

Coleen T. Murphy, Ph.D.

**148 CARL ICAHN LABORATORY
DEPARTMENT OF MOLECULAR BIOLOGY
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Current Position

Assistant Professor and Richard B. Fisher Preceptorship in Integrative Genomics, Department of Molecular Biology, Lewis-Sigler Institute for Integrative Genomics, and Princeton Neuroscience Institute, Princeton University (July 1, 2005-)

*My research group studies aging and the quantitation of "quality of life with age," including the decline of cognitive and reproductive capacities with age. We develop behavioral, genomic, genetic, biochemical, robotic, and computational approaches, using *C. elegans* as our model system.*

Education and Training

Postdoctoral Training with C. Kenyon, Ph.D., UCSF (2000-05): *Longevity Gene Discovery: Transcriptional Analysis of C. elegans Longevity Mutants*. Awarded *Life Sciences Research Foundation*, *American Cancer Society* (declined), and *Ellison Medical Foundation / AFAR* Postdoctoral Fellowships.

Ph.D., Dept. of Biochemistry, Stanford University, with James A. Spudich, Ph.D. (1993-99): *The Role of Variable Loops & the Conserved Core in Myosin Function: Kinetic Analysis of Dictyostelium Myosin II*. Awarded *HHMI* and *NSF* (declined) Graduate Fellowships.

B.S., Biochemical and Biophysical Sciences, Chemistry minor, University Honors & Honors in Major, *Magna cum Laude*, University of Houston (1992); *Crystallization Studies of Apolipoprotein A-II* (Honors Thesis)

Post-Baccalaureate research with Johann Deisenhofer, Ph.D., HHMI, U. T. Southwestern (1992-93): *Purification and crystallization of uvrA*

Research with Hanno Roder, Ph.D., Bayer, Germany (1991): *Protein Kinase 40erk & Alzheimer's Disease Bioinformatics: Writing Software for Genome Research*, Cold Spring Harbor Lab course (2001)
EMBO Course: Pre-Steady-State Kinetics, Max Planck Inst., Dortmund, Germany (1997)
Physiology Course, Marine Biological Laboratories, Woods Hole, MA (1995)

Honors and Awards

- Princeton Old Dominion Fellows (2011-13)
- Glenn Award for Research in Biological Mechanisms of Aging (2010)
- NIA Lab. of Neurosciences *Distinguished Lecturer in Neuroscience & Aging* (2009)

- NIH *Research Partnership in Cognitive Aging* Award (R01, 2009)
- American Society for Cell Biology *Women in Cell Biology Jr. Career Recognition Award* (2008)
- NIH New Innovators Award (2008)
- Keck Distinguished Young Scholars in Medical Research (2008)
- McKnight Scholars Award (Neuroscience) (2008)
- Basil O'Connor Starter Scholar Research Award (2008)
- Thomas Jefferson University Distinguished Speaker Award (2008)
- Pew Scholar in the Biomedical Sciences (2006)
- Sloan Research Fellowship (2006)
- Ellison Medical Foundation New Scholar in Aging (2006; declined)
- Named "Scientist to Watch" by *The Scientist* (2006)
- Burroughs-Wellcome Career Awards in the Biomedical Sciences Finalist (2003)
- Ellison Medical Foundation / AFAR Senior Postdoctoral Fellowship (2003-05)
- Life Sciences Research Foundation Postdoctoral Fellowship (2000-2003)
- American Cancer Society Fellowship (2000; declined)
- Howard Hughes Medical Institute Pre-Doctoral Fellowship (1994-99)
- NSF Pre-doctoral Fellowship (1994; declined)
- Senior Honors Thesis Award, University of Houston (1992)
- American Chemical Society Undergraduate Award (1992)
- Rhodes Scholarship Semi-Finalist (1992)
- Dean's List, University of Houston (1988-1992)
- Outstanding Student Award, University of Houston German Dept. (1988 & 1989)
- Phi Kappa Phi and Alpha Lambda Delta/Phi Eta Sigma (1988)
- Nat. Merit Scholar, Kansas State Scholar, K.C. Star *Scholar-Athlete*, Valedictorian, Spring Hill H.S. (1987)

Publications

27. Rizki, G., Iwata, T.N., Li, J., Riedel, C.G., Picard, C.L., Jan, M., **Murphy, C.T.**, and Lee, S.S. "The Evolutionarily conserved longevity determinants HCF-1 and SIR-2.1/SIRT1 collaborate to regulate DAF-16/FOXO." (2011) PLoS Genet. Sep; 7(9):e1002235.
26. Liu, G., Rogers, J., **Murphy, C. T.**, and Rongo, C. "EGF signaling activates the ubiquitin proteasome system to modulate *C. elegans* lifespan." (2011) EMBO J. June 14. doi: 10.1038/emboj.2011.195.
25. Kauffman, A.L., Parsons, L., Stein, G.M., Wills, A.A., Kaletsky, R.L., and **Murphy, C.T.**, "*C. elegans* Positive Butanone Learning, Short-term, and Long-term Associative Memory Assays." (2011) J. Vis. Exp. **49**
24. Luo, S. and **Murphy, C.T.**, "*C. elegans* Reproductive Aging: Regulation and Underlying Mechanisms." (2011) Genesis Feb;49(2):53-65. doi: 10.1002/dvg.20694. Epub 2011 Jan 2
23. **Murphy, C. T.** "Aging: miRacles of Longevity?" (2010) Curr. Biol. (20): R1076-R107. (invited perspective)
22. Luo, S., Kleemann, G.A., Ashraf, J.M., Shaw, W.M., and **Murphy, C.T.**, "TGF- β and Insulin Signaling Temporally and Spatially Regulate Reproductive Aging via Germline Quality Maintenance." Cell **143**(2):299-312.
 • *Featured in Cell's PaperClip, Oct. 15, 2010*
 • *Featured in the New York Times, Oct. 15, 2010*
 • *Featured in News & Views, Nature***468**: 386-387 (17 Nov. 2010)
21. Kauffman, A.L., Ashraf, J.A., Corces-Zimmerman, M.R., Landis, J.L., and **Murphy, C.T.**, "Insulin Signaling and Caloric Restriction Differentially Influence the Decline of Learning and Memory with Age." PLOS Biology, 8(5): e1000372, May 18 (2010).
 • *Featured in Nature Reviews Neuroscience, June 9, 2010*
20. Kaletsky, R.L. and **Murphy, C.T.** "The Role of Insulin/IGF-like Signaling in *C. elegans* Longevity and Aging." (2010) Disease Models and Mechanisms.
19. Landis, J.N. and **Murphy, C.T.** "Integration of diverse inputs in the regulation of *C. elegans* DAF-16/FOXO." Dev Dynamics.

2010 Feb 5.

18. Luo, S., Shaw, W.M., Ashraf, J., and **Murphy, C.T.** (2009). "TGF- β Sma/Mab signaling mutations uncouple reproductive aging from somatic aging." *PLoS Genet.* 2009 Dec. 5 (12):e1000789.
17. Lee, S.-J., **Murphy, C.T.**, and Kenyon, C. "Glucose shortens the life span of *C. elegans* by downregulating Aquaporin gene expression." (2009) *Cell Metab.* doi:10.1016/j.cmet.2009.10.003.
16. Chikina, M.D., Huttenhower, C., **Murphy, C.T.**† and Troyanskaya, O.G.†, "Global Prediction of Tissue-Specific Gene Expression and Context-Dependent Gene Networks in *C. elegans*." (2009) *PLoS Comput Biol* 5(6): e1000417. † **co-corresponding authors.**
15. Oliveira, R.P.*, Dilks, K.*, Abate, J.P., Landis, J., Ashraf, J., **Murphy, C.T.**†, and T. Keith Blackwell, T.K.†, "Condition-adapted stress and longevity gene regulation by *C. elegans* SKN-1/Nrf." *Aging Cell* (2009 Jul 3) *co-first authors. † **co-corresponding authors.**
14. Kleemann, G.A., and **Murphy, C. T.**, "Endocrine regulation of Aging in *C. elegans*." (2009) *Mol Cell Endocrinol* **299**(1):51-7.
13. **Murphy, C. T.**, Lee, S.J., and Kenyon, C., "Tissue entrainment by feedback regulation of insulin gene expression in the endoderm of *Caenorhabditis elegans*." (2007) *PNAS*. **104**(48): 19046-50.
12. Shaw, W.M., Luo, S., Landis, J., Ashraf, J., and **Murphy, C. T.**, "The *C. elegans* TGF- β Dauer Pathway Regulates Longevity via Insulin Signaling." (2007) *Curr Biol*, Oct 9;17(19):1635-45.
11. **Murphy, C. T.** "The Search for DAF-16/FOXO Transcriptional Targets: Approaches and Discoveries." (2006) *Experimental Gerontology*. **41**(10): 910-21. (invited review)
10. Kenyon, C. and **Murphy, C. T.**, "Enrichment of regulatory motifs upstream of predicted DAF-16 targets." (2006) *Nature Genetics* **38**(4): 397-8.
9. Murphy, C. T. "Using Whole-Genome Transcriptional Analyses to Discover Molecular Mechanisms of Aging." (2006) *Drug Discovery Today: Disease Mechanisms*. 3(1): 41-46. (invited review)
8. McCarroll, SA, **Murphy, C. T.** Zou S, Pletcher SD, Chin CS, Jan YN, Kenyon C, Bargmann CI, Li H. "Comparing genomic expression patterns across species identifies shared transcriptional profile in aging." (2004) *Nature Genetics* **36**(2): 197-204.
7. **Murphy, C. T.** "A Review of Genes that Act Downstream of the DAF-16 FOXO transcription factor to influence the lifespan of *C. elegans*." Res. & Persp. in Longevity, *Longevity and Frailty*, Springer (2005). (invited review)
6. **Murphy, C. T.**, McCarroll S., Bargmann C.I., Fraser A., Kamath R.S., Ahringer J., Li H., & Kenyon C. "Genes that Act Downstream of DAF-16 to Influence the Lifespan of *C. elegans*." (2003) *Nature* **424**: 277-83.
 - *Featured in News and Views, Nature* **424**: 259-61.
 - *Cited more than 700 times by July 2011 (Google Scholar)*
5. Hsu, A. L., **Murphy, C. T.**, and Kenyon, C. "*C. elegans* HSF-1 functions with DAF-16 to Regulate Aging and the Heat-Shock Response." (2003) *Science* **300**: 1142-5.
4. **Murphy, C. T.**, Rock, R. S., and Spudich, J. A. "A Myosin II Mutation Uncouples ATPase activity from Motility and Shortens Step Size." (2001) *Nature Cell Biology* **3**: 311-315.
3. **Murphy, C. T.** & Spudich, J. A. "Variable Surface Loops and Myosin Activity: Accessories to a Motor," (2000) *J. Mus. Res. Cell Mot.* **21**:139-151. (invited review)
2. **Murphy, C. T.** & Spudich, J. A. "The Sequence of the Myosin 50-20K Loop Affects Myosin's Affinity for Actin throughout the Actin-Myosin ATPase Cycle and Its Maximum ATPase Activity." (1999) *Biochemistry* **38**(12): 3785-92.
1. **Murphy, C. T.** & Spudich, J. A. "*Dictyostelium* Myosin 25-50K Loop Substitutions Specifically Affect ADP Release Rates."

(1998) *Biochemistry* **37** (19): 6738-6744.

Patent Publications:

U.S. Patent No.: 7,794,957. C. Kenyon, J. Berman, A. Dillin, M. Hansen, A. Hsu, C. Murphy. "Eukaryotic Genes involved in adult lifespan regulation," Pub. No.: US 2006/0228707 A1. Oct. 12, 2006.

Invited Presentations

- 2012 *Arolla Conference, "Cell and Developmental Systems"* 8/2012
- *Plenary speaker, C. elegans "Aging & Stress" meeting, 7/12-16/2012*
- *Duke University, 4/3/2012*
- *Washington State University, Reproductive Biology seminar series, 2/22/2012*
- *Princeton Adult School, 2/21/2012*
- *ASCB 2011 Annual Meeting, session co-chair and invited speaker 12/7/2011*
- *Princeton-NIBB Conference, Okazaki, Japan 10/31/2011*
- *NIH Cognitive Aging Award conference, 10/20/2011*
- *Class of 1968 Seminar on The Brain, 9/30/11*
- *Marine Biology Labs, Biology of Aging course, 7/29/11*
- *International C. elegans Conference, Germline Aging Workshop (6/23/11) (invited & declined)*
- *Aspen Physics Center, Computation and Collective Behavior in Biological Systems lecture, 6/17/11*
- *McKnight Foundation Neuroscience meeting, 6/13/10*
- *Medina Conference of Federal Judges, Princeton University, 6/10/11*
- *Pennsylvania State University, 4/11/11*
- *Stanford University, Frontiers in Biology Seminar Series, 3/30/11*
- *UMDNJ Biology seminar, 3/15/11*
- *Brandeis University, 3/9/11*
- *ASCB, Cell Growth and Cell Cycle Minisymposium invited speaker, 12/15/10*
- *NIH Awards in Cognitive Aging (10/10, declined due to maternity leave)*
- *Marine Biology Labs (Woods Hole) Biology of Aging course, 7/28/10*
- *Mid-Atlantic Developmental Biology Society meeting, 6/5/10*
- *Rockefeller University, 5/19/10*
- *Columbia University, Neurobiology 4/13/10*
- *Pew Scholars meeting, Costa Rica 3/24/10*
- *U. Pennsylvania, Chemistry, 3/18/10*
- *U. Pennsylvania, Internal Medicine, 10/29/09*
- *NIA Neuroscience & Aging, 10/13/09*
- *LSRF Symposium, 10/1/09*
- *Harvard Systems Biology, 5/15/09*
- *U. Southern California, Biochemistry seminar series, 4/27/09*
- *The Scripps Research Institute, 2/9/09*
- *ASCB Women in Cell Biology Jr. Career Recognition Award 12/15/08*
- *Rutgers University, Dept. of Genetics seminar series, 10/22/08*
- *Cold Spring Harbor Labs, Molecular Genetics of Aging, 9/25/08*
- *2008 C. elegans Aging, Stress, and Pathogenesis meeting, 7/08*
- *Thomas Jefferson University, Distinguished Speaker Lecture, 5/21/08*
- *U.T. San Antonio Health Sciences Center, Barshop Institute for Longevity and Aging, 4/30/08*
- *U. Penn Cell and Developmental Biology Seminar series, 4/22/08*
- *Buck Symposium, Nutrients and Aging, Buck Institute of Aging, 11/14/07*
- *HHMI Pre-med Scholars meeting, invited speaker, 10/07*
- *Peddie School Summer Science Institute, 7/12/07*
- *Princeton Molecular Biology Alumni Seminar, 6/1/07*
- *CUNY Queens College, Biology Dept., 5/2/07*
- *Princeton University TIGER talk, 4/24/07*
- *Princeton Council on Science and Technology, 3/15/07*
- *LSI Center for Quantitative Biology Retreat, 1/13/07*

- *RNA and Cancer Biology*, Banbury Center, Cold Spring Harbor, 10/3/06
- *Conference on Longevity*, Center for Systems Biology, Institute for Advanced Studies, Princeton, 5/9/06
- *Society for Developmental Biology*, Carnegie Institute, Baltimore MD, 5/5/06
- Genomics Institute of Singapore, *Genomics Seminar Series*, 4/28/06
- Temasek Life Sciences Laboratories, *Invited Speaker Seminar Series*, Singapore, 4/27/06
- University of Pennsylvania, Chemistry Dept., *Biological Chemistry Seminar Series*, 1/12/06
- U.C. Davis, Genome Center & Dept. of Pharmacology, *Genomics Colloquium*, 12/2/05
- The Jackson Laboratories, *Short Course in Mammalian Genetics*, 7/26/05
- *15th International C. elegans Meeting*, Los Angeles, 6/27/05
- McGill University School of Medicine, *Anatomy Dept. Seminar Series*, 2/23/05
- IPSEN Foundation, *Longevity and Frailty Conference*, Paris, 10/11/04
- Gene Expression Workshop, *2004 West Coast Worm Meeting*, 7/04
- Princeton University, 4/04
- University of Washington Genome Sciences, 3/31/04
- Skirball Institute, NYU 3/04
- Columbia University Biology Dept., 3/04
- Brown University Genome Sciences, 3/04
- UNC Chemistry Dept., 2/04
- UCLA Physiology Dept., 2/12/04
- Harvard School of Public Health, 2/04
- Duke Biology Dept., 1/28/04
- San Francisco Economic Roundtable, "Using *C. elegans* to study aging and lifespan" 4/03
- Plenary session, *14th International C. elegans Meeting*, Los Angeles, 6/30/03
- Pathogenesis Workshop, *14th International C. elegans Meeting*, Los Angeles, 6/29/03
- University of Michigan, Center for Aging Research, 5/5/03
- Rice University, Biology Dept., 2/11/03
- Harvard Medical School, Physiology Dept. 1/03
- *Molecular Genetics of Aging*, Cold Spring Harbor Lab., 10/02
- Plenary session speaker, *West Coast Worm Meeting*, 6/02

Department & University Service

- Princeton University Committee on Examinations and Standing, 2010-
- Princeton University Institutional Biosafety Committee, 2008-
- Freshmen & Sophomore Advisor, Whitman College, 2008-2010
- Fellow, Whitman College, 2010-
- Lewis Sigler Fellows selection committee, 2008-2010
- Molecular Biology Admissions committee, 2009-10
- Organizer/Chair of 2010 QCB Retreat
- QCB Seminar Series committee, 2009-10
- Molecular Biology Dept. Seminar Series committee 2009-10
- Organizer, WormClub seminar series, 2007-09
- Chair, 2007 Molecular Biology Department Retreat
- Co-chair, 2006 Molecular Biology Department Retreat
- Faculty Panelist, Princeton University Council on Science and Technology Panel for incoming women interested in science, math, and engineering, 2006, 2007 and 2011
- Graduate advisees: Shijing Luo, Amanda Kaufmann, Jessica Landis, Geneva Stein, Cheng Shi
- UG advisees: Richard Dzeng, Max Jan, Ryan Corces, Namita Bisaria, Denrick Cooper, William Rounds, Jarlath Byrne Rodgers, Eileen Zhuang, Allison Seebald, Conor O'Sullivan, Julie Sung, Rosaline Ma, Jeff Cherng
- Summer students: Ranese Jeffrey (2006 & 2007), Modupe Durojaiye (2007), Mark Rutledge (2008), Snow Hou (2010), Amanda Mackey (2011)
- Panelist, McGraw Center Academic Job Search workshop, Sept. 2006
- Panelist, McGraw Center orientation for new faculty, Sept. 2006
- Panelist, Molecular Biology Postdoctoral Fellows workshop on faculty job searches, Oct. 2006

Science Community Service

- Grant reviewer, Cognitive Aging P01, NIA
- Grant reviewer, NSF
- Co-chair, 2011 ASCB Mini-symposium, “Cellular Mechanisms of Aging and Disease”
- Grant reviewer, NIH *Cellular Mechanisms of Aging and Development (CMAD)* study section (ad hoc, 2012)
- F1000 (Faculty of 1000) member
- Editor, *C. elegans Aging*, WormBook
- Editorial Board, Supervising Editor, *Aging Cell*
- Board of Reviewing Editors, *Molecular Biology of the Cell*
- Board of Reviewing Editors, *Frontiers in Genetics*
- Grant reviewer for AFAR (American Federation of Aging Research), 2008-2010
- Grant reviewer for HFSP
- Grant reviewer for CUNY’s CIRG program
- Reviewer: *Cell*, *Science*, *Nature*, *Nature Genetics*, *Proc. Nat. Acad. Sci.*, *PloS Biology*, *PLoS Genetics*, *PLoS Comput. Biology*, *PLoS Pathogens*, *PLoS ONE*, *Current Biology*, *Development*, *Dev. Cell*, *Genes & Dev.*, *Mech. of Aging & Dev.*, *Aging Cell*, *Exp. Gerontology*, *Phys. Genomics*, *Genetics*, *Developmental Biology*, *Genome Biology*, *Neurobiology of Aging*, *NY Annals*, *Mol. Biol. Cell*, *BMC Genomics*, *J. Biol. Chem.*, *J. Amer. Aging Assoc*, *Oncogene*, *Nature Mol. Systems Biol.*, *Bioessays*
- Co-Organizer, 2008 and 2010 *C. elegans Aging, Stress, & Pathogenesis Meetings*
- *15th International C. elegans Meeting*: Plenary Session Chair
- *15th International C. elegans Meeting*: Poster Judge
- Organizer, “Gene Expression Workshop,” *West Coast Worm Meeting 7/04*