Stanford



Katrin Andreasson

Edward F. and Irene Thiele Pimley Professor of Neurology and Neurological Sciences

CONTACT INFORMATION

- **Alternate Contact**

  Annie Shiau

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Bio

ACADEMIC APPOINTMENTS

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

HONORS AND AWARDS

- Arc Ignite Award, Arc Institute (2025)
- Inge Grundke-Iqbal Award, The Alzheimer's Association (2025)
- Arc Ignite Award, Arc Institute (2023)

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: https://med.stanford.edu/andreasson-lab.html
- Stanford Alzheimer’s Disease Research Center: https://med.stanford.edu/adrc.html
- Stanford Immunology: https://med.stanford.edu/immunol/phd-program.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)

Sofia Guerrero

Postdoctoral Faculty Sponsor

Travis Conley, Hannah Ennerfelt, Yoo Jin Genie Jung, Tae Hyun Kweon, Manling Xie

Doctoral Dissertation Advisor (AC)

Christopher Heron, Genper Wong

Postdoctoral Research Mentor

Jolie Huang

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Immunology (PhD Program)
- Neurosciences (PhD Program)

Publications

PUBLICATIONS

- **Restored clearance of senescent neutrophils by tissue-resident macrophages limits organ aging.** *Science (New York, N.Y.)*
  Tan, Y. J., Conley, T. E., Yao, F., García-Marqués, F. J., Akinyemi, D. E., Dinh, V. V., Wang, Q., Bermudez, A., Kim, J., Belk, J. A., Soehnlein, O., Pitteri, S. J., Andreasson, et al
  2026; 393 (6808): eaea3075

- **Parkinson's disease is characterized by vitamin B6-dependent inflammatory kynurenine pathway dysfunction.** *Research square*
  Wilson, E., Umans, J., Swarovski, M., Minhas, P., Midttun, Ø., Ulvik, A. A., Shahid-Besanti, M., Linortner, P., Mhatre, S., Wang, Q., Channappa, D., Corso, N., Tian, et al
  2024

- **Restoring hippocampal glucose metabolism rescues cognition across Alzheimer's disease pathologies.** *Science (New York, N.Y.)*
  Minhas, P. S., Jones, J. R., Latif-Hernandez, A., Sugiura, Y., Durairaj, A. S., Wang, Q., Mhatre, S. D., Uenaka, T., Crapser, J., Conley, T., Ennerfelt, H., Jung, Y. J., Liu, et al
  2024; 385 (6711): eabm6131

- **TREM1 disrupts myeloid bioenergetics and cognitive function in aging and Alzheimer disease mouse models.** *Nature neuroscience*
  Wilson, E. N., Wang, C., Swarovski, M. S., Zera, K. A., Ennerfelt, H. E., Wang, Q., Chaney, A., Gauba, E., Ramos Benitez, J. A., Le Guen, Y., Minhas, P. S., Panchal, M., Tan, et al
  2024

- **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

- **Reduced expression of the cell intrinsic clock protein Bmal1 in myeloid cells accelerates cognitive decline and alters microglial function in aging mice**
  Iweka, C., Seigneur, E., Latif-Hernandez, A., Paredes, S., Cabrera, M., Blacher, E., Wang, Q., Longo, F., DeLecea, L., Andreasson, K.
  AMER SOC CELL BIOLOGY.2023: 761

- **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

- **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

- **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-+

- **Anti-Inflammatory and Neuroprotective Effects of PGE(2) 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.
  2017; 12 (2): 292-304

- **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

- **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.
  2016; 7 (4): 454-463

- **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

- **Microarray analysis of the in vivo response of microglia to Aß peptides in mice with conditional deletion of the prostaglandin EP2 receptor.** *Genomics data*
  Johansson, J. U., Woodling, N. S., Brown, H. D., Wang, Q., Andreasson, K. I.
  2015; 5: 268-271

- **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

- **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
- **Protection by vascular prostaglandin E-2 signaling in hypoxic-ischemic encephalopathy** *EXPERIMENTAL NEUROLOGY*
  Taniguchi, H., Anacker, C., Wang, Q., Andreasson, K.
  2014; 255: 30-37
- **Suppression of Alzheimer-Associated Inflammation by Microglial Prostaglandin-E-2 EP4 Receptor Signaling** *JOURNAL OF NEUROSCIENCE*
  Woodling, N. S., Wang, Q., Priyam, P. G., Larkin, P., Shi, J., Johansson, J. U., Zagol-Ikapitte, I., Boutaud, O., Andreasson, K. I.
  2014; 34 (17): 5882-5894
- **Suppression of Inflammation with Conditional Deletion of the Prostaglandin E-2 EP2 Receptor in Macrophages and Brain Microglia** *JOURNAL OF NEUROSCIENCE*
  Johansson, J. U., Pradhan, S., Lokteva, L. A., Woodling, N. S., Ko, N., Brown, H. D., Wang, Q., Loh, C., Cekanaviciute, E., Buckwalter, M., Manning-Bog, A. B., Andreasson, K. I.
  2013; 33 (40): 16016-16032
- **Investigating the role of prostaglandin E2 mediated neuroinflammation in models of Parkinsonism** *11th International Congress of Neuroimmunology (ISNI)*
  Pradhan, S., Johansson, J., Wang, Q., Ko, N., Manning-Bog, A., Andreasson, K.
  ELSEVIER SCIENCE BV.2012: 111–12
- **Inflammatory prostaglandin E2 signaling in a mouse model of Alzheimer disease** *ANNALS OF NEUROLOGY*
  Shi, J., Wang, Q., Johansson, J. U., Liang, X., Woodling, N. S., Priyam, P., Loui, T. M., Merchant, M., Breyer, R. M., Montine, T. J., Andreasson, K.
  2012; 72 (5): 788-798
- **Signaling via the prostaglandin E-2 receptor EP4 exerts neuronal and vascular protection in a mouse model of cerebral ischemia** *JOURNAL OF CLINICAL INVESTIGATION*
  Liang, X., Lin, L., Woodling, N. S., Wang, Q., Anacker, C., Pan, T., Merchant, M., Andreasson, K.
  2011; 121 (11): 4362-4371
- **Function of prostaglandin E-2 EP receptors in the acute outcome of rodent hypoxic ischemic encephalopathy** *NEUROSCIENCE LETTERS*
  Taniguchi, H., Anacker, C., Suarez-Mier, G. B., Wang, Q., Andreasson, K.
  2011; 504 (3): 185-190
- **The Prostaglandin E-2 E-Prostanoid 4 Receptor Exerts Anti-Inflammatory Effects in Brain Innate Immunity** *JOURNAL OF IMMUNOLOGY*
  Shi, J., Johansson, J., Woodling, N. S., Wang, Q., Montine, T. J., Andreasson, K.
  2010; 184 (12): 7207-7218
- **Prostaglandin signalling in cerebral ischaemia** *BRITISH JOURNAL OF PHARMACOLOGY*
  Andreasson, K.
  2010; 160 (4): 844-846
- **Emerging roles of PGE(2) receptors in models of neurological disease** *PROSTAGLANDINS & OTHER LIPID MEDIATORS*
  Andreasson, K.
  2010; 91 (3-4): 104-112
- **The organotypic hippocampal slice culture model for examining neuronal injury.** *Journal of visualized experiments : JoVE*
  Wang, Q., Andreasson, K.
  2010
- **Prostaglandin E-2-EP4 receptor agonist protects neonatal brain from hypoxia-ischemia**
  Taniguchi, H., Anacker, C., Liang, X., Wang, Q., Sabar, F., Andreasson, K.
  NATURE PUBLISHING GROUP.2009: S541
- **Impaired cognition, sensorimotor gating, and hippocampal long-term depression in mice lacking the prostaglandin E2 EP2 receptor** *EXPERIMENTAL NEUROLOGY*
  Savonenko, A., Munoz, P., Melnikova, T., Wang, Q., Liang, X., Breyer, R. M., Montine, T. J., Kirkwood, A., Andreasson, K.

2009; 217 (1): 63-73

- **The prostaglandin E-2 EP2 receptor accelerates disease progression and inflammation in a model of amyotrophic lateral sclerosis** *ANNALS OF NEUROLOGY*
  Liang, X., Wang, Q., Shi, J., Lokteva, L., Breyer, R. M., Montine, T. J., Andreasson, K.
  2008; 64 (3): 304-314
- **Misoprostol, an anti-ulcer agent and PGE(2) receptor agonist, protects against cerebral ischemia** *NEUROSCIENCE LETTERS*
  Li, J., Liang, X., Wang, Q., Breyer, R. M., McCullough, L., Andreasson, K.
  2008; 438 (2): 210-215
- **Function of prostaglandin receptors in models of neurological disease**
  Andreasson, K. I.
  BLACKWELL PUBLISHING.2008: 12–13
- **The hypoxic-ischemic encephalopathy model of perinatal ischemia.** *Journal of visualized experiments : JoVE*
  Taniguchi, H., Andreasson, K.
  2008
- **Divergent effects of prostaglandin receptor signaling on neuronal survival** *NEUROSCIENCE LETTERS*
  Wu, L., Wang, Q., Liang, X., Andreasson, K.
  2007; 421 (3): 253-258
- **Function of COX-2 and prostaglandins in neurological disease** *International Workshop on Brain Uptake and Utilization of Fatty Acids, Lipids and Lipoproteins*
  Liang, X., Wu, L., Wang, Q., Hand, T., Bilak, M., McCullough, L., Andreasson, K.
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- **Cycloxygenase-2 activity promotes cognitive deficits but not increased amyloid burden in a model of Alzheimer's disease in a sex-dimorphic pattern** *NEUROSCIENCE*
  Melnikova, T., Savonenko, A., Wang, Q., Liang, X., Hand, T., Wu, L., Kaufmann, W. E., Vehmas, A., Andreasson, K. I.
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- **Deletion of the prostaglandin E-2 EP2 receptor reduces oxidative damage and amyloid burden in a model of Alzheimer's disease** *JOURNAL OF NEUROSCIENCE*
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- **Neuroprotection by the PGE(2) EP2 receptor in permanent focal cerebral ischemia** *ANNALS OF NEUROLOGY*
  Liu, D., Wu, L. J., Breyer, R., Mattson, M. P., Andreasson, K.
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- **Prostaglandin D-2 mediates neuronal protection via the DP1 receptor** *JOURNAL OF NEUROCHEMISTRY*
  Liang, X. B., Wu, L. J., Hand, T., Andreasson, K.
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- **PGE(2) receptors rescue motor neurons in a model of amyotrophic lateral sclerosis** *ANNALS OF NEUROLOGY*
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- **Neuroprotective function of the PGE(2) EP2 receptor in cerebral ischemia** *JOURNAL OF NEUROSCIENCE*
  McCullough, L., Wu, L. J., Haughey, N., Liang, X. B., Hand, T., Wang, Q., Breyer, R. M., Andreasson, K.
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- **Neuronal overexpression of cyclooxygenase-2 increases cerebral infarction** *31st Annual Meeting of the Society-for-Neuroscience*
  Dore, S., Otsuka, T., Mito, T., Sugo, N., Hand, T., Wu, L. J., Hurn, P. D., Traystman, R. J., Andreasson, K.
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- **Neuronal overexpression of COX-2 results in dominant production of PGE(2) and altered fever response** *NEUROMOLECULAR MEDICINE*
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- **Plasma P-Tau217 as a Prognostic, Monitoring, and Risk-Stratification Biomarker of Clinical Progression in Lewy Body Disease.** *Neurology*
  Lorkiewicz, S. A., Abdelnour, C., Bolen, M. L., Smith, A. M., Shahid-Besanti, M., Hemachandra, D., Müller-Oehring, E. M., Siddiqui, N., Montoliu-Gaya, L., Arslan, B., Ashton, N. J., Wilson, E. N., Tian, et al
  2026; 107 (11): e218686
- **Alzheimer's disease blood biomarkers reveal proteomic modules of disease progression.** *medRxiv : the preprint server for health sciences*
  Butler, R. R., Brown, M. P., Weber, A. J., Cary, G. A., Le Guen, Y., Losada, P. M., Mendiola, J. H., Henderson, V. W., Sha, S. J., Poston, K. L., Andreasson, K. I., Wagner, A. D., Mormino, et al
  2026
- **A new blueprint of brain border immunity.** *Nature immunology*
  Ennerfelt, H. E., Andreasson, K. I.
  2026
- **Parkinson's disease is characterized by vitamin B6-dependent inflammatory kynurenine pathway dysfunction.** *NPJ Parkinson's disease*
  Wilson, E. N., Umans, J., Swarovski, M. S., Minhas, P. S., Mendiola, J. H., Midttun, Ø., Ulvik, A., Shahid-Besanti, M., Linortner, P., Mhatre, S. D., Wang, Q., Channappa, D., Corso, et al
  2025; 11 (1): 96
- **Unveiling the age related metabolic shift of innate immune cells in response to stroke injury**
  Iweka, C., Cabrera, M., Blacher, E., Alexandrova, L., Mcreynolds, M., Andreasson, K.
  AMER SOC CELL BIOLOGY.2024
- **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
  2022; 14 (1): 172
- **Odorant receptors in macrophages: potential targets for atherosclerosis.** *Trends in immunology*
  Wang, C., Andreasson, K. I.
  2022
- **TAM-ping down amyloid in Alzheimer's disease.** *Nature immunology*
  Wilson, E. N., Andreasson, K. I.
  2021
- **The Dueling Duo: IL10 and TNF Face Off in Microglial Recovery from Endotoxin Challenge.** *Immunity*
  Minhas, P. S., Durairaj, A. S., 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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