14 Jan 2019

CURRICULUM VITAE

**Bryan McIver Hooks (Mac)**

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| University of Pittsburgh School of MedicineDepartment of Neurobiology200 Lothrop Street Suite W1458Pittsburgh, PA 15213-2536 | 5529 Beacon StreetPittsburgh, PA 15217617-501-7838mac.hooks@gmail.com |
| 412-624-8465 | Birth Place: Washington, DC |
| hooksm@pitt.edu | Citizenship: USA; Clearance: TS/SCI |

**EDUCATION and TRAINING**

Undergraduate

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| --- | --- | --- | --- |
| 9/1992-6/1996 | Harvard CollegeCambridge, MA | AB *summa cum laude*, 1996 | Biology |

Graduate

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| 9/1995-6/1996 | Harvard UniversityCambridge, MA | AM, 1996 | Biology |
| 9/2001-6/2007 | Harvard Medical SchoolBoston, MA | PhD, 2007Advisor: Chinfei Chen | Neurobiology |

Postgraduate

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| --- | --- | --- | --- |
| 11/2007-8/2014 | Howard Hughes Medical Institute (Janelia)Ashburn, VA | Postdoctoral AssociateAdvisors: Gordon Shepherd and Karel Svoboda | Neurobiology |

**APPOINTMENTS and POSITIONS**

|  |  |  |
| --- | --- | --- |
| 9/2016-present | Assistant Professor | Department of Neurobiology, University of Pittsburgh School of Medicine |
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| 9/2014-8/2016 | Visiting Assistant Professor | Department of Neurobiology, University of Pittsburgh School of Medicine |
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| **APPOINTMENTS and POSITIONS (MILITARY)** |
| 8/1996-7/2001 | United States NavySubmarine Officer | USS BOSTON (SSN-703)Qualified in Submarine WarfareUSS ALBUQUERQUE (SSN-706)Qualified as Nuclear Engineer Officer |
| 7/2001-present | United States Navy ReserveSubmarine Officer | SUBMARINE GROUP TWO unitCOMSUBDEVRON TWELVE unitEMORY S LAND (AS-40) DET E unit (CO)NAVAL SECURITY FORCES DAHLGREN (CO)UNDERSEA WARFARE OPS DET T (XO)UNDERSEA WARFARE OPS DET O (CO)OFFICE OF NAVAL RESEARCH S&T 101 (XO)COMMANDER SUBMARINE GROUP NINE FORCE PROTECTION DET 2 (CO)VTU NOSC PITTSBURGH (OIC) |

**CERTIFICATION and LICENSURE**

Submarine Warfare Qualified (11/1998); Nuclear Engineer Officer, Certified by Naval Sea System Command (4/2000); Staff Operations and Planning; Submarine Advisory Team Watch Officer (SATWO); Submarine Element Coordinator (SEC); Theater ASW Watch Officer (TASWO); Battle Watch Captain (BWC; CTF-69 and CTF-34); Force Protection Officer; Anti-Terrorism Officer; Naval Science Research Liaison; Joint Professional Military Education Phase I (Air Command and Staff College); Navy Reserve Unit Commanding Officer AQD

**MEMBERSHIP in PROFESSIONAL and SCIENTIFIC SOCIETIES**

Society for Neuroscience, 10/2008-10/2018

**HONORS**

1992 Valedictorian, Landon School

1992 National Merit Scholar

1993 Detur Prize

1995 Phi Beta Kappa

1996 AB *summa cum laude*

1996 ADM Holloway Award (#1 Navy ROTC midshipman nationwide)

1997 VADM Behrens Award (Naval Nuclear Propulsion Training Command, #1 of 77 officers)

1997 Fire Control Excellence Award (Submarine Officer Basic Course, Naval Submarine School)

2001 Navy Achievement Medal

2004 Albert J Ryan Foundation Fellow (2004-2007)

2004 Ruth L Kirchstein National Research Service Award F31

2008 Navy Commendation Medal

2010 Navy Commendation Medal (Gold star in lieu of second award)

2013 Meritorious Service Medal

2014 Finalist, Earl Stadtman Investigator Search

2016 Meritorious Service Medal (Gold star in lieu of second award)

2017 NARSAD Young Investigator Grant

**PUBLICATIONS**

Refereed articles

1. Cai H, Stevens Kalceff MA, **Hooks BM**, and Lawn BR (1994) Cyclic Fatigue of a Mica-Containing Glass Ceramic at Hertzian Contacts. J Materials Research 9: 2654-2661.

2. Cai H, Padture NP, **Hooks BM**, Lawn BR (1994) Flaw Tolerance and Toughness-Curves in Two-Phase Particulate Composites: SiC/Glass System. J Europ Ceram Soc 13: 149-157.

3. **Hooks BM** and Chen C (2006) Distinct Roles for Spontaneous and Visual Activity in Remodeling of the Retinogeniculate Synapse. Neuron 52: 281-291.

\*See comment inNeuron 52:221-2222 and Curr Opin Neurobio 19: 154-161.

4. Roy K, Murtie JC, El-Khodor BF, Edgar N, Sardi SP, **Hooks BM**, Benoit-Marand M, Chen C, Moore H, O'Donnell P, Brunner D, and Corfas G (2007) Loss of erbB signaling in oligodendrocytes alters myelin and dopaminergic function, a potential mechanism for neuropsychiatric disorders. PNAS 104: 8131-8136.

5. **Hooks BM** and Chen C (2008) Vision Triggers an Experience-Dependent Sensitive Period at the Retinogeniculate Synapse. J Neurosci 28: 4807-17.

\*See comment inCurr Opin Neurobio 19: 154-161.

6. Komiyama T, Sato TR, O’Connor DH, Zhang YX, Huber D, **Hooks BM**, Gabitto M, and Svoboda K (2010) Learning-related fine-scale specificity imaged in motor cortex circuits of behaving mice. Nature 464: 1182-1186.

\*See recommendation inFaculty of 1000.

7. Suter BA, O’Connor T, Iyer V, Petreanu LT, **Hooks BM**, Kiritani T, Svoboda K, and Shepherd GMG (2010) Ephus: multipurpose data acquisition software for neuroscience experiments. Front. Neurosci 4: 1-12. doi:[10.3389/fnins.2010.00053](http://dx.doi.org/10.3389/fnins.2010.00053).

8. **Hooks BM**, Hires SA, Zhang Y-X, Huber D, Petreanu L, Svoboda K, Shepherd GMG (2011) Laminar Analysis of Excitatory Local Circuits in Vibrissal Motor and Sensory Cortical Areas. PLoS Biol 9(1): e1000572. doi:10.1371/journal.pbio.1000572.

9. Mao T, Kusefoglu D, **Hooks BM**, Huber D, Petreanu L, Svoboda K (2011) [Long-range neuronal circuits underlying the interaction between sensory and motor cortex.](http://www.ncbi.nlm.nih.gov/pubmed/21982373) Neuron 72:111-23.

10. Madisen L, Mao T, Koch H, Zhuo JM, Berenyi A, Fujisawa S, Hsu YW, Garcia AJ 3rd, Gu X, Zanella S, Kidney J, Gu H, Mao Y, **Hooks BM**, Boyden ES, Buzsáki G, Ramirez JM, Jones AR, Svoboda K, Han X, Turner EE, Zeng H (2012) [A toolbox of Cre-dependent optogenetic transgenic mice for light-induced activation and silencing.](http://www.ncbi.nlm.nih.gov/pubmed/22446880) Nat Neurosci. 15: 793-802.

\*See recommendation inFaculty of 1000.

11. **Hooks BM**, Mao T, Gutnisky DA, Yamawaki N, Svoboda K, Shepherd GMG (2013) Organization of cortical and thalamic input to pyramidal neurons in mouse motor cortex. J Neurosci. 33:748-760.

\*See recommendation inFaculty of 1000.

12. Hauser JL, Edson EB, **Hooks BM**, Chen C (2013) Metabotropic Glutamate Receptors and Glutamate Transporters Shape Transmission at the Developing Retinogeniculate Synapse. J Neurophysiol. 109:113-123.

13. Yang W, Carrasquillo Y, **Hooks BM**, Nerbonne JM, Burkhalter A (2013) Distinct balance of excitation and inhibition in an interareal feedforward and feedback circuit of mouse visual cortex. [J Neurosci.](http://www.ncbi.nlm.nih.gov/pubmed/23076103) 33:17373-17384.

14. Louros SR, **Hooks BM**, Litvina L, Carvalho AL, Chen C (2014) A role for Stargazin in experience-dependent plasticity. Cell Reports 7:1614-1625.

15. Wang X, **Hooks BM**, Sun QQ (2014) Thorough GABAergic innervations of the entire axon initial segment revealed by an optogenetic laserspritzer. J Physiol 592: 4257-76.

16. **Hooks BM**, Lin JY, Guo C, and Svoboda K (2015) Dual channel circuit mapping reveals sensorimotor convergence in the primary motor cortex. J Neurosci 35: 4418-4426.

17. Viswanathan S, Williams ME, Bloss EB, Stasevich TJ, Speer CM, Nern A, Pfeiffer BD, **Hooks BM**, Li WP, English BP, Tian T, Henry GL, Macklin JJ, Patel R,Gerfen CR, Zhuang X, Wang Y, Rubin GM, Looger LL (2015) High-performance probes for light and electron microscopy. Nat Methods 12: 568-576.

18. Sugino K, Clark E, Schulmann A, Shima Y, Wang L, Hunt DL, **Hooks BM**, Trankner D, Chandrashekar J, Picard S, Lemire A, Spruston N, Hantman A, Nelson SB (2018) The Transcriptional Logic of Mammalian Neuronal Diversity (submitted).

https://www.biorxiv.org/content/biorxiv/early/2017/11/01/208355.full.pdf

19. **Hooks BM**, Papale AE, Paletzki R, Feroze M, Eastwood BS, Couey JJ, Winnubst J, Chandrashekar J, Gerfen CR (2018) Topographic precision in sensory and motor corticostriatal projections varies across cell type and cortical area. Nat. Communications 9:3549. DOI: 10.1038/s41467-018-05780-7.

20. **Hooks BM** (2018) Dual channel photostimulation for independent excitation of two populations. Current Protocols in Neuroscience 11:e52 DOI: 10.1002/cpns.52.

21. Tappan SJ, Eastwood BS, O’Connor N, Wang Q, Ng L, Feng D, **Hooks BM**, Gerfen CR, Hof PR, Schmitz C, Glaser JR (2019) Automatic real-time navigation system for the mouse brain. J Comp Neurol (in press).

22. Eastwood BS, **Hooks BM**, Paletzki R, O’Connor NJ, Glaser JR, Gerfen CR (2019) Whole Mouse Brain Reconstruction and Registration to a Reference Atlas with Standard Histochemical Processing of Coronal Sections. J Comp Neurol (in press).

Reviews, invited published papers, proceedings of conference and symposia, monographs, books, and book chapters

1. **Hooks BM**, and Chen C: A Model for Synaptic Refinement in Visual Thalamus. In: Development and Plasticity in Sensory Thalamus and Cortex, pp. 226-244. (Erzurumlu R, Guido W, and Molnar Z, eds.) Springer, 2006.

2. **Hooks BM** and Chen C (2007) Critical periods in the visual system: changing views for a model of experience-dependent plasticity. Neuron 56: 312-326.

3. Svoboda K, **Hooks BM**, and Shepherd GMG: Barrel Cortex. In: Handbook of Brain Microcircuits, pp. 31-38. (Grillner S and Shepherd GM, eds.) Oxford, 2010.

4. Suter BA, Yamawaki N, Borges K, Li X, Kiritani T, **Hooks BM**, Shepherd GMG (2014) Neurophotonics applications to motor cortex research: a review. Neurophotonics 1: 011008.

5. **Hooks BM** (2017) Sensorimotor Convergence in Circuitry of the Motor Cortex. Neuroscientist 23: 251-263.

6. Papale AE and **Hooks BM** (2018) Circuit changes in motor cortex during motor skill learning. Neuroscience 368: 283-297.

7. Gittis AH, **Hooks BM**, Gerfen CR (2019) “The Basal Ganglia” in Circuit Development (Section Editor Hongkui Zeng), Comprehensive Developmental Neuroscience Series, 2nd Edition (Series Editors John Rubenstein, Pasko Rakic, Bin Chen and Kenneth Kwan).

8. Kim T, **Hooks BM**, Cheetham CEJ (2019) “Circuit Development in Somatosensory Cortex” in Circuit Development (Section Editor Hongkui Zeng), Comprehensive Developmental Neuroscience Series, 2nd Edition (Series Editors John Rubenstein, Pasko Rakic, Bin Chen and Kenneth Kwan).

Published abstracts

 None.

Other publications

 None.

**PROFESSIONAL ACTIVITIES**

TEACHING

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Dates | Institution | Course | Role | Responsibilities |
| Spring 2016-Spring 2019+ | University of Pittsburgh  | Systems Neuroscience | Faculty | Lab instructor for human neuroanatomy |
| Spring 2017-Spring 2019+ | University of Pittsburgh  | Systems Neuroscience | Faculty | Lecturer for somatosensory systems |
| Fall 2017-Fall 2018+ | University of Pittsburgh  | Molecular and Cellular Neuroscience | Faculty | Lecturer for neurophysiology and neurodevelopment |
| Fall 2018+ | University of Pittsburgh  | Gross Anatomy | Faculty | Lab instructor for human gross anatomy |
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| Fall 2016; Spring 2015 | University of Pittsburgh  | CNUP PhD Program Journal Club | Faculty | Lead journal club for PhD students to improve analytical and scientific communication skills |
| 9/2003-12/2005 | Harvard Medical School | Neuroscience 200/HST130(Fall semester) | Teaching Fellow (2003); Head TF (2004-2005) | Led five Teaching Fellows in neurophysiology portion of an intensive introductory course for MD and PhD students at Harvard Medical School. |

RESEARCH SUPPORT

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| --- | --- | --- | --- | --- |
| **Grant #** | **Grant Title** | **Role**  | **Dates** | **Funding** |
| NIH 1R01 NS103993 | Motor Cortex Microcircuitry Underlying Movement Control and Learning | Principal Investigator | 12/1/17-11/30/22 | $218,750/yr (direct) |
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| NARSAD  | 2017 Young Investigator Grant | Principal Investigator | 2/1/18-1/31/20 | $35,000/yr |
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|  | **Completed Support** |  |  |  |
| NIH F31 NS048630 | Predoctoral Kirchstein NRSA:Activity and experience dependent mechanisms regulating retinogeniculate synapse development | Principal Investigator (student) | 2/1/04-1/31/07 | $30,190/yr(direct) |

Invited Talks:

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| Date | Institution/Conference | Title |
| 10/2004 | Society for Neuroscience | “The role of visual experience in retinogeniculate synaptic development.” (597.10) |
| 10/15/2009 | Barrels XXII Conference | “Local Excitatory Circuits in Vibrissal Sensory and Motor Cortex” |
| 12/30/2009 | Institute of Neuroscience, Shanghai, China | “Mapping the cortical and subcortical circuits underlying active, vibrissa-based somatosensation in mice” |
| 7/12/2011 | Sloan-Schwartz Meeting (@Janelia Farm/HHMI) | “Functional Organization of Mouse Primary Motor Cortex” |
| 11/11/2011 | Barrels XXIV Conference | “Long-range excitatory circuits in vibrissal motor cortex” |
| 10/12/2012 | Barrels XXV Conference | “Long-range circuitry and recruitment of inhibition in the rodent vibrissal motor cortex” |
| 10/23/2012 | Light-based approaches to neural circuit reconstruction meeting (@ Janelia Farm/HHMI) | “Optical mapping of long-range circuits in the mouse sensorimotor system” |
| 11/30/2012 | National Institutes of Health, Earl Stadtman Symposium | “Organization of long-range excitatory circuitry in mouse vibrissal sensory and motor cortices” |
| 5/20/2013 | University of Pittsburgh, Department of Neurobiology | “Optical mapping of local and long range synaptic circuits in the mouse sensorimotor system” |
| 9/18/2013 | University of Pittsburgh, Department of Neurobiology | “Optical mapping of local and long range synaptic circuits in the mouse sensorimotor system” |
| 12/12/2013 | National Institutes of Health, Earl Stadtman Symposium | “Optical mapping of local and long range synaptic circuits in the mouse sensorimotor system” |
| 4/3/2014 | Naval Research Laboratory, Materials Science and Technology Division (6300) | “Optical techniques for mapping brain circuits” |
| 11/14/2014 | Barrels XXVII Conference | “Cre-recombinase driver lines for pyramidal neurons of primary sensory and motor areas involved in vibrissal somatosensation” |
| 1/26/2016 | Winter Conference on Brain Research | “Circuit Specialization Across Primary Sensory and Motor Domains of Cerebral Cortex” |
| 8/29/2017 | CAS Institute of Neuroscience (ION), Shanghai, China | “Optical methods for mapping motor circuitry with cell type precision” |
| 8/31/2017 | Zhejiang University Qiushi Academy for Advanced Studies (QAAS), Hangzhou, China | “Optical methods for mapping motor circuitry with cell type precision” |
| 3/22/2018 | West Virginia University Rockefeller Neuroscience Institute, Morgantown, WV | “Mapping motor circuitry with cell type precision” |
| 5/11/2018 | Harvard Medical School, Albert J Ryan Foundation Retreat, North Conway, NH | “Optical methods for mapping motor circuitry with cell type precision” |
| 6/22/2018 | Cleveland Clinic Foundation (LRI), Cleveland, OH | “Optical methods for mapping motor circuitry with cell type precision” |
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Poster presentations and abstracts:

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| Date | Institution/Conference | Title |
| 7/2006 | Gordon Research Conference on Synaptic Transmission | “Roles of Spontaneous Activity and Sensory Experience in Retinogeniculate Synaptic Development” |
| 10/2006 | Society for Neuroscience | “Previous sensory experience enhances synaptic plasticity following sensory deprivation” (518.11) |
| 11/2008 | Society for Neuroscience | “Laminar connectivity in the vibrissal representation zones of primary somatosensory (barrel) cortex and primary motor cortex” (370.16) |
| 10/2009 | Society for Neuroscience | “Local excitatory circuits in mouse vM1, vS1, and S2 cortex” (77.14) |
| 11/2011 | Society for Neuroscience | “Long-range excitatory circuits in vibrissal motor cortex” (496.01) |
| 10/2012 | Society for Neuroscience | “Long-range corticocortical recruitment of inhibition in the mouse vibrissal sensory and motor cortices” (676.06) |
| 11/13/2013 | Society for Neuroscience | “Dual channel photostimulation reveals sensorimotor convergence in neural circuitry of the mouse vibrissal system.” (743.14) |
| 11/14/2017 | Society for Neuroscience | “Pathway-specific recruitment of inhibition in motor cortex.” (470.10) |
| 11/15/2017 | Society for Neuroscience | “Corticostriatal projections map the organization of inter-area corticocortical connectivity.” (690.19) |

Other research activities:

Ad hoc reviewer for the Journal of Neuroscience (2012-)

Ad hoc reviewer for Cerebral Cortex (2013-)

Ad hoc reviewer for PLoS One (2015-)

Ad hoc reviewer for Frontiers in Neuroanatomy (2018-)

Ad hoc reviewer for eLife (2018-)

Reviewer for the Research Grants Council (RGC) of Hong Kong (2018-)

Reviewer for the Marsden Fund Council (Royal Society of New Zealand) (2018-)

Ad hoc member, Neural Differentiation, Plasticity, and Regeneration (NDPR) study section (1/2018)

Ad hoc member, BRAIN Initiative: Targeted BRAIN Circuits Projects study section (6/2018)

LIST of CURRENT RESEARCH INTERESTS

My research interest is to understand the development, function, and plasticity of the circuitry controlling primary motor cortex. I have the leadership experience and creativity to undertake this research program and the technical knowledge to implement the methods needed to explore these questions. This builds on the findings of my previous work, which described the local excitatory connections within motor and somatosensory cortex, as well as the targeting of input from five different cortical and thalamic areas to motor cortex. I plan to study the long-range connections that recruit specific subtypes of neurons in motor cortex. First, I will examine direct excitation of cortical interneurons and the magnitude of disynaptic inhibition recruited. Second, I will look for higher order patterns of connectivity in motor cortex by developing methods to independently stimulate multiple excitatory pathways (such as sensory and frontal cortex). Lastly, I will use the understanding gained of motor cortex circuitry to later explore the specific synaptic connections that are changed during motor learning. This develops my interest in the understanding the factors governing development and plasticity of synaptic connectivity, which I have studied since my graduate work. I have a strong record of productive research with several publications in the relevant field and believe my expertise makes me well suited to undertake this project.

This current proposal with my postdoctoral researcher Dr. Roman Goz builds our work in the studying the long-range input to mouse M1. We have used cell-type specific Cre-driver mice to label the long-range input to several types of excitatory and inhibitory interneurons. Our preliminary data suggest that cortical and thalamic inputs to M1 form connections of differing strengths with specific types of interneurons. Because cortical interneurons are known to gate plasticity and different classes of interneurons have distinct connectivity and rules for plasticity, our lab is studying the connectivity of M1 interneurons as a locus of plasticity during motor learning and neurological disorders. Dr. Goz has learned the methods we use to quantitatively assess connectivity and has is determined to use these same tools to study circuit changes in models of neurodegeneration. I am excited to support him in using these tools to address circuit questions, as the circuit changes in dementia have received less attention than the molecular mechanisms of degeneration, in part because until the advent of optical circuit mapping techniques and cell-type specific animals, it was more challenging to study changes at specific circuit connections.

SERVICE

Community Activities

Harvard Square Homeless Shelter (1/2002 – 4/2006): Volunteer, overnight supervisor, and Supply Director at a 24 person capacity winter emergency homeless shelter

Nonresident tutor in Biology at Pforzheimer House (9/2005 – 6/2007): Nonresident advisor for biology undergraduates in one of twelve Harvard Houses