflammatory myeloid cells distinguishes active disease from remission in Multiple Sclerosis**
  Chaney, A., Wilson, E., Jain, P., Cropper, H., Swarovski, M., Lucot, K., Vogel, H., Andreasson, K., James, M. L.
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- **Loss of DP1 Aggravates Vascular Remodeling in Pulmonary Arterial Hypertension via mTORC1 Signaling.** *American journal of respiratory and critical care medicine*
  He, Y. n., Zuo, C. n., Jia, D. n., Bai, P. n., Kong, D. n., Chen, D. n., Liu, G. n., Li, J. n., Wang, Y. n., Chen, G. n., Yan, S. n., Xiao, B. n., Zhang, et al
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- **Author Correction: Fragmented mitochondria released from microglia trigger A1 astrocytic response and propagate inflammatory neurodegeneration.** *Nature neuroscience*
  Joshi, A. U., Minhas, P. S., Liddelow, S. A., Haileselassie, B. n., Andreasson, K. I., Dorn, G. W., Mochly-Rosen, D. n.
  2020

- **Mitochondrial dysfunction mediated through dynamin-related protein 1 (Drp1) propagates impairment in blood brain barrier in septic encephalopathy.** *Journal of neuroinflammation*
  Haileselassie, B. n., Joshi, A. U., Minhas, P. S., Mukherjee, R. n., Andreasson, K. I., Mochly-Rosen, D. n.
  2020; 17 (1): 36

- **PGE(2) signaling via the neuronal EP2 receptor increases injury in a model of cerebral ischemia** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Liu, Q., Liang, X., Wang, Q., Wilson, E. N., Lam, R., Wang, J., Kong, W., Tsai, C., Pan, T., Larkin, P. B., Shamloo, M., Andreasson, K. I.
  2019; 116 (20): 10019–24

- **PGE2 signaling via the neuronal EP2 receptor increases injury in a model of cerebral ischemia.** *Proceedings of the National Academy of Sciences of the United States of America*
  Liu, Q. n., Liang, X. n., Wang, Q. n., Wilson, E. N., Lam, R. n., Wang, J. n., Kong, W. n., Tsai, C. n., Pan, T. n., Larkin, P. B., Shamloo, M. n., Andreasson, K. I.
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- **Aldehyde dehydrogenase 2 activity and aldehydic load contribute to neuroinflammation and Alzheimer's disease related pathology.** *Acta neuropathologica communications*
  Joshi, A. U., Van Wassenhove, L. D., Logas, K. R., Minhas, P. S., Andreasson, K. I., Weinberg, K. I., Chen, C. H., Mochly-Rosen, D. n.
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- **Therapeutic strategies for diffuse midline glioma from high-throughput combination drug screening.** *Science translational medicine*
  Lin, G. L., Wilson, K. M., Ceribelli, M. n., Stanton, B. Z., Woo, P. J., Kreimer, S. n., Qin, E. Y., Zhang, X. n., Lennon, J. n., Nagaraja, S. n., Morris, P. J., Quezada, M. n., Gillespie, et al
  2019; 11 (519)

- **Fragmented mitochondria released from microglia trigger A1 astrocytic response and propagate inflammatory neurodegeneration.** *Nature neuroscience*
  Joshi, A. U., Minhas, P. S., Liddelow, S. A., Haileselassie, B. n., Andreasson, K. I., Dorn, G. W., Mochly-Rosen, D. n.
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- **Macrophage de novo NAD(+) synthesis specifies immune function in aging and inflammation** *NATURE IMMUNOLOGY*
  Minhas, P. S., Liu, L., Moon, P. K., Joshi, A. U., Dove, C., Mhatre, S., Contrepois, K., Wang, Q., Lee, B. A., Coronado, M., Bernstein, D., Snyder, M. P., Migaud, et al
  2019; 20 (1): 50-+

- **TREM1-TARGETED PET IMAGING OF TUMOR-ASSOCIATED MACROPHAGES IN AN ORTHOTOPIC GLIOBLASTOMA MOUSE MODEL**
  Johnson, E., Murty, S., Mayer, A., Tsai, C., Mehta, S., Ilovich, O., Massoud, T., Andreasson, K., James, M.
  OXFORD UNIV PRESS INC.2017: 249

- **Anti-Inflammatory and Neuroprotective Effects of PGE(2) EP4 Signaling in Models of Parkinson's Disease** *JOURNAL OF NEUROIMMUNE PHARMACOLOGY*
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  Oskolkova, O., Gawlak, G., Tian, Y., Ke, Y., Sarich, N., Son, S., Andreasson, K., Bochkov, V. N., Birukova, A. A., Birukov, K. G.
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- **Regulation of lung endothelial permeability and inflammatory responses by prostaglandin A2: role of EP4 receptor.** *Molecular biology of the cell*
  Ohmura, T., Tian, Y., Sarich, N., Ke, Y., Meliton, A., Shah, A. S., Andreasson, K., Birukov, K. G., Birukova, A. A.
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- **Gpr124 is essential for blood-brain barrier integrity in central nervous system disease** *NATURE MEDICINE*
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- **DEVELOPMENT AND EVALUATION OF A NEW HIGHLY SPECIFIC TREM1-SPECIFIC PET TRACER FOR IMAGING MALADAPTIVE INFLAMMATION**
  Johnson, E. M., Mayer, A., Wang, Q., Tsai, C., Mehta, S., Habte, B., Ilovich, O., Massoud, T. F., Andreasson, K. I., James, M. L.
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- **Anti-Inflammatory and Neuroprotective Effects of PGE2 EP4 Signaling in Models of Parkinson's Disease.** *Journal of neuroimmune pharmacology*
  Pradhan, S. S., Salinas, K., Garduno, A. C., Johansson, J. U., Wang, Q., Manning-Bog, A., Andreasson, K. I.
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- **Myeloid Cell Prostaglandin E-2 Receptor EP4 Modulates Cytokine Production but Not Atherogenesis in a Mouse Model of Type 1 Diabetes** *PLOS ONE*
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  2016; 11 (6)

- **Untangling the Web: Toxic and Protective Effects of Neuroinflammation and PGE(2) Signaling in Alzheimer's Disease** *ACS CHEMICAL NEUROSCIENCE*
  Woodling, N. S., Andreasson, K. I.
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- **Microarray analysis of the in vivo response of microglia to Aß peptides in mice with conditional deletion of the prostaglandin EP2 receptor.** *Genomics data*
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- **Signaling in Models of Alzheimer's Disease.** *Current immunology reviews*
  Johansson, J. U., Woodling, N. S., Shi, J., Andreasson, K. I.
  2015; 11 (2): 125-131

- **Through-skull fluorescence imaging of the brain in a new near-infrared window** *NATURE PHOTONICS*
  Hong, G., Diao, S., Chang, J., Antaris, A. L., Chen, C., Zhang, B., Zhao, S., Atochin, D. N., Huang, P. L., Andreasson, K. I., Kuo, C. J., Dai, H.
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- **Through-skull fluorescence imaging of the brain in a new near-infrared window.** *Nature photonics*
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  Woodling, N. S., Wang, Q., Priyam, P. G., Larkin, P., Shi, J., Johansson, J. U., Zagol-Ikapitte, I., Boutaud, O., Andreasson, K. I.
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- **Commentary: Progressive inflammation as a contributing factor to early development of Parkinson's disease.** *Experimental neurology*
  Pradhan, S., Andreasson, K.
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- **Investigating the role of prostaglandin E2 mediated neuroinflammation in models of Parkinsonism** *11th International Congress of Neuroimmunology (ISNI)*
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- **Function of prostaglandin E-2 EP receptors in the acute outcome of rodent hypoxic ischemic encephalopathy** *NEUROSCIENCE LETTERS*
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  Grabrucker, A. M., Schmeisser, M. J., Udvardi, P. T., Arons, M., Schoen, M., Woodling, N. S., Andreasson, K. I., Hof, P. R., Buxbaum, J. D., Garner, C. C., Boeckers, T. M.
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- **Emerging roles of PGE(2) receptors in models of neurological disease** *PROSTAGLANDINS & OTHER LIPID MEDIATORS*
  Andreasson, K.
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- **The organotypic hippocampal slice culture model for examining neuronal injury.** *Journal of visualized experiments : JoVE*
  Wang, Q., Andreasson, K.
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- **Function of COX-2 and prostaglandins in neurological disease** *International Workshop on Brain Uptake and Utilization of Fatty Acids, Lipids and Lipoproteins*
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