

Henry N. Higgs

Associate Professor
Department of Biochemistry
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Research Experience

- 2001-present **Assistant Professor.** *Dartmouth Medical School.* Formin proteins, actin dynamics, and lymphocyte cytoskeleton. Promoted to Associate Professor in 2007.
- 1997-2001 **Post-doctoral Fellow.** *Salk Institute (Thomas Pollard).* Mechanism of actin nucleation by Arp2/3 complex and Wiskott-Aldrich Syndrome protein (WASp), mechanism of WASp regulation by Cdc42 and PIP₂, and investigation of WASp function in leukocytes.
- 1996-1997 **Post-doctoral Fellow.** *University of Washington, Department of Biochemistry and HHMI (John Glomset).* Cloning and expression of a phosphatidic acid-preferring phospholipase A₁ from bovine testis.
- 1990-1996 **PhD Candidate.** *University of Washington, Department of Biochemistry and HHMI (John Glomset).* Identification, purification, and enzymological characterization of a phosphatidic acid-preferring phospholipase A₁ from sperm and brain cytosol.
- 1988-1990 **Research Technician.** *Universite Louis Pasteur, Strasbourg France (Pierre Chambon).* Purification and characterization of mammalian basal transcription factors.
- 1987-1988 **Research Technician.** *University of North Carolina-Chapel Hill, Laboratories for Reproductive Biology (Frank French).* Cloning, DNA sequencing, bacterial expression, and genomic mapping of human androgen receptor.

Education

- 1997-2001 Post-Doctoral Fellow
Salk Institute for Biological Studies, La Jolla CA
- 1996-1997 Post-Doctoral Fellow
Howard Hughes Medical Institute, University of Washington, Seattle WA
- 1990-1996 Ph.D. candidate
Department of Biochemistry, University of Washington, Seattle WA
- 1986-1987 BA Biology (Magna Cum Laude).
1984-1985 Lafayette College, Easton PA
- 1985-1986 Undergraduate Study. Cambridge University, UK (Corpus Christi College)
- 1983-1984 Undergraduate Study. Pennsylvania State University, State College PA

Awards and Affiliations

- Pew Biomedical Research Scholar, 2003 – 2007.
- Editorial Board of *Current Biology*, 2004 to present.
- NIH National Research Service Award, 1998 to 2001.
- American Society of Cell Biology, member, 1996 to present.

Research Publications

- Chhabra, E. C., Ramabhadran, V., & Higgs, H. N. J. Cell Sci. Submitted. *INF2 is an endoplasmic reticulum, associated formin protein.*
- Esue, O., Harris, E. S., Higgs, H. N. & Wirtz, D. (2008) *The filamentous actin cross-linking/bundling activity of mammalian formins.* J. Mol. Biol. PMID: 18835565.
- Nicholson-Dykstra, S. M. & Higgs, H. N. (2008) *Arp2 depletion inhibits sheet-like protrusions but not linear protrusions of fibroblasts and lymphocytes.* Cell Motil. Cytoskeleton. 65(11): 904-922.
- Wawro, B., Greenfield, N. J., Wear, M. A., Cooper, J. A., Higgs, H. N., & Hitchcock-Degregori, S. E. (2007) *Tropomyosin regulates elongation by formin at the fast-growing end of the actin filament.* Biochemistry 46(27): 8146-8155.
- Eisenmann, K. M., Harris, E. S., Kitchen, S. M., Holman, H. A., Higgs, H. N. & Alberts, A. S. (2007) *Dia-interacting protein modulates formin-mediated actin assembly at the cell cortex.* Curr Biol 17(7): 579-591.
- Chhabra, E. S. & Higgs, H. N. (2006) *INF2 is a WH2 motif-containing formin that severs actin filaments and accelerates both polymerization and depolymerization.* J. Biol. Chem. 281(36):26754-26767.
- Harris, E. S., Rouiller, I., Hanein, D., & Higgs, H. N. (2006) *Mechanistic differences in actin bundling activity of two mammalian formins, FRL1 and mDia2.* J. Biol. Chem. 281 (20): 14383-14392.
- Kovar, D. R., Harris, E. S., Mahaffy, R., Higgs, H. N., & Pollard, T. D. *Control of the assembly of ATP- and ADP-actin by formins and profilin.* (2006) Cell. 124: 423-435.
- Barzik, M., Kotova, T. I., Higgs, H. N., Hazelwood, L., Hanein, D., Gertler, F. B., & Schafer, D. A. *Ena/VASP proteins enhance actin polymerization in the presence of barbed end capping Proteins.* (2005) J. Biol. Chem. 280 (31): 28,653-28662.
- Li, F. & Higgs, H. N. *Dissecting requirements for auto-inhibition of actin nucleation by the formin, mDia1.* (2005) J. Biol. Chem. 280 (8): 6986-6992.
- Higgs, H. N. & Peterson, K. J. *Phylogenetic analysis of the Formin Homology 2 domain.* (2005) Mol. Biol. Cell. 16(1): 1-13.
- Majstoravich, S., Zhang, J., Nicholson-Dykstra, S., Linder, S., Friedrich, W., Siminovitch, K. A., & Higgs, H. N. *Lymphocyte microvilli are dynamic, actin-dependent structures that do not require Wiskott-Aldrich syndrome protein (WASP) for their morphology.* (2004) Blood. 104(5): 1396-1403.
- Harris, E. S., Li, F., & Higgs, H. N. *The mouse formin, FRLalpha, slows actin filament barbed end elongation, competes with capping protein, accelerates polymerization from monomers, and severs filaments.* (2004) J. Biol. Chem. 279(19): 20076-20087.
- Li, F., & Higgs, H. N. *The mouse Formin mDia1 is a potent actin nucleation factor regulated by autoinhibition.* (2003) Curr. Biol. 13(15): 1335-1340.
- Robinson, R.C., Turbedsky, K., Kaiser, D. A., Marchand, J. B., Higgs, H. N., Choe, S., & Pollard, T. D. *Crystal structure of Arp2/3 complex.* (2001) Science. 294(5547): 1679-1684.
- Hufner, K., Higgs, H. N., Pollard, T. D., Jacobi, C., Aepfelbacher, M., & Linder, S. *The VC region of Wiskott-Aldrich syndrome protein induces Arp2/3 complex-dependent actin nucleation.* (2001) J. Biol. Chem. 276: 35761-35767.
- Marchand, J. B, Kaiser, D. A., Pollard, T. D., & Higgs, H. N. *Interaction of WASp/Scar proteins with actin and vertebrate Arp2/3 complex.* (2001) Nature Cell Biol. 3: 76-82.
- Higgs, H. N., & Pollard, T. D. *Activation by Cdc42 and PIP₂ of Wiskott-Aldrich Syndrome protein (WASP) stimulates actin nucleation by Arp2/3 complex.* (2000) J. Cell Biol. 150: 1311-1320.
- Lin, Q., Higgs, H. N., & Glomset, J. A. *Membrane lipids have multiple effects on interfacial catalysis by a phosphatidic acid-preferring phospholipase A₁ from bovine testis.* (2000) Biochemistry. 39: 9335-9344.

- Linder, S., **Higgs, H. N.**, Huefner, K., Schwarz, K., Pannicke, U., & Aepfelbacher, M. *The polarization defect of Wiskott-Aldrich Syndrome macrophages is linked to dislocalization of the Arp2/3 complex.* (2000) *J. Immunology.* 165: 221-225.
- Blanchoin, L., Amann, K. J., **Higgs, H. N.**, Marchand, J. B., Kaiser, D. A., & Pollard, T. D. *Direct observation of dendritic actin filament networks nucleated by Arp2/3 complex and WASP/Scar proteins.* (2000) *Nature.* 404: 1007-1011.
- Higgs, H. N.**, Blanchoin, L., & Pollard, T. D. *Influence of the C terminus of Wiskott-Aldrich Syndrome protein (WASP) and the Arp2/3 complex on actin polymerization.* (1999) *Biochemistry* 38: 15212-15222.
- Huang, M., Yang, C., Schafer, D. A., Cooper, J. A., **Higgs, H. N.**, & Zigmond, S. H. *Cdc42-induced actin filaments are protected from capping protein.* (1999) *Curr. Biol.* 9: 979-982.
- May, R. C., Hall, M. E., **Higgs, H. N.**, Pollard, T. D., Chakraborty, T., Wehland, J., Machesky, L. M., & Sechi, A. S. *The Arp2/3 complex is essential for the actin-based motility of Listeria monocytogenes.* (1999) *Curr. Biol.* 9: 759-762.
- Machesky, L. M., Mullins, R. D., **Higgs, H. N.**, Kaiser, D. A., Blanchoin, L., May, R. C., Hall, M. E., & Pollard, T. D. *Scar, a WASP-related protein, activates nucleation of actin filaments by the Arp2/3 complex.* (1999) *Proc. Natl. Acad. Sci. USA.* 96: 3739-3744.
- Vinson, V. K., De La Cruz, E. M., Kaiser, D. A., **Higgs, H. N.**, & Pollard, T. D. *Evaluation of the affinity of Acanthamoeba profilins for actin by fluorescence anisotropy.* (1998) *Biochemistry.* 37(31): 10871-10880.
- Higgs, H. N.**, Han, M., Johnson, G. E., & Glomset, J. A. *Cloning of a phosphatidic acid-preferring phospholipase A₁ from bovine testis.* (1998) *J. Biol. Chem.* 273(10), 5468-5477.
- Higgs, H. N.**, & Glomset, J. A. *Purification and properties of a phosphatidic acid-preferring phospholipase A₁ from bovine testis. Examination of the molecular basis of its activation.* (1996) *J. Biol. Chem.* 271 (18), 10874-10883.
- Higgs, H. N.**, & Glomset, J. A. *Identification and characterization of a phosphatidic acid-preferring phospholipase A₁ from bovine brain and testis.* (1994) *Proc. Nat. Acad. Sci.* 91, 9574-9578.
- Lubahn, D. B., Brown, T. R., Simental, J. A., **Higgs, H. N.**, Migeon, C. J., Wilson, E. M., & French, F. S. *Sequence of the intron/exon junctions of the coding region of the human androgen receptor gene and identification of a point mutation in a family with complete androgen insensitivity.* (1989) *Proc. Nat. Acad. Sci.* 86, 9534-9538.
- Lubahn, D. B., Joseph, D. R., Sar, M., Tan, J., **Higgs, H. N.**, Larson, R. E., French, F. S., & Wilson, E. M. *The human Androgen receptor: complementary deoxyribonucleic acid cloning, sequence analysis and gene expression in prostate.* (1988) *Molec. Endocrinol.* 2(12) 1265-1275.

Reviews

Chhabra, E. S. & **Higgs, H. N.** *The many faces of actin: matching assembly factors with cellular structures.* Nature Cell Biol. 9(10) 1110-1121.

Harris, E. S. & **Higgs, H. N.** *Biochemical analysis of mammalian formin effects on actin dynamics.* (2006) Methods Enzymol. 406: 190-214.

Higgs, H. N. *Formin proteins: a domain-based approach.* (2005) Trends Biochem. Sci. 30(6): 342-353.

Nicholson-Dykstra, S., **Higgs, H. N.**, & Harris, E. S. *Actin dynamics: growth from dendritic branches.* (2005) Current Biology. 15(9) R346-357.

Higgs, H. N. *There goes the neighborhood: Eps8 joins the barbed-end crowd.* (2004) Nature Cell Biol. 6(12): 1147-1149.

Harris, E. S. & **Higgs, H. N.** *Actin cytoskeleton: formins lead the way.* (2004) Current Biology. 14(13) R520-R522.

Merz, A. J., & **Higgs, H. N.** *Listeria motility: biophysics pushes things forward.* (2003) Current Biology. 13(8): R302-R304.

Higgs, H. N. *Actin nucleation: cortactin caught in the act.* (2002) Current Biology. 12(17) R593-R595.

Higgs, H. N. *Actin nucleation: nucleation-promoting factors are not all equal.* (2001) Current Biology. 11(24) R1009-1012.

Higgs, H. N. & Pollard, T. D. *Regulation of actin nucleation by Arp2/3 complex: Activation by a diverse array of proteins.* (2001) Ann. Rev. Biochem. 70: 649-676.

Higgs, H. N., & Pollard, T. D. *Regulation of actin polymerization by Arp2/3 complex and WASp/Scar proteins.* (1999) J. Biol. Chem. 274: 32531-32534.

Invited Presentations

- 9/08 Pennsylvania Muscle Institute, University of Pennsylvania, Philadelphia PA
- 9/08 Cytoskeletal and Cellular Motility Group, Yale University, New Haven CT
- 5/08 Department of Biology, University of Massachusetts, Amherst MA
- 5/07 Department of Biochemistry and Molecular Biology, Mayo Clinic, Rochester MN.
- 7/06 FASEB Conference, *Regulation & Function of Small GTPases*. Saxtons River VT.
- 4/06 Department of Biology, University of Massachusetts, Amherst MA
- 4/06 Pennsylvania Muscle Institute, University of Pennsylvania, Philadelphia PA
- 3/06 Department of Cell Biology, Emory University, Atlanta GA
- 12/05 Cell Migration Special Sub-group. American Society for Cell Biology, San Francisco, CA.
- 12/05 Minisymposium Co-chair: Formins and Arp2/3 complex. American Society for Cell Biology, San Francisco, CA.
- 11/05 Department of Physiology, McGill University. Montreal Canada.
- 4/05 Ludwig Institute, University College London.
- 12/04 Cell Adhesion Special Sub-group. American Society for Cell Biology, Washington DC.
- 11/04 Department of Physiology. University of Texas, Southwestern, Dallas TX.
- 9/04 Van Andel Research Institute, Grand Rapids MI.
- 9/04 Department of Cell Biology. Washington University St. Louis, MO.
- 12/03 Formin Protein Special Sub-group. American Soc. for Cell Biology, San Francisco CA.
- 10/03 Burnham Institute. La Jolla CA.
- 11/01 Department of Physiology and Biophysics. University of Vermont, Burlington VT.