

Stanford



Katrin Andreasson

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Neurology & Neurological Sciences

CONTACT INFORMATION

- **Alternate Contact**

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Bio

ACADEMIC APPOINTMENTS

- Professor - Med Center Line, Neurology & Neurological Sciences
- 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

COURSES

2018-19

- Neurobiology of Disease Seminar: NENS 205 (Win)

2016-17

- Neuroscience Core Curriculum: Translational Neuroscience: NENS 207, NEPR 214 (Spr)

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Chinyere Agbaegbu Iweka, Eran Blacher, Esha Gauba, Congcong Wang, Ted Wilson

Doctoral Dissertation Advisor (NonAC)

Paras Minhas

Doctoral Dissertation Reader (NonAC)

Liana Bonanno, Kendra Lechtenberg, Tawaun Lucas

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

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

Publications

PUBLICATIONS

- **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
- **Gpr124 is essential for blood-brain barrier integrity in central nervous system disease** *NATURE MEDICINE*
Chang, J., Mancuso, M. R., Maier, C., Liang, X., Yuki, K., Yang, L., Kwong, J. W., Wang, J., Rao, V., Vallon, M., Kosinski, C., Zhang, J. J., Mah, et al
2017; 23 (4): 450-?
- **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
- **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
- **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
- **Reversal of Paralysis and Reduced Inflammation from Peripheral Administration of beta-Amyloid in T(H)1 and T(H)17 Versions of Experimental Autoimmune Encephalomyelitis** *SCIENCE TRANSLATIONAL MEDICINE*
Grant, J. L., Ghosn, E. E., Axtell, R. C., Herges, K., Kuipers, H. F., Woodling, N. S., Andreasson, K., Herzenberg, L. A., Herzenberg, L. A., Steinman, L.
2012; 4 (145)
- **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
- **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
- **Emerging roles of PGE(2) receptors in models of neurological disease** *PROSTAGLANDINS & OTHER LIPID MEDIATORS*
Andreasson, K.
2010; 91 (3-4): 104-112
- **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
- **Deletion of the prostaglandin E-2 EP2 receptor reduces oxidative damage and amyloid burden in a model of Alzheimer's disease** *JOURNAL OF NEUROSCIENCE*
Liang, X. B., Wang, Q., Hand, T., Wu, L. J., Breyer, R. M., Montine, T. J., Andreasson, K.
2005; 25 (44): 10180-10187
- **Cyclooxygenase-dependent lipid-modification of brain proteins** *BRAIN PATHOLOGY*
Boutaud, O., Andreasson, K. I., Zagol-Ikapitte, I., Oates, J.
2005; 15 (2): 139-142
- **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.
2004; 24 (1): 257-268
- **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
- **Peripheral TREM1 responses to brain and intestinal immunogens amplify stroke severity** *Nature Immunology*
Liu, Q., Johnson, E., et al
2019
- **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.
2019; 7 (1): 190

- **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., Andreasson, K. I., Dorn, G. W., Mochly-Rosen, D.
2019; 22 (10): 1635–48
- **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., Contrepolis, K., Wang, Q., Lee, B. A., Coronado, M., Bernstein, D., Snyder, M. P., Migaud, et al
2019; 20 (1): 50-+
- **Therapeutic strategies for diffuse midline glioma from high-throughput combination drug screening.** *Science translational medicine*
Lin, G. L., Wilson, K. M., Cerbelli, M., Stanton, B. Z., Woo, P. J., Kreimer, S., Qin, E. Y., Zhang, X., Lennon, J., Nagaraja, S., Morris, P. J., Quezada, M., Gillespie, et al
2019; 11 (519)
- **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., 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
- **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*
Pradhan, S. S., Salinas, K., Garduno, A. C., Johansson, J. U., Wang, Q., Manning-Bog, A., Andreasson, K. I.
2017; 12 (2): 292-304
- **Prostaglandin E receptor-4 receptor mediates endothelial barrier-enhancing and anti-inflammatory effects of oxidized phospholipids.** *FASEB journal*
Oskolkova, O., Gawlak, G., Tian, Y., Ke, Y., Sarich, N., Son, S., Andreasson, K., Bochkov, V. N., Birukova, A. A., Birukov, K. G.
2017
- **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.
2017
- **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.
WILEY.2017: 15
- **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.
2016: -?
- **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
- **Myeloid Cell Prostaglandin E-2 Receptor EP4 Modulates Cytokine Production but Not Atherogenesis in a Mouse Model of Type 1 Diabetes** *PLOS ONE*
Vallerie, S. N., Kramer, F., Barnhart, S., Kanter, J. E., Breyer, R. M., Andreasson, K. I., Bornfeldt, K. E.
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.
2016; 7 (4): 454-463
- **Microarray analysis of the in vivo response of microglia to Aβ 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
- **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.
2014; 8 (9): 723-730
- **Protection by vascular prostaglandin E-2 signaling in hypoxic-ischemic encephalopathy** *EXPERIMENTAL NEUROLOGY*
Taniguchi, H., Anacker, C., Wang, Q., Andreasson, K.
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- **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.
2014; 8 (9): 723-30
- **Commentary: Progressive inflammation as a contributing factor to early development of Parkinson's disease.** *Experimental neurology*
Pradhan, S., Andreasson, K.
2013; 241: 148-155
- **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.
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- **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
- **Amyloid beta protein-induced zinc sequestration leads to synaptic loss via dysregulation of the ProSAP2/Shank3 scaffold** *MOLECULAR NEURODEGENERATION*
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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- **Prostaglandin signalling in cerebral ischaemia** *BRITISH JOURNAL OF PHARMACOLOGY*
Andreasson, K.
2010; 160 (4): 844-846
- **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
- **Small Molecule, Non-Peptide p75(NTR) Ligands Inhibit A beta-Induced Neurodegeneration and Synaptic Impairment** *PLOS ONE*
Yang, T., Knowles, J. K., Lu, Q., Zhang, H., Arancio, O., Moore, L. A., Chang, T., Wang, Q., Andreasson, K., Rajadas, J., Fuller, G. G., Xie, Y., Massa, et al
2008; 3 (11)
- **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

- **COX-2 oxidative metabolism of endocannabinoids augments hippocampal synaptic plasticity** *MOLECULAR AND CELLULAR NEUROSCIENCE*
Yang, H., Zhang, J., Andreasson, K., Chen, C.
2008; 37 (4): 682-695

- **Function of prostaglandin receptors in models of neurological disease**
Andreasson, K. I.
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- **The hypoxic-ischemic encephalopathy model of perinatal ischemia.** *Journal of visualized experiments : JoVE*
Taniguchi, H., Andreasson, K.
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- **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*
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- **Trial of celecoxib in amyotrophic lateral sclerosis** *ANNALS OF NEUROLOGY*
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2006; 60 (1): 22-31

- **Cyclooxygenase-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.
2006; 141 (3): 1149-1162

- **Sex differences in cell death** *ANNALS OF NEUROLOGY*
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2005; 58 (2): 317-321

- **Prostaglandin H-2-derived adducts of proteins correlate with Alzheimer's disease severity** *JOURNAL OF NEUROCHEMISTRY*
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- **Neuroprotection by the PGE(2) EP2 receptor in permanent focal cerebral ischemia** *ANNALS OF NEUROLOGY*
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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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- **Neuronal overexpression of cyclooxygenase-2 increases cerebral infarction** *31st Annual Meeting of the Society-for-Neuroscience*
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- **Neuronal overexpression of COX-2 results in dominant production of PGE(2) and altered fever response** *NEUROMOLECULAR MEDICINE*
Vidensky, S., Zhang, Y., Hand, T., Goellner, J., Shaffer, A., Isakson, P., Andreasson, K.
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- **Age-dependent cognitive deficits and neuronal apoptosis in cyclooxygenase-2 transgenic mice** *JOURNAL OF NEUROSCIENCE*
Andreasson, K. I., Savonenko, A., Vidensky, S., Goellner, J. J., Zhang, Y., Shaffer, A., Kaufmann, W. E., Worley, P. F., Isakson, P., Markowska, A. L.
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- **Cyclooxygenases and the central nervous system** *PROSTAGLANDINS & OTHER LIPID MEDIATORS*
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- **A large family of putative transmembrane receptors homologous to the product of the Drosophila tissue polarity gene frizzled** *JOURNAL OF BIOLOGICAL CHEMISTRY*
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Yamagata, K., Kaufmann, W. E., Lanahan, A., Papapavlou, M., Barnes, C. A., Andreasson, K. I., Worley, P. F.
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- **EXPRESSION OF A MITOGEN-INDUCIBLE CYCLOOXYGENASE IN BRAIN NEURONS - REGULATION BY SYNAPTIC ACTIVITY AND GLUCOCORTICOIDS** *NEURON*
Yamagata, K., Andreasson, K. I., Kaufmann, W. E., Barnes, C. A., Worley, P. F.
1993; 11 (2): 371-386