

CURRICULUM VITAE

Avital Adah Rodal, Ph.D.

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A. EDUCATION AND RESEARCH

7/2017- Associate Professor of Biology, Brandeis University, Waltham, MA
2010-2017 Assistant Professor of Biology, Brandeis University, Waltham, MA
2003-2010 Postdoctoral Fellow/Associate, Massachusetts Institute of Technology
"Membrane traffic and synaptic architecture"
Advisor: J. Troy Littleton
1997-2002 Ph.D., Molecular and Cell Biology, University of California, Berkeley
"Actin cytoskeleton dynamics at the *S. cerevisiae* cell cortex"
Advisor: David G. Drubin
1993-1997 B.Sc. Biology, and B.Sc. Chemical Engineering
Massachusetts Institute of Technology
"Deregulation of isoleucine biosynthesis in *C. glutamicum*"
Research advisor: Anthony Sinskey

B. HONORS AND AWARDS

2018 Landis Award for Outstanding Mentorship, NINDS
2013-2017 Pew Scholar Award
2012-2017 NIH Director's New Innovator Award
2012-2014 Basil O'Connor Scholar Award, March of Dimes
2008-2013 K99/R00, NIH Pathway to Independence Award, NINDS
2006-2008 Charles King Trust of the Medical Foundation Postdoctoral Fellow
2003-2006 Damon Runyon Cancer Research Foundation Postdoctoral Fellow
1997-2002 Howard Hughes Medical Institute Pre-doctoral Fellow
1997 Phi Beta Kappa, MIT
Whitehead Prize, MIT - outstanding promise for biology research career
Wei Award, MIT - research at the interface of life science and engineering
2002, 2006 US patents - 6,451,564, and 6,987,017 "Methods for producing L-isoleucine"

C. PUBLICATIONS

- Herzog JJ, Xu W, Deshpande M, Rahman R, Suib H, **Rodal AA**, Rosbash M, Paradis S. TDP-43 dysfunction restricts dendritic complexity by inhibiting CREB activation and altering gene expression. *Proc Natl Acad Sci U S A*. 2020. doi: 10.1073/pnas.1917038117.
- Blanchette CR, **Rodal AA**. Mechanisms for biogenesis and release of neuronal extracellular vesicles. *Curr. Opin. Neurobiology* 2020;63:104-110.
- Ye H, Ojelade S, Li-Kroeger D, Zuo Z, Wang L, Li Y, Gu JYJ, Tepass U, **Rodal AA**, Bellen HJ, Shulman JM. Retromer subunit, VPS29, regulates synaptic transmission and is required for endolysosomal function in the aging brain. *elife* 2020; doi: 10.7554/eLife.51977.
- Del Signore SJ, Kelley CF, Messelaar EM, Lemos T, Marchan MF, Ermanoska B, Mund M, Kaksonen M, **Rodal AA**. Autoregulation clamps the synaptic membrane-remodeling machinery and promotes productive actin-dependent endocytosis. 2020.
<https://www.biorxiv.org/content/10.1101/2020.03.06.981076v1>.
- Walsh RB, Becalska AN, Zunitch MA, Wang S, Isaac B, Yeh A, Koles K, **Rodal AA**. Opposing functions for retromer and Rab11 in extracellular vesicle cargo traffic at synapses. 2019
<https://www.biorxiv.org/content/10.1101/645713v2>.

6. Nguyen DN, Redman RL, Horiya S, Bailey JK, Xu B, Stanfield RL, Temme JS, LaBranche CC, Wang S, **Rodal AA**, Montefiori DC, Wilson IA, Krauss IJ. The Impact of Sustained Immunization Regimens on the Antibody Response to Oligomannose Glycans. *ACS Chem Biol*. 2020;15(3):789-798.
7. Wood DA, Zuraw-Weston S, Torres IK, Lee Y, Wang L, Jiang Z, Lázaro GR, Wang S, **Rodal AA**, Hagan MF, Rotello VM, Dinsmore, AD. Nanoparticles Binding to Lipid Membranes: from Vesicle-Based Gels to Vesicle Inversion and Destruction. *Nanoscale*. 2019, doi: 10.1039/c9nr06570a.
8. Wang S, Zhao Z, **Rodal AA**. Higher order assembly of Sorting Nexin 16 controls tubulation and distribution of neuronal endosomes. *J Cell Biol*. 2019, 218(8):2600-2618.
9. Del Signore SJ, **Rodal AA**. The enemy of my enemy: PTEN and PLCXD collude to fight endosomal PtdIns(4,5)P₂. *J Cell Biol*. 2019; 218(7):2082-2083.
10. Feng Z, Wang H, Wang S, Zhang Q, Zhang X, **Rodal A**, Xu B. Enzymatic Assemblies Disrupt Membrane and Target Endoplasmic Reticulum (ER) for Selective Cancer Cell Death. *J Am Chem Soc*. 2018, 140(30):9566-9573
11. Wang H, Feng Z, Del Signore SJ, **Rodal AA**, Xu B. Active probes for imaging membrane dynamics of live cells with high spatial and temporal resolution over extended time scales and areas. *J Am Chem Soc*. 2018, 140(10):3505-3509.
12. Zhou J, Du X, Berciu C, Del Signore SJ, Chen X, Yamagata N, **Rodal AA**, Nicastro D, Xu B. Cellular uptake of a taurine-modified, ester bond-decorated D-peptide derivative via dynamin-based endocytosis and macropinocytosis. *Mol Ther*. 2018 , 26(2):648-658.
13. Wang H, Shi J, Feng Z, Zhou R, Wang S, **Rodal AA**, Xu B. An in-situ dynamic continuum of supramolecular phosphoglycopeptides enables formation of 3D cell spheroids. *Angew Chem Int Ed Engl*. 2017, 10.1002/ange.201710269.
14. Herzog JJ*, Deshpande M*, Shapiro L, **Rodal AA**, Paradis S. TDP-43 misexpression causes defects in dendritic growth. (*co-first authors). *Sci Rep*. 2017, 7(1):15656.
15. Del Signore SJ*, Biber SA*, Lehmann KS, Eskin TL, Heimler SR, Rosenfeld BH, Sweeney S, **Rodal AA**. dOCRL maintains immune cell quiescence by regulating endosomal traffic (*co-first authors) *PLoS Genetics* 2017, 13(10):e1007052.
16. Del Signore SJ, **Rodal AA**. The membrane strikes back: Synaptic functions of Skywalker require phosphoinositide binding. *Nat Struct Mol Biol*. 2016, 23(11):956-957.
17. Deshpande M, **Rodal AA**. Beyond the SNARE – Munc18-1 chaperones α -synuclein. *J Cell Biol*. 2016, 214(6):641-3.
18. Deshpande M*, Feiger Z*, Shilton AK, Luo CC, Silverman E, **Rodal AA**. Role of endosomal traffic of BMP receptors in synaptic growth defects in a *Drosophila* ALS model. (*co-first authors) *Mol Biol Cell*. 2016, 27(19):2898-910.
19. Stanishneva-Konovalova T*, Kelley CF*, Messelaar EM, Wasserman SA, Sokolova OS[†], **Rodal AA**[†]. Coordinated autoinhibition of F-BAR domain membrane binding and WASp activation by Nervous Wreck (*co-first authors; [†]co-corresponding authors) *PNAS* 2016, 113(38):E5552-61.
20. Jungmann R, Avendaño MS, Dai M, Woehrstein JB, Agasti SS, Feiger Z, **Rodal A**, Yin P. Multiplexed Quantitative Super-Resolution Imaging with qPAINT using Transient Binding Analysis. *Nature Methods* 2016, 13(5):439-42.
21. Deshpande M, **Rodal AA**. The crossroads of synaptic growth signaling, membrane traffic, and neurological disease: Insights from *Drosophila*. *Traffic* 2016,17(2):87-101.
22. Koles K, Yeh A. **Rodal AA**. Tissue-specific tagging of endogenous loci in *Drosophila melanogaster*. *Biol Open* 2015, 5(1):83-9.
23. Kelley CF, Messelaar EM, Eskin TL, Wang S, Song K, Vishnia K, Becalska AN, Shupliakov O, Hagan MF, Danino D, Sokolova OS, Nicastro D, **Rodal AA**. Membrane charge directs the outcome of F-BAR domain lipid binding and autoregulation. *Cell Rep* 2015, 13(11):2597-609.
24. Koles K, Messelaar EM, Feiger Z, Yu CJ, Frank CA, **Rodal AA**. The EHD protein Past1 controls postsynaptic membrane elaboration and synaptic function. *Mol Biol Cell* 2015 15;26(18):3275-88.
25. **Rodal AA**, Del Signore SJ, Martin AC. *Drosophila* comes of age as a model system for understanding the function of cytoskeletal proteins in cells, tissues, and organisms. *Cytoskeleton* 2015 72(5):207-24.
26. Kelley CF, Becalska AN, Berciu C, Nicastro D, **Rodal AA**. Assembly of actin filaments and microtubules in Nwk F-BAR-induced membrane deformations. *Comm. Int. Biol*. 2015 8(3) e1000703.
27. Frank CA, Wang X, Collins CA, **Rodal AA**, Yuan Q, Verstreken P, Dickman DK. New approaches for

- studying synaptic development, function, and plasticity using *Drosophila* as a model system. *J Neurosci*. 2013 33(45):17560-8.
28. Becalska, AN, Kelley, CF, Berciu, C, Stanishneva-Konovalova, TB, Fu, X, Wang S, Sokolova, OS, Nicastro, D, **Rodal, AA**. Formation of membrane ridges and scallops by the F-BAR protein Nervous Wreck. *Mol Biol Cell*. 2013 24(15):2406-18.
 29. Zhao L, Wang, D, Wang, Q, **Rodal, AA**, Zhang, YQ. *Drosophila* cyfip regulates synaptic development and endocytosis by suppressing filamentous actin assembly. *PLoS Genetics*. 2013 9(4):e1003450.
 30. Vizcarra CL, Kreutz B, **Rodal AA**, Toms AV, Lu J, Zheng W, Quinlan ME, Eck MJ. Structure of the Spire KIND domain and insights into its interaction with Fmn-family formins. *PNAS* 2011 108(29):11884-9.
 31. **Rodal AA**, Blunk AD, Akbergenova Y, Jorquera RA, Buhl LK, Littleton JT. A presynaptic endosomal membrane trafficking pathway controls synaptic growth signaling. *J. Cell Biol*. 2011 193(1):201-17.
 32. **Rodal AA**, Motola-Barnes RN, Littleton JT. Nervous Wreck and Cdc42 cooperate to regulate endocytic actin assembly during synaptic growth. *J Neurosci* 2008 28(33):8316-25.
 33. **Rodal AA**, Littleton JT. Synaptic endocytosis; illuminating the role of clathrin assembly. *Curr Biol* 2008 18(6): R259-261.
 34. Quintero-Monzon O, Strokopytov B, **Rodal AA**, Almo SC, Goode BL. Structural and functional dissection of the Abp1 ADFH actin-binding domain reveals versatile in vivo adapter functions. *Mol Biol Cell* 2005 16(7):3128-39.
 35. **Rodal AA***, Sokolova O*, Robins, DB, Daugherty KM, Hippenmeyer S, Riezman H, Grigorieff N, Goode BL. Conformational changes in the Arp2/3 complex leading to actin nucleation. *Nature Struct Mol Biol* 2005 12(1):26-31. (*co-first authors)
 36. **Rodal AA**, Kozubowski L, Goode BL, Drubin DG, Hartwig JH. Actin and septin ultra-structures at the budding yeast cell cortex. *Mol Biol Cell*. 2005 16(1):372-84.
 37. Balcer HI, Goodman AL, **Rodal AA**, Smith E, Kugler J, Heuser JE, Goode BL. Coordinated regulation of actin filament turnover by a high-molecular-weight Srv2/CAP complex, cofilin, profilin, and Aip1. *Curr Biol*. 2003 13(24):2159-69.
 38. **Rodal AA**, Manning AL, Goode BL, Drubin DG. Negative regulation of yeast WASp by two SH3 domain-containing proteins. *Curr Biol*. 2003 13(12):1000-8.
 39. **Rodal AA**, Duncan M, Drubin D. Purification of glutathione S-transferase fusion proteins from yeast. *Methods Enzymol*. 2002 351:168-72.
 40. Sagot, I, **Rodal AA**, Moseley J, Goode BL, Pellman D. An actin nucleation mechanism by the formin Bni1 and profilin. *Nat Cell Biol*. 2002 4(8):626-31.
 41. Goode BL, **Rodal AA**. Modular complexes that regulate actin assembly in budding yeast. *Curr Opin Microbiol*. 2001 4(6):703-12.
 42. Guillouet S, **Rodal AA**, An GH, Gorret N, Lessard PA, Sinskey AJ. Metabolic redirection of carbon flow toward isoleucine by expressing a catabolic threonine dehydratase in a threonine-overproducing *Corynebacterium glutamicum*. *Appl Microbiol Biotechnol*. 2001 57(5-6):667-73.
 43. Goode BL*, **Rodal AA***, Barnes G, Drubin DG. Activation of the Arp2/3 complex by the actin filament binding protein Abp1p. *J Cell Biol*. 2001 153(3):627-34. (*co-first authors)
 44. Kozminski KG, Chen AJ, **Rodal AA**, Drubin DG. Functions and functional domains of the GTPase Cdc42p. *Mol Biol Cell*. 2000 11(1):339-54.
 45. Guillouet S, **Rodal AA**, An G, Lessard PA, Sinskey AJ. Expression of the *Escherichia coli* catabolic threonine dehydratase in *Corynebacterium glutamicum* and its effect on isoleucine production. *Appl Environ Microbiol*. 1999 65(7):3100-7.
 46. **Rodal AA**, Tetreault JW, Lappalainen P, Drubin DG, Amberg DC. Aip1p interacts with cofilin to disassemble actin filaments. *J Cell Biol*. 1999 145(6):1251-64.
 47. Rongo C, Whitfield CW, **Rodal A**, Kim SK, Kaplan JM. LIN-10 is a shared component of the polarized protein localization pathways in neurons and epithelia. *Cell*. 1998 94(6):751-9.

D. RESEARCH SUPPORT

Current support

Title: R01 NS116375 Organization and function of the periaxial zone

Role: Principal Investigator

Sponsor: NINDS
Dates: 4/15/2020 - 3/31/2024.

Title: R01 NS103967 Mechanisms and regulation of extracellular vesicle traffic in the nervous system
Role: Principal Investigator
Sponsor: NINDS, supplement from NIA
Dates: 12/1/2017 - 11/30/2022

Title: Bio-Inspired Soft Materials (Seth Fraden PI)
Role: Investigator in Interdisciplinary Research Group (IRG1) Self-limited assembly
Sponsor: NSF DMR-2011846 (MRSEC)
Dates: 9/1/2020 - 8/31/2026

Completed support

Title: Regulation of endocytosis by the Angelman Syndrome protein Ube3a
Role: co-Principal Investigator (with Hanoch Kaphzan, University of Haifa)
Sponsor: Brandeis-Leir Foundation program
Dates: 7/1/2016 - 6/31/2017

Title: A confocal microscope for neurodegenerative disease research at Brandeis
Role: Principal Investigator
Sponsor: Fidelity Biosciences Research Initiative
Dates: 3/01/2015 - 2/28/2016

Title: Structure and function of curvature generating BAR Proteins
Role: co-Principal Investigator (with Daniel Harries/Hebrew U. and Dganit Danino/Technion)
Sponsor: Brandeis-Leir Foundation program
Dates: 1/1/2014 - 12/31/2014

Title: Collaborative membrane remodeling on neuronal endosomes
Role: Principal Investigator
Sponsor: Pew Scholars Program
Dates: 8/01/2013-7/31/2017

Title: Manipulation of membrane traffic in ALS
Role: Principal Investigator
Sponsor: Blazeman Foundation for ALS research
Dates: 6/01/2013-5/31/2018

Title: DP2 NS082127 (New Innovator Award) Activity-dependent regulation of membrane traffic and growth signaling in neurons
Role: Principal Investigator
Sponsor: NIH Office of the Director/NINDS
Dates: 9/01/2012-6/31/2017

Title: NSF MRI DBI-1228757 MRI: Acquisition of an integrated live imaging system for research and teaching at Brandeis University
Role: co-Principal Investigator (with Bruce Goode)
Sponsor: NSF/DBI
Dates: 08/01/2012-07/31/2013

Title: Mechanisms of endosomal membrane traffic related to Down Syndrome
Role: Principal Investigator
Sponsor: March of Dimes Basil O'Connor starter scholar award
Dates: 2/1/2012 - 2/28/2014

Title: Manipulating membrane traffic in neurodegenerative disease

Role: Principal Investigator

Sponsor: Fidelity Biosciences Research Initiative

Dates: 4/01/2011 - 8/31/2013

Title: Dissecting the Function of *Drosophila* OCRL in Neuronal Endosomal Traffic

Role: Principal Investigator

Sponsor: Lowe Syndrome Association

Dates: 12/15/2010 - 12/14/2012

Title: Engineering lipid membrane conformations using proteins involved in endocytosis

Role: Investigator on Seed Project

Sponsor: NSF 0820492 (MRSEC, Bob Meyer PI)

Dates: 9/1/2010 - 8/31/2012

Title: K99/R00 NS60947 Structure and regulation of synaptic architecture

Role: Principal Investigator

Sponsor: NIH / NINDS

Dates: 8/1/2010 - 7/31/2013