

Curriculum Vitae

James G. McNally

Appointment and Address:

Senior Scientist
Institute for Soft Matter and Functional Materials
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Education:

University of Maryland	B.S. (Physics)	8/73-5/77
University of Chicago	Ph.D. (Biophysics and Theoretical Biology)	10/78-8/83
Princeton University	postdoctoral (Biology)	10/83-9/87

Honors:

Honors Scholarship, University of Maryland	8/73-5/74
Graduated Summa Cum Laude with High Honors in Physics	5/77
Predoctoral traineeship, University of Chicago	10/78- 8/83
American Cancer Society Postdoctoral Fellowship	6/85-6/86
NIH/NCI Directors Award	6/05

Research experience:

1976-1977: Studied the effect of low temperature treatments on a circadian rhythm in *Paramecium multimicronucleatum* with Audrey Barnett at the University of Maryland.

1977-1978: Computer programmer and autoradiographer at the Naval Surface Weapons Center, White Oak, Maryland.

1978-1983: Graduate student with Jack Cowan and Hewson Swift at the University of Chicago. Studied the effects of the ionophore A23187 on cell-wall pattern formation in the alga *Micrasterias*. Used transmission electron microscopy to identify ultrastructural correlates of the patterning process.

1980-1983: Collaborated with Ira Wool at the University of Chicago in a study of ribosomal protein evolution. Used computer programs to detect distant relationships between newly sequenced rat-ribosomal proteins and ribosomal proteins of other species.

1983-1987: Postdoctoral fellow with Edward Cox at Princeton University. Used monoclonal antibodies to test predictions of different theories of pattern formation in the cellular slime mold *Polysphondylium*. Compared observed patterns to predicted patterns using 3-D computer graphics.

1987-1998. Assistant Professor of Biomedical Computing; joint appointments - Biology, and Cell Biology and Physiology, Washington University, St. Louis: Developed methods for wide-field deconvolution microscopy and applied them to the analysis of 3D motility.

1998-2014. Principal Investigator and Imaging Facility Head, Laboratory of Receptor Biology and Gene Expression, NCI: Conducting independent research in transcription and chromatin structure, as well as establishing and maintaining a core fluorescence microscopy facility.

2014-present. Senior Scientist, Helmholtz Zentrum, Berlin: Developing methods for X-ray microscopy of cells.

Published Manuscripts

1. Stasevich, T.J., Hayashi-Takanaka, Y., Sato, Y., Maehara, K., Ohkawa, Y., Sakata-Sogawa, K., Tokunaga, M., Nagase, T., Nozaki, N., **McNally, J.G.**, Kimura, H. (2014) Regulation of RNA polymerase II activation by histone acetylation in single living cells. *Nature* **10**.1038/nature13714.
2. Morisaki, T. and **McNally, J.G.** (2014) Photoswitching-Free FRAP Analysis with a Genetically Encoded Fluorescent Tag. *PLoS One*. doi: 10.1371/journal.pone.0107730.
3. Morisaki, T., Müller, W.G., Golob, N., Mazza, D. and **McNally, J.G.** (2014) Single-molecule analysis of transcription factor binding at transcription sites in live cells. *Nat. Commun.* **5**:4456 doi: 10.1038/ncomms5456.
4. Ali, M., Chernova, T.A., Newnam, G.P., Yin, L., Shanks, J., Karpova, T.S., Lee, A., Laur, O., Subramanian, S., Kim, D., **McNally, J.G.**, Seyfried, N.T., Chernoff, Y.O., Wilkinson, K.D. (2014) Stress-dependent proteolytic processing of the actin assembly protein Lsb1 modulates a yeast prion. *J. Biol. Chem.* **289**:27625-39.
5. Mazza, D. and **McNally, J.G.** (2014) Genetically encoded fluorescent proteins and FRAP. in “The Fluorescent Protein Revolution” eds. Day, R.N. and Davidson, M.W. CRC Press, Boca Raton, FL, USA, pp 177-199.
6. Dalal, Y. and **McNally, J.G.** (2014) Now you see it, now you don't: A biochemist's primer for advances in high resolution microscopy. *Phys Life Rev.* **11**:36-7; discussion 38. doi: 10.1016/j.plrev.2013.11.007.
7. Poorey, K., Viswanathan, R., Carver, M.N., Karpova, T.S., Cirimotich, S.M., **McNally, J.G.**, Bekiranov, S. and Auble, D.T. (2013) Measuring chromatin interaction dynamics on the second time scale at single-copy genes. *Science* **342**:369-372.
8. Rieder D, Ploner C, Krogdram AM, Stocker G, Fischer M, Scheideler M, Dani C, Amri EZ, Müller WG, **McNally JG**, Trajanoski Z. (2013) Co-expressed genes prepositioned in spatial neighborhoods stochastically associate with SC35 speckles and RNA polymerase II factories. *Cell Mol Life Sci.* **71**:1741-59. doi: 10.1007/s00018-013-1465-3.
9. Mueller, F., Stasevich, T.J., Mazza, D. and **McNally, J.G.** (2013) Quantifying transcription factor kinetics: at work or at play. *Crit. Rev. Biochem. Mol. Biol.* **48**:492-514.
10. Mazza, D., Ganguly, S. and **McNally, J.G.** (2013) Monitoring dynamic binding of chromatin proteins in vivo by single-molecule tracking. *Methods Mol. Biol.* **1042**:117-137.
11. Hurley, A., Smith, M., Karpova, T. Hasley, R.B., Belkina, N., Shaw, S., Balenga, N., Druey, K.M., Nickel, E., Packard, B., Imamichi, H., Hu, Y., Follmann, D., **McNally, J.**, Higgins, J., Sneller, M., Lane, H.C. and Catalfamo, M. (2013) Enhanced effector function of CD8 T cells from healthy controls and HIV infected patients occurs through thrombin activation of the protease-activated receptor-1. *J. Infect. Dis.* **207**:638-650.
12. Choy, J.S., O'Toole, E., Schuster, B.M., Crisp, J.J., Karpova, T.S., **McNally, J.G.**, Winey, M., Gardner, M.K. and Basrai, M.A. (2013) Genome-wide haploinsufficiency screen reveals a novel role for γ -TuSC in spindle organization and genome stability. *Mol. Biol. Cell* **24**:2753-2763.
13. Mazza, D., Mueller, F., Stasevich, TJ and **McNally, J.G.** (2013) Convergence of chromatin binding estimates in live cells. *Nat. Methods* **10**:691-2.
14. Case, C.M., Sackett, D.L., Wangsa, D., Karpova, T., **McNally, J.G.**, Ried, T. and Camps, J. (2013) CKAP2 ensures chromosomal stability by maintaining the integrity of microtubule nucleation sites. *PLoS One* **8**:e64575 doi: 10.1371/journal.pone.0064575.
15. Quenet, D., **McNally, J.G.** and Dalal, Y. (2012) Through thick and thin: the conundrum of chromatin fibre folding in vivo. *EMBO Rep.* **13**:943-944.
16. Rieder, D., Trajanoski, Z. and **McNally, J.G.** (2012) Transcription factories. *Front. Gene.* **3**:221 doi:10.3389/fgene.2012.00221.
17. Mazza, D., Abernathy, A., Morisaki, T. and **McNally, J.G.** (2012) A benchmark for chromatin binding measurements in live cells. *Nuc. Acids. Res.* **40**:e119. Doi:10.1093/nar/gks701.
18. Lickwar, C.R., Mueller, F., Hanlon, S.E., **McNally, J.G.** and Lieb, J.D. (2012) Genome-wide protein-DNA binding dynamics suggest a molecular clutch for transcription factor function. *Nature* **484**:251-255.
19. Mueller, F., Morisaki, T., Mazza, D. and **McNally, J.G.** (2012) Minimizing the impact of photoswitching of fluorescent proteins on FRAP analysis. *Biophys. J.* **102**:1656-1665.
20. Mueller, F., Karpova, T.S., Mazza, D. and **McNally, J.G.** (2012) Monitoring dynamic binding of chromatin proteins in vivo by fluorescence recovery after photobleaching (FRAP). *Meth. Mol. Biol.* **833**:153-176.

21. Mazza, D., Stasevich, T.J., Karpova, T.S. and **McNally, J.G.** (2012) Monitoring dynamic binding of chromatin proteins in vivo by fluorescence correlation spectroscopy (FCS) and temporal image correlation spectroscopy (TICS). *Meth. Mol. Biol.* **833**:153-176.
22. Müller, W.G., Heymann J.B., Nagashima, K., Guttman, P., Werner, S., Rehbein, S., Schneider, G., **McNally, J.G.** (2011) Towards an atlas of mammalian cell ultrastructure by cryo soft X-ray tomography. *J. Struct. Biol.* **177**:179-192.
23. Maiuri, P., Knezevich, A., DeMarco, A., Mazza, D., Kula, A., **McNally, J.G.** and Marcello, A. (2011) Fast transcription rates of RNA polymerase II in human cells. *EMBO Rep.* **12**:1280-1285.
24. Stasevich, T. and **McNally, J.G.** (2011) Assembly of the transcription machinery: ordered and stable, random and dynamic, or both? *Chromosoma* **120**:533-545.
25. **McNally, J.G.** (2011) Foreword. Biophysics in chromatin structure and nuclear dynamics. *Chromosome Res.* **19**:1-3.
26. Chernova, T.A., Romanyuk, A.V., Karpova, T.S., Shanks, J.R., Ali, M., Moffatt, N., Howie, R.L., O'Dell, A., **McNally, J.G.**, Liebman, S.W., Chernoff, Y.O. and Wilkinson, K.D. (2011) Prion induction by the short-lived, stress-induced protein Lsb2 is regulated by ubiquitination and association with the actin cytoskeleton. *Mol. Cell* **43**:242-252.
27. Kuipers, M.A., Stasevich, T.J., Sasaki, T., Wilson, K.A., Hazelwood, K.L., **McNally, J.G.**, Davidson, M.W. and Gilbert, D.M. (2011) Highly stable loading of Mcm proteins onto chromatin in living cells requires replication to unload. *J. Cell Biol.* **192**:29-41.
28. Gordon, S.N., Cecchinato, V., Andersen, V., Heraud, J.M. Hryniewicz, A., Park, R.W., Venzon, D., Chung, H.K., Karpova, T., **McNally, J.**, Silvera, P. Reimann, K.A., Matsui, H., Kanehara, T., Shinmura, Y., Yokote, H., Franchini, G. (2011) Smallpox vaccine safety is dependent on T cells and not B cells. *J. Infect. Dis.* **203**:1043-1053.
29. Schneider, G., Guttman, P., Heim, S., Rehbein, S., Mueller, F., Nagashima, K., Heymann, J.B., Müller, W.G., **McNally, J.G.** (2010) Three-dimensional cellular ultrastructure resolved by X-ray microscopy. *Nat. Meth.* **7**:985-987.
30. Sung, M-H., **McNally, J.G.** (2010) Live cell imaging and systems biology. *WIREs Systems Biol. Med.* DOI:10.1002/wsbm.108.
31. Stasevich, T.J., Mueller, F., Michelman-Ribeiro, A., Rosales, T., Knutson, J., **McNally, J.G.** (2010) Cross validating FRAP and FCS to quantify the impact of photobleaching on in vivo binding estimates. *Biophys. J.* **99**:3093-3101.
32. Mueller, F., Mazza, D., Stasevich, T.J., **McNally, J.G.** (2010) FRAP and kinetic modeling in the analysis of nuclear protein dynamics: what do we really know? *Curr. Opin. Cell Biol.* **22**:403-411.
33. Stasevich, T.J., Mueller, F., Brown, D.T. , **McNally, J.G.** (2010) Dissecting the binding mechanism of the linker histone in live cells: an integrated FRAP analysis. *EMBO J.* **29**:1225-1234.
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35. Heyerdahl, S.L., Rozenberg, J., Jamtgaard, L., Rishi, V., Varticovski, L., Akah, K., Scudiero, D., Shoemaker, R.H., Karpova, T.S., Day, R.N., **McNally, J.G.**, Vinson, C. (2010) The arylstibonic acid compound NSC13746 disrupts B-ZIP binding to DNA in living cells. *Eur J Cell Biol* **89**:564-573.
36. **McNally, J.G.** and Mazza, D. (2010). Fractal geometry in the nucleus. *EMBO J.* **29**:2-3.
37. Hager, G.L*, **McNally, J.G.***, Misteli, T*. (2009) Transcription dynamics. *Mol. Cell* **35**:741-753. *equal contribution.
38. Stocker, G., Fischer, M., Rieder, D., Bindea, G., Kainz, S., Oberstolz, M., **McNally, J.G.** and Trajanoski, Z. (2009). iLAP: a workflow-driven software for experimental protocol development, data acquisition and analysis. *BMC Bioinform.* **10**:390.
39. Rochman, M., Postnikov, Y., Correll, S., Malicet, C., Wincovitch, S., Karpova, T.S., **McNally, J.G.**, Wu, X., Bubunenko, N.A.; Grigoryev, S. and Bustin, M. (2009) The interaction of NSBP1/HMG5 with nucleosomes in euchromatin counteracts linker histone-mediated chromatin compaction and modulates transcription. *Mol. Cell* **35**:642-656.
40. Michelman-Ribeiro, A., Mazza, D., Rosales, T., Stasevich, T.J., Boukari, H., Rishi, V., Vinson, C., Knutson, J.R. and **McNally, J.G.** (2009) Direct measurement of association and dissociation rates of DNA binding in live cells by fluorescence correlation spectroscopy. *Biophys. J.* **97**:337-346.
41. **McNally, J.G.** (2009) Transcription, chromatin condensation, and gene migration. *J. Cell Biol.* **185**:7-9.

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44. Karpova, T.S., Kim, M.J., Spriet, C., Nalley, K., Stasevich, T., Kherrouche, Z., Heliot, L. and **McNally, J.G.** (2008). Concurrent fast and slow cycling of a transcriptional activator at an endogenous promoter. *Science* **319**:466-469.
45. Sprouse, R.O., Karpova, T.S., Mueller, F., Dasgupta, A., **McNally, J.G.** and Auble, D.T. (2008). Regulation of TATA-binding protein dynamics in living yeast cells. *Proc. Natl. Acad. Sci. USA* **105**:13304-13308.
46. Sung, M.H., Bagain, L., Chen, Z., Karpova, T., Yang, X., Silvin, C., Voss, T.C., **McNally, J.G.**, Van Waes, C. and Hager, G.L. (2008) Dynamic effect of bortezomib on nuclear factor-kappaB activity and gene expression in tumor cells. *Mol Pharmacol.* **74**:1215-1222.
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48. Park, C.J., Park, J.E., Karpova, T.S., Soung, N.K., Yu, S.R., Song, S., Lee, K.H., Xia, X., Kang, E., Dabanoglu, I., Oh, D.Y., Zhang, J.Y., Kang, Y.H., Wincovitch, S., Huffaker, T.C., Veenstra, T.D., **McNally, J.G.** and Lee, K.S. (2008) Requirement of the budding yeast polo kinase Cdc5 in proper microtubule growth and dynamics. *Euk. Cell* **7**:444-453.
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50. Mueller, F., Wach, P. and **McNally, J.G.** (2008) Evidence for a common mode of transcription factor interaction with chromatin as revealed by improved quantitative FRAP. *Biophys. J.* **94**:3323-3339.
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53. Mueller, W.G., Rieder, D., Karpova, T.S., John, S., Trajanoski, Z. and **McNally, J.G.** (2007) Organization of chromatin and histone modifications at a transcription site. *J. Cell Biol.* **177**:957-67.
54. Braga, J., **McNally, J.G.** and Carmo-Fonseca, M. (2007) A reaction-diffusion model to study RNA motion by quantitative fluorescence recovery after photobleaching. *Biophys. J.* **92**:2694-703.
55. Karpova, T.S. and **McNally, J.G.** (2006) Detecting protein-protein interactions with CFP-YFP FRET by acceptor photobleaching. *Curr. Prot. Cytom.* 12.7.1-12.7.11.
56. Koga, F., Xu, W., Karpova, T.S., **McNally, J.G.**, Baron, R., Neckers, L. (2006) Hsp90 inhibition transiently activates Src kinase and promotes Src-dependent Akt and Erk activation. *Proc. Natl. Acad. Sci USA* **103**:11318-11322.
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