Curriculum Vitae

Oliver Braubach, Ph.D

Senior Applications Scientist
Akoya Biosciences
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Menlo Park, CA 94025
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DOB: 01-03-1981
Citizenship: USA / GERMANY
Languages: English, German, Spanish

Education

2011	Ph.D. Physiology & Biophysics Dalhousie University, Canada Thesis: Development and plasticity of the zebrafish olfactory system Supervisors: Drs. Roger Croll & Alan Fine
2003	B.Sc. (Honors) Neuroscience Dalhousie University, Canada

Positions

2019-	Senior Applications Scientist Akoya Biosciences 1505 O'Brien Drive Menlo Park, CA 94025
2019	Project Scientist Department of Biomedical Sciences Center for Bioinformatics and Functional Genomics Cedars Sinai Medical Center, Los Angeles, USA
2017-2019	Project Scientist Department of Neurosurgery Laboratory: Dr. Julia Ljubimova Cedars Sinai Medical Center, Los Angeles, USA
2011-2017	Postdoctoral Fellow Center for Functional Connectomics Laboratory: Dr. Lawrence B. Cohen KIST, Seoul, Korea

2011-2011 Postdoctoral Fellow
Department of Cellular and Molecular Physiology
Laboratory: Dr. Lawrence B. Cohen
Yale University, New Haven, USA

Other positions

2015- Founder and CEO
Braubach Immobilien Verwaltung
Feldkirch, Austria

Research Interests

Neurobiology, optical imaging, immunology, high-plex immunofluorescence imaging, single cell sequencing.

Teaching

2015-2016 Teaching Assistant
Course: Imaging Structure and Function of the Nervous System
Cold Spring Harbor Laboratory, NY, USA

2004-2010 Departmental Tutor
Course: Introduction to Human Physiology (#1000-1010)
Advanced Human Physiology (#2030-2032)
Cellular Neurophysiology (#2570)
Department of Physiology and Biophysics
Dalhousie University, Canada

2004-2009 Teaching Assistant
Course: Introduction to Human Physiology (#1000-1010)
Cellular Neurophysiology (#2570)
Department of Physiology and Biophysics
Dalhousie University, Canada

2003-2004 Language Instructor
Course: Intermediate German
Advanced English for hospitality industry
Nexus Idiomas Language Institute
Cuenca, Ecuador

Student Mentorship

2018-2019	Ekaterina Shatalova (Cedars Sinai Premed Student Intern)
2018	Saya Davani (Cedars Sinai Student Intern)
2016-2017	Tristan Geiller (KIST Neuroscience Graduate Student): Computational analysis of calcium imaging data.
2015-2016	Tuce Tombaz (KIST Neuroscience Intern): *In vivo* calcium imaging and data analysis.
2015	Roza Azami (KIST Bioinformatics Graduate Student): Computational Analysis of calcium imaging data.
2010-2011	Andrew Murray (DAL Neuroscience Undergraduate Student): Classical conditioning of zebrafish behavior.
2009-2010	Nirupa Varantharasan (DAL Marine Biology Undergraduate Student): The gustatory system of the blind Mexican cave fish.
2009-2010	Lesley Roberts (DAL Neuroscience Undergraduate Student): The gustatory system of zebrafish.
2009-2010	Jessica Bilkey (DAL Neuroscience Undergraduate Student): Expression of *sal4* in gustatory receptors.
2009	Isabella Hernandez-Plata (DAL Summer student): Development of tastebuds in zebrafish.

Fellowships & Awards

2010	Nikon Small World Microscopy Competition 1’000.- (USD)
2009	RIKEN Brain Science Institute Visiting Student Research Fellowship 10’000.- (USD)
2008	Best Student Presentation Award Canadian Zoological Society 300.- (CAD)
2007	Best Presentation Award Canadian Institute of Health Research Student Conference 500.- (CAD)
2005-2008	Graduate Student Research Fellowship Nova Scotia Health Research Foundation 21’000 *per annum* (CAD)
2004-2010	Graduate Student Fellowship Dalhousie University Faculty of Medicine 4’000 *per annum* (CAD)

Affiliations

2018-	RELISH Consortium
2018-2019	Controlled Release Society
2013-	International Zebrafish Neuroscience Research Consortium (ZNRC)
2005-2018	Society for Neuroscience (SFN)
2010-2014	European Chemoreception Organization (ECRO)
2010-2014	Association for Chemoreception Sciences (ACHEMS)
2009-2011	Canadian Association for Neuroscience (CAN)
2008-2009	Canadian Zoological Society (CSZ)

Journals Refereed

Chemical Senses
Developmental Neurobiology

Publications (19)

(08-01-2019: Google scholar h-factor: 9; 2 publications with >100 citations; 4 publications with >50 citations; 6 publications with >30 citations)

2019

Galstyan A, Markman J, Shatalova E, Chiechi A, Korman A, Patil R, Klymyshyn D, Tourtellotte W, Israel L, **Braubach O**, Ljubimov V, Mashouf L, Ramesh A, Grodzinski Z, Penichet ML, Black K, Holler E, Sun T, Ding H, Ljubimov A, Ljubimova J. (2019). Blood-brain barrier permeable nano immunoconjugates induce local immune responses for glioma therapy. *Nature Communications* 10: 3850. doi.org/10.1038/s41467-019-11719-3.

Kum J, Kim JW, **Braubach O**, Ha JG, Cho H, Kim CH, Han HB, Choi JH, Yoon JH. Neural dynamics of olfactory perception: low- and high-frequency modulations of local field potential spectra in mice revealed by an oddball stimulus. *Frontiers in Neuroscience*: 2019 May 28. doi.org/10.3389/fnins.2019.00478.

Israel L*, **Braubach O***, Galstyan A, Chiechi A, Shatalova ES, Grodzinski, Z, Ding H, Black KL, Ljubimova JY, Holler E. (2019). A combination of tri-leucine and Angiopep-2 drives a poly-anionic polymalic acid nanodrug platform across the blood-brain barrier. *ACS Nano*: 2019 Jan 11. doi: 10.1021/acsnano.8b06437.
co-1st author

2018

Braubach O*, Tombaz T, Bozza T, Cohen LB, Homma R, Choi Y. (2018). Sparsened neuronal activity in an optogenetically activated olfactory glomerulus. *Nature Scientific Reports* 8: 14955. doi: 10.1038/s41598-018-33021-w.
**corresponding author*

Sepehri-Rad M, Cohen LB, **Braubach O**, Baker B. (2018). Monitoring voltage fluctuations of intracellular membranes. *Nature Scientific Reports* 8: 6911. doi: 10.1038/s41598-018-25083-7.

Ljubimova J, **Braubach O***, Patil R, Chiechi A, Tang J, Galstyan A, Shatalova E, Kleinman M, Black K, Holler E. (2018). Coarse particulate matter ($PM_{2.5-10}$) in Los Angeles Basin air induces expression of inflammation and cancer biomarkers in rat brains. *Nature Scientific Reports* 8: 5708. doi: 10.1038/s41598-018-23885-3.
**corresponding author*

2017

Sepehri-Rad M, Choi Y**,** Cohen LB, Baker B, Zhong S, Storace DA, **Braubach O**. Voltage and calcium imaging of brain activity (2017). *Biophysics Journal* 113: 2160-2167.

2015 **Braubach O**, Cohen LB, Choi Y. (2015). Historical overview and general methods of membrane potential imaging. *Advances in Experimental Medicine and Biology* 859: 3-26.

Storace DA, **Braubach O**, Jin L, Cohen LB, Sung U. (2015). Monitoring Brain Activity with Protein and Calcium Sensors. *Nature Scientific Reports* 5: 10212. doi: 10.1038/srep10212.

2014 Stewart AM, **Braubach O**, Spitsbergen J, Gerlai R, Kalueff AV. (2014). Zebrafish models for translational neuroscience research: from tank to bedside. *Trends in Neurosciences* 37(5): 264-78.

2013 Jackson R, **Braubach O**, Bilkey J, Zhang J, Akimenko MA, Fine A, Croll RP, Jonz MG. (2013). Expression of *sall4* in taste buds of zebrafish. *Developmental Neurobiology* 73(1): 543-58.

Braubach O, Miyasaka N, Koide T, Yoshihara Y, Croll RP, Fine A. (2013). Experience-dependent versus experience-independent postembryonic development of distinct groups of zebrafish olfactory glomeruli. *The Journal of Neuroscience* 33(16): 6905-6916.

Kalueff A, Gebhard M, Stewart AM, Cachat J, Brimmer M, Chawla JS, Craddock C, Kyzar EJ, Roth A, Landsman S, Gaikwad S, Robinson K, Baatrup E, Tierney K, Shamchuk A, Norton W, Miller N, Nicolson T, **Braubach O**, Gilman C, Pitman J, Rosemberg D, Gerlai R, Echevarria D, Lamb E, Neuhauss SC, Weng W, Bally-Cuif L, Schneider H. (2013). Towards a comprehensive catalog of zebrafish behavior 1.0, and beyond. *Zebrafish* 10(1): 70-86.

2012 **Braubach O**, Fine A, Croll RP. (2012). Distribution and functional organization of glomeruli in the olfactory bulbs of zebrafish (*Danio rerio*). *The Journal of Comparative Neurology* 520(11): 2317-2339.

2011 **Braubach O**, Wyeth RC, Murray A, Fine A, Croll RP. (2011). A simple and effective method to condition olfactory behaviors in groups of zebrafish. In: *Zebrafish Neurobehavioral Protocols*. Editors: Kalueff AV, Canavello P, Cachat J. Humana Press.

Wyeth RC, **Braubach O**, Fine A, Croll RP. (2011). Videograms: a method for repeatable unbiased quantitative behavioral analysis without scoring or tracking. In: *Zebrafish Neurobehavioral Protocols*. Editors: Kalueff AV, Canavello P, Cachat J. Humana Press.

2009 **Braubach O**, Wood HD, Gadbois S, Fine A, Croll RP. (2009). Olfactory conditioning in the zebrafish (*Danio rerio*). *Behavioral Brain Research* 198(1): 190-198.

2006 **Braubach O**, Dickinson AJG, Evans CE, Croll RP. (2006). Neural control of ciliary beating in the velum of *Ilyanassa obsoleta*. *Journal of Experimental Biology* 209: 4676-4689.

2004 **Braubach O**, Croll RP. (2004). Evidence that histamine acts as a neurotransmitter in statocyst hair cells in the snail, *Lymnaea stagnalis*. *Journal of Gravitational Physiology* 11(3): 57-66.

Invited Seminars (10)

Braubach O. (2019). Molecular identification of olfactory bulb interneurons after calcium imaging. Department of Physiology, Yale School of Medicine, New Haven, CT, USA.

Braubach O. (2019). What lies between olfactory bulb inputs and outputs? Department of Physiology, Dalhousie University, Halifax, NS, Canada.

Braubach O. (2014). Organization and function of a light-addressable olfactory glomerulus. Neuro-Electronics Research Flanders (NERF), Leuven, Belgium.

Braubach O. (2014). Anatomical diversity of zebrafish glomeruli. University of Göttingen, Göttingen, Germany.

Braubach O. (2013). An optogenetic examination of lateral inhibition in the olfactory system. The First IBS Research Conference, Institute for Basic Science, Daejeon, South Korea.

Braubach O. (2013). Stimulus-dependent lateral excitation and inhibition revealed via selective optical activation of an individual olfactory glomerulus. Marine Biological Laboratory, Woods Hole, MA, USA.

Braubach O. (2012). Olfactory glomeruli: what are they and what do they do? Department of Biology, Saint Francis Xavier University, Antigonish, NS, Canada.

Braubach O. (2011). Evidence for parallel olfactory pathways in zebrafish. RIKEN Brain Science Institute, Saitama, Japan.

Braubach O, Fine A, Croll RP. (2008). Zebrafish as a model for understanding olfaction: From the development of glomeruli to the learning of odorants. Department of Biology, University of Ottawa, Ottawa, ON, Canada.

Braubach O, Wood HD, Fine A, Croll RP. (2007). Zebrafish olfactory learning: from neurons to behavior and back to neurons. International Ethology Conference, Dalhousie University, Halifax, NS, Canada.

Conference Proceedings (25)

Students under my direct supervision are underlined

2019 Israel L, **Braubach O**, Galstyan A, Shatalova E, Chiechi A, Grodzinski Z, Patil R, Ding H, Black K, Ljubimova J, Holler E. (2019). A poly-malic acid scaffold conjugated to BBB penetrating peptides and tri-leucine crosses the blood-brain barrier of healthy mice. Controlled Release Society Annual Meeting, Valencia, Spain.

2018 Israel L, **Braubach O***, Galstyan A, Chiechi A, Shatalova E, Grodzinski Z, Ding H, Holler E, Ljubimova J. (2018). A soluble, nontoxic polymeric drug delivery platform conjugated to Angiopep-2 and tri-leucine traverses the blood-brain-barrier and distributes throughout the mouse brain. Controlled Release Society Annual Meeting, New York, USA.
* presenting author

Sepehri Rad M, Cohen LB, **Braubach O**, Baker BJ. (2018). Monitoring voltage fluctuations of intracellular membranes. Biophysical Journal 114(3), 360A.

2017 Sepehri Rad M, Cohen LB, **Braubach O**, Baker BJ. (2017). Monitoring voltage fluctuations of internal cell membranes. Journal of General Physiology 149(9), 14A.

2016 **Braubach O**, Geiller T, Tombaz T, Homma R, Bozza T, Cohen LB, Choi Y. (2016). Physiological and molecular phenotyping of interneurons in the glomerular layer of the mouse olfactory bulb. Chemical senses 41(9), E238-239.

2015 Cohen LB, Storace D, **Braubach O**. (2015). *In vivo* imaging in targeted cell populations in the mouse olfactory bulb. Bio-optics: Design and Application, OT4D. 5.

2014 Storace DA, **Braubach O**, Cohen LB, Sung U. (2014). *In vivo* imaging of odor-evoked responses in the mouse olfactory bulb using the FP voltage sensory Arclight and the calcium sensor GCaMP3. Biophysical Journal 106 (2): 382a.

2013 **Braubach O**, Tombaz T, Homma R, Bozza T, Cohen LB, Choi Y. (2013). Stimulus-dependent lateral excitation and inhibition revealed via selective optical activation of an individual olfactory glomerulus. Program No.

450.28/OO11. 2013 Online Abstract Viewer and Itinerary Planner, Society for Neuroscience, Washington DC, USA.

Braubach O, Tombaz T, Allahverdizadeh M, Bozza T, Cohen LB, Homma R. (2013). *In vivo* optophysiological analysis of the glomerular unit response in mice. P#89, P63. Annual meeting of the American Association for Chemoreception Sciences (ACHEMS), Huntington Beach, USA.

2012 **Braubach O**, Allahverdizadeh M, Bozza T, Cohen LB, Homma R. (2012). Selective optical activation of a genetically identified olfactory glomerulus and associated juxtaglomerular neurons. P136. International Symposium for Olfactory and Taste (ISOT), Stockholm, Sweden.

2011 **Braubach O**, Bozza T, Cohen LB, Homma R. (2011). Selective optical activation of a genetically identified olfactory glomerulus as a tool to study the glomerular unit response. Program No. 475.12/II7. 2011 Online Abstract Viewer and Itinerary Planner, Society for Neuroscience, Washington DC, USA.

Fine A, Miyasaka N, Koide T, Yoshihara Y, Croll R, **Braubach O.** (2011). Anatomical organization and development of olfactory pathways that may mediate innate and learned behaviors in zebrafish. Program No. 34.18/C2. 2011 Online Abstract Viewer and Itinerary Planner, Society for Neuroscience, Washington DC, USA.

Braubach O, Miyasaka N, Koide T, Yoshihara Y, Croll RP, Fine A. (2011). Development of distinct olfactory pathways in the zebrafish olfactory system. Annual meeting of the Canadian Association for Neuroscience (CAN), Quebec City, QC, Canada.

Murray A, **Braubach O**, Wyeth RC, Fine A, Croll RP. (2011). Appetitive swimming behaviour and single-trial classical conditioning in larval zebrafish (*Danio rerio*). 2nd North Atlantic Zebrafish Research Symposium, Halifax, NS.

2010 **Braubach O**, Miyasaka N, Koide T, Yoshihara Y, Fine A, Croll RP. (2010). Development and variability of glomerular maps in the zebrafish olfactory system. Ninth International Meeting on Zebrafish Development and Genetics, Madison, WI, USA.

Bilkey J, **Braubach O**, Croll R, Fine A, Jonz M. (2010). Characterization of GFP-labelled taste receptor cells in transgenic zebrafish. Annual meeting of the Canadian Association for Neuroscience (CAN), Ottawa, ON, Canada.

Braubach O, Miyasaka N, Koide T, Yoshihara Y, Fine A, Croll RP. (2010). Development of glomerular maps in the zebrafish olfactory system. Annual meeting of the Canadian Association for Neuroscience (CAN), Ottawa, ON, Canada.

2009 **Braubach O**, Fine A, Croll RP. (2009). Postembryonic development of the glomerular map in zebrafish. Annual meeting of the Atlantic Zebrafish Users Group (AZUG), Halifax, NS, Canada.

Ellis L, **Braubach O**, Croll RP, Fine A. (2009). Mapping olfactory conditioning in the zebrafish brain using the immediate early gene Egr-1. Canadian Association of Neuroscience Annual Meeting, Vancouver, BC, Canada.

2008 **Braubach O**, Fine A, Croll RP. (2008). New insights into the neuroanatomy of the zebrafish olfactory system. Program No. 363.23. 2008 Online Abstract Viewer and Itinerary Planner, Society for Neuroscience, Washington DC, USA.

Braubach O, Fine A, Croll, RP. (2008). Postembryonic development of the glomerular map in the zebrafish. P495. International Symposium for Olfaction and Taste (ISOT), San Francisco, California, USA.

2007 **Braubach O**, Croll RP, Fine A. (2007). Using zebrafish to study mechanisms of behavioral plasticity. Canadian Institute of Health Research (CIHR) National Student Symposium, University of Manitoba, Winnipeg, MN, Canada.

2006 **Braubach O**, Fine A, Croll RP. (2006). Classical conditioning of zebrafish to amino acid odorants. Program No. 435.11. 2006 Online Abstract Viewer and Itinerary Planner, Society for Neuroscience, Washington DC, USA.

2005 **Braubach O**, Dickinson AJG, Evans CE, Croll RP. (2005). Neural control of ciliary beating in the velum of *Ilyanassa obsoleta*. Integrative and Comparative Biology 45 (6): 1113.

2002 Croll RP, **Braubach O**, Borycz J, Nason J, Evans C. (2002). Histamine is the putative neurotransmitter used by gravireceptor cells of the statocyst in molluscs. Gravitational and Space Biology Bulletin 16 (1): 25.