Kelsie Ann Eichel, PhD

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Education and Training

2017-present **Stanford University**
HHMI Hanna Gray Fellow, Damon Runyon Postdoctoral Fellow
Adviser: Dr. Kang Shen

2011-2017 **University of California, San Francisco**
Ph.D. in Biochemistry & Molecular Biology, NSF Graduate Fellowship
Adviser: Dr. Mark von Zastrow

2006-2010 **Northwestern University**
BA, Program Honors Biological Sciences
Honors Thesis Adviser: Dr. Richard Morimoto

Research Experience

2017-present *Postdoctoral Fellow*, **Kang Shen Lab**, Stanford University & HHMI

- Discovered that multiple *C. elegans* neurons have axon initial segments and established an *in vivo* developmental model to study neuronal polarity
- Elucidated a novel endocytic clearance mechanism in the axon initial segment that is critical for neuronal polarity
- Established a cross-translational platform to translate *C. elegans* findings to induced human neurons

2013-2017 *Graduate Student*, **Mark von Zastrow Lab**, UCSF

- Discovered an unexpected behavior of β-arrestins, critical regulators of G protein-coupled receptors (GPCR), that suggests novel drug development strategies
- Delineated β-arrestin activation cycle in which the GPCR is a catalyst for β-arrestin activation instead of a co-scaffold
- Initiated collaborations to gain structural, biophysical, and biochemical insight into β-arrestin activation

2010-2011 *Research Technician,* **Ilya Ruvinsky Lab**, University of Chicago

- Elucidated aspects of transcriptional regulatory logic suggesting that only simpler aspects, such as an on-off heat shock response, are retained over evolutionary time
- Identified a genetic modifier of a toxic single neonatal diabetes mutation in the insulin gene

Publications

Eichel K, Jullié D, Barsi-Rhyne B, Latorraca LR, Masureel M, Sibarita JB, Dror RO, von Zastrow M. Catalytic activation of β-arrestin by GPCRs. ***Nature*** (2018) 557(7705), 381–386.

- Previewed in *Nature* 'News and Views:' B. Krumm and B. Roth. Activation mechanisms for a universal signalling protein. *Nature* 557, 318-319 (2018).
- Highlighted in *Cell Research* 'Research Highlight:' A. Kahsai, B. Pani, and RJ Lefkowitz. GPCR signaling: conformational activation of arrestins. *Cell Research* (2018).

Eichel K and von Zastrow M. Subcellular organization of GPCR signaling. ***Trends Pharmacol Sci*** (2018), 39(2), 200-208.

Liang SI, van Lengerich B, **Eichel K**, Cha M, Patterson, DM, Yoon, TY, von Zastrow M, Jura N, Gartner ZJ. Phosphorylated EGFR Dimers Are Not Sufficient to Activate Ras. ***Cell Rep*** (2018), 22(10), 2593-2600.

O'Hayre M, **Eichel K***, Avino S*, Zhao X, Feng, X, Kawakami K, Aoki J, Inoue A, von Zastrow M, and Gutkind JS. Genetic evidence that β-arrestins are dispensable for the initiation of β2-adrenergic receptor signaling to ERK. ***Sci Signal*** (2017), 484(10).

Lobingier BT*, Hüttenhain R*, **Eichel K**, Miller KB, Ting AY, Krogan NJ, von Zastrow M. A method for spatially and temporally resolved protein network interrogation in living cells. ***Cell*** (2017), 169(2), 350-360.

Eichel K, Jullié D, and von Zastrow M. β-arrestin drives MAP kinase signaling from clathrin-coated structures after GPCR dissociation. ***Nat Cell Bio*** (2016), 18(3), 303-10.

- Highlighted in *Current Biology* in 'Dispatch' section: Ranjan, R et al. GPCR Signaling: β-arrestins Kiss and Remember. *Curr Bio* (2016), 26(7), 285-288.
- Faculty of 1000 evaluations: Rated as an 'Excellent' article in F1000 Prime Review

He Z, **Eichel K**, and Ruvinsky I. Functional conservation of *cis*-regulatory elements of heat-shock genes over long evolutionary distances. ***PLoS ONE*** (2011), 6(7), e22677

*denotes equal contribution

Manuscripts in preparation

Eichel K, Uenaka T, Cheng S, Pak J, Taylor CA, Wernig M, Özkan E, and Shen K. Neuronal polarity requires an endocytic clearance mechanism in the axon initial segment.

Grants and Fellowships

2020-present Howard Hughes Medical Institute Hanna H. Gray Fellowship
- $1.4 million over 8 years, provides postdoctoral and faculty phase funding

2018-2020 Damon Runyon Postdoctoral Fellowship (ended early for Hanna Gray Fellowship)
2018 Jane Coffin Childs Postdoctoral Fellowship (declined for Damon Runyon Fellowship)
2013-2016 National Science Foundation Graduate Research Fellowship

Awards and Honors

2020 Yale University Kavli Neuroscience Institute SYNAPSES Seminar Series selection
2018 Merton Bernfield Memorial Award of the American Society for Cell Biology
2017 Harold M. Weintraub Graduate Student Award
2015 American Society for Cell Biology (ASCB) Travel Award
2015 Associated Students of the Graduate Division Travel Award (UCSF)
2013 Outstanding Teaching Assistant Award, UCSF Tetrad Program
2010 Irving M. Klotz Prize in Basic Research, Northwestern University

Invited Talks (International Conferences)

ASCB (American Society for Cell Biology) Annual Conference

2020 Cell polarity signaling in neurons subgroup: Neuronal polarity requires endocytosis in the axon initial segment. Virtual
2018 Organelle homeostasis minisymposium (Bernfield Award): Activation cycle of β-arrestin allowing independent trafficking and signalin functions. San Diego, CA
2016 Membrane organization, dynamics, traffic, and regulation minisymposium: Mechanism and signaling consequences of independent β-arrestin and receptor trafficking. San Francisco, CA
2015 Membrane regulation and signaling microsymposium: β-arrestin drives MAP kinase signaling from clathrin-coated structures after GPCR dissociation. San Diego, CA

GRKs and Arrestins: From Structure to Disease FASEB Conference

2017 Activation cycle of β-arrestin allowing independent trafficking and signaling functions. Saxtons River, VT

Lysosomes & Endocytosis Gordon Research Seminar

2016 Mechanism & signaling consequences of independent β-arrestin & receptor trafficking. Andover, NH

Invited Talks (Regional Meetings)

2020 **Superworm Meeting**: Neuronal polarity requires an endocytic clearance mechanism in the axon initial segment. Stanford, CA
2020 **Bass Biology Floor Meeting**: Endocytosis of dendritic proteins in the axon initial segment safeguards neuronal polarity. Stanford, CA
2016 **Bay Area Trafficking Symposium**: Mechanism and signaling consequences of independent β-arrestin and receptor trafficking. Berkeley, CA
2010 **Northwestern Undergraduate Research Symposium**: Neuronal toxicity of amyloidogenic proteins in *C. elegans* models. Evanston, IL

Select Poster Presentations

ASCB Annual Conference

2019 Endocytosis of dendritic proteins in the axon initial segment safeguards neuronal polarity. Washington, DC
2017 Activation cycle of β-arrestin allowing independent trafficking and signaling functions. Philadelphia, PA
2015 β-arrestin drives MAP kinase signaling from clathrin-coated pits after GPCR dissociation. San Diego, CA

CSHL Molecular Mechanisms of Neuronal Connectivity

2020 Endocytosis of dendritic proteins in the axon initial segment safeguards neuronal polarity. Virtual Meeting

Cell Biology of the Neuron and Circuits II

2019 Endocytosis of dendritic proteins in the axon initial segment safeguards neuronal polarity. Ashburn, VA

Cell Biology of the Neuron Gordon Research Conference

2018 Mechanisms of polarized membrane trafficking in *C. elegans.* Waterville, NH

GRKs & Arrestins: Structure to Disease FASEB

2017 Activation cycle of β-arrestin allowing independent trafficking and signaling functions. Saxtons River, VT

Molecular Pharmacology Gordon Research Conference

2017 β-arrestin drives MAP kinase signaling from clathrin-coated pits after GPCR dissociation. Il Ciocco, Italy
2015 GPCR mediated control of clathrin-coated pit dynamics. Ventura, CA

Bay Area Trafficking Symposium

2016 β-arrestin drives MAP kinase signaling from clathrin-coated pits after GPCR dissociation. Berkeley, CA
2013 GPCR mediated control of clathrin-coated pit dynamics. San Francisco, CA

Leadership Experience

2020-present Co-developed Stanford Grant Writing Academy program for NIH Diversity Supplement applications
2016-2017 Co-chair for Molecular Pharmacology Gordon Research Seminar
2014 Co-organizer of Bay Area Trafficking Symposium

Mentoring Experience

2020 Stanford First Generation Mentorship Program
2020 Stanford Biology Department Graduate Program Preview Mentor
2019-2020 Stanford Women in Science and Engineering Peer Group
2020-present Research mentor for research technician, Stanford University
2014 Research mentor for rotation student, UCSF
2010-2011 Research mentor for rotation student, University of Chicago

Teaching Experience

2020-present Grant Coach, NIH Diversity Supplement Program Workshop, Stanford Grant Writing Academy
2019 Teaching Assistant, HHMI Hanna Gray Fellowship Writing Workshop, Stanford University
2013 Teaching Assistant, Bioregulatory Mechanisms Course, UCSF, awarded outstanding TA
2013 Teaching Assistant, NSF Graduate Research Fellowship Writing Course, UCSF
2011-2015 Science and Health Education Partnership, San Francisco Public Schools

Training and Workshops

2020	HHMI Hanna Gray Fellows Program Mentor Training (8 hours)
2020	Stanford Postdoc Teaching Training (8 hours)
2020	Center for the Integration of Research Teaching & Learning Course: Introduction to Evidence-Based Undergrad STEM Teaching Course (32 hours)
2018	Developmental Neurobiology Course at Okinawa Institute of Science and Technology (2 weeks)

Community Involvement

2020	Stanford Postdoc Association Diversity Advisory Committee
2020	ASCB Abstract Programming Task Force
2020-present	Independent Reviewer: Journal of Cell Biology
2014-present	American Society for Cell Biology Member
2012-2014	Bay Area Science Festival Volunteer