

Andrew Dillin, Ph.D.

PERSONAL

Name: Andrew Dillin
Citizenship: United States of America
Address: UC Berkeley
Molecular and Cell Biology Department
Li Ka Shing Center, 400A
Berkeley, Ca. 94705

EDUCATION

University of California, Berkeley

Ph.D. Molecular and Cell Biology 1993-1998

University of Nevada, Reno

B.S. Biochemistry 1989-1993

ACADEMIC APPOINTMENT

2012 - present Professor, MCB – UC Berkeley
2012 - present HHMI Investigator, UC Berkeley
2011-2012 Professor, The Salk Institute for Biological Studies, Molecular and Cell Biology Laboratory, La Jolla, California
2009-2012 Adjunct Professor, Department of Neuroscience, University of California, San Diego
2008-2012 Director, Glenn Center for Aging Research at the Salk Institute
2008-2012 HHMI Investigator, The Salk Institute for Biological Studies, Molecular and Cell Biology Laboratory, La Jolla, California
2007-2011 Associate Professor, The Salk Institute for Biological Studies, Molecular and Cell Biology Laboratory, La Jolla, California
2007-2009 Adjunct Associate Professor, Department of Biology, University of California, San Diego
2002- 2007 Assistant Professor, The Salk Institute for Biological Studies, Molecular and Cell Biology Laboratory, La Jolla, California

RESEARCH EXPERIENCE

1998-2002 Postdoctoral Fellow with Dr. Cynthia Kenyon, University of California, San Francisco. Determinants of longevity in the nematode *Caenorhabditis elegans*
1993-1998 Graduate Student with Dr. Jasper Rine, University of California, Berkeley. Studies of transcriptional silencing, regulation of replication initiation and mitosis in yeast
1991-1993 Undergraduate Student with Dr. Ardythe McCracken, University of Nevada. ER associated protein degradation (ERAD)

TEACHING EXPERIENCE

MCB290 – *Aging* (2013), *Classic Discoveries in Molecular and Cell Biology* (2019)
Bio1A - 800+ students. *Introductory Biology/Genetics/Cell biology*. (2013-2019)
MCB140L - *Advanced Undergraduate Genetics Lab*. (2013-Present).
MCB140 - *Advanced Undergraduate Genetics*. (2020-Present)
MCB291 – *Ethics*. (2020)

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AWARDS

Siebel Distinguished Chair in Stem Cell Biology (2013)
Nathan Shock Award (2012)
NIH/NIA MERIT Award (2012-2022)
Vincent Cristofalo Award (2010)
Glenn Foundation for Medical Research Award (2007-2009)
McKnight Neuroscience of Brain Disorders Award (2007-2010)
Pioneer Developmental Chair (2006-2008)
Ellison Medical Foundation Award (2004-2008)
Larry L. Hillblom Junior Faculty Award (2003-2006)
American Diabetes Association Junior Faculty Award (2004-2006)
Damon Runyon-Walter Winchell Postdoctoral Fellowship, UC San Francisco (1999-2002)
Genentech Distinguished Predoctoral Fellowship, UC Berkeley (1997)
Outstanding Graduate Student Instructor, UC Berkeley (1996-1997)
Outstanding Senior, College of Agriculture, University of Nevada (1992-1993)
Howard Hughes Summer Research Fellowship, University of Nevada (1992)
National Science Foundation Research Fellowship, University of Nevada (1991)

GRANT SUPPORT

--	(Dillin, PI)	09/01/2008-08/31/2025
Howard Hughes Medical Institute Molecular Pathways of Aging The major goal of this project is to perform high risk, innovative research towards the understanding of aging and age-related diseases. Role: PI		
R01 AG059566	(Dillin, PI)	07/15/18-03/31/2023
NIH/NIA Glial regulation of longevity through a transcellular unfolded protein response The major goal of this project is to explore the mechanism of stress communication between glia and distal tissues and seeks to uncover the identity of signaling agents. Role: PI		
R01 AG05589	(Dillin, PI)	01/01/17-12/31/2022
NIH/NIA The Collapse of Proteostasis during Aging is Mediated by Cytoskeletal Actin Functions The major goal of this project is to determine how cytoskeletal integrity is monitored and maintained during the aging process. Role: PI		
R37 AG024365	(Dillin, PI)	09/01/2004-08/31/2021
NIH/NIA The Perception of Mitochondrial Stress in Receiving Cells The major goal of this project is to determine how distal tissues can sense mitochondrial stress in other tissues, and how their own form and function might change in response to distal mitochondrial signaling. Role: PI		
R01 ES021667	(Dillin, PI)	03/01/2012-06/30/2022
NIH/NIEHS Distal Mitochondrial Signaling in a Multicellular Organism		

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The major goal of this project is to discover how mitochondria within the nervous system can communicate a signal that will ensure the survival of an animal under conditions of stress.

Role: PI

Peer Reviewed Journal Articles of Andrew Dillin:

Frakes, A, Metcalf, M, Tronnes. S, Bar-Ziv R, Durieux¹, J, Gildea. H, Kandahari, N, Monshietehadi S, Higuchi-Sanabria, R, **Dillin, A.** Science. 2020 January 24.

Schinzel, RT, Higuchi-Sanabria, R, Shalem, O, Moehle, EA, Webster BM, Joe, L, Bar-Ziv, R, Frankino, PA, Durieux, J, Pender, C, Kelet, N, Kumar SS, Savalia, N, Chi, H, Nguyen N, Simic, M, **Dillin A.** The Hyaluronidase, TMEM2, Promotes ER Homeostasis and Longevity Independent of the UPR^{ER} Cell. 2019 Nov 21.

Anderson EC, Frankino PA, Higuchi-Sanabria R, Yang Q, Bian Q, Podshivalova K, Shin A, Kenyon C, **Dillin A,** Meyer BJ. X Chromosome Domain Architecture Regulates *Caenorhabditis elegans* Lifespan but Not Dosage Compensation. Dev Cell. 2019 Sep 4.

Frankino PA, Moehle EA, **Dillin A.** Evolutionary Comeuppance: Mitochondrial Stress Awakens the Remnants of Ancient Bacterial Warfare. Cell Metab. 2019 May 7.

Simic M, Moehle E, Schinzel, R, Lorbeer F, Halloran J, Heydari, K, Sanchez M, Jullié D, Hockemeyer D, **Dillin A.** Transient activation of the UPR^{ER} is an essential step in the acquisition of pluripotency during reprogramming. Science Advances. 2019 April 20.

Youssar L, Wernet V, Hensel N, Yu X, Hildebrand HG, Schreckenberger B, Kriegler M, Hetzer B, Frankino P, **Dillin A,** Fischer R. Intercellular communication is required for trap formation in the nematode-trapping fungus *Duddingtonia flagrans*. PLoS Genet. 2019 Mar 27.

Bar-Ziv R, Nguyen NT, **Dillin A.** Vive ut Numquam Moriturus: Tweaking Translational Control to Regulate Longevity. Mol Cell. 2019 Feb 21.

Higuchi-Sanabria R, Paul JW, Durieux J, Benitez C, Frankino PA, Tronnes SU, Garcia G, Daniele JR, Monshietehadi S, **Dillin A.** Spatial regulation of the actin cytoskeleton by HSF-1 during aging. Mol Biol Cell. 2018 Aug 22.

Zhang, Q, Wu, X, Chen P, Liu, L, Xin, N, Tian Y, **Dillin, A.** The Mitochondrial Unfolded Protein Response Is Mediated Cell-Non-autonomously by Retromer-Dependent Wnt Signaling. Cell. 2018 Aug 9

Daniele JR, Heydari K, **Dillin A.** Mitochondrial Subtype Identification and Characterization. Curr Protoc Cytome. 2018 July.

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- Simic MS, **Dillin A**. The Lysosome, Elixir of Neural Stem Cell Youth. *Cell Stem Cell*. 2018 May 3.
- Moehle EA, Shen K, **Dillin A**. Mitochondrial Proteostasis in the Context of Cellular and Organismal Health and Aging. *J Biol Chem*. 2018 Apr 5.
- De Magalhaes Filho CD, Henriquez B, Seah NE, Evans RM, Lapierre LR, **Dillin A**. Visible light reduces *C. elegans* longevity. *Nat Commun*. 2018 Mar 2.
- Higuchi-Sanabria R, Frankino PA, Paul JW 3rd, Tronnes SU, **Dillin A**. A Futile Battle? Protein Quality Control and the Stress of Aging. *Dev Cell*. 2018 Jan 22.
- Nguyen TB, Louie SM, Daniele JR, Tran Q, **Dillin A**, Zoncu R, Nomura DK, Olzmann JA. DGAT1-Dependent Lipid Droplet Biogenesis Protects Mitochondrial Function during Starvation-Induced Autophagy. *Dev Cell*. 2017 Jul 10;42(1):9-21.
- Riera CE, Tsaousidou E, Halloran J, Follett P, Hahn O, Pereira MMA, Ruud LE, Alber J, Tharp K, Anderson CM, Brönneke H, Hampel B, Filho CDM, Stahl A, Brüning JC, **Dillin A**. The Sense of Smell Impacts Metabolic Health and Obesity. *Cell Metab*. 2017 Jul 5;26(1):198-211.
- Berendzen KM, Durieux J, Shao LW, Tian Y, Kim HE, Wolff S, Liu Y, **Dillin A**. Neuroendocrine Coordination of Mitochondrial Stress Signaling and Proteostasis. *Cell*. 2016. 166(6):1553-1563
- Kim HE, Grant AR, Simic MS, Kohnz RA, Nomura DK, Durieux J, Riera CE, Sanchez M, Kapernick E, Wolff S, **Dillin A**. Lipid Biosynthesis Coordinates a Mitochondrial-to-Cytosolic Stress Response. *Cell*. 2016. 166(6):1539-1552
- Daniele JR, Heydari K, Arriaga EA, **Dillin A**. Identification and Characterization of Mitochondrial Subtypes in *Caenorhabditis elegans* via Analysis of Individual Mitochondria by Flow Cytometry. *Anal Chem*. 2016. 88(12):6309-16
- Merkwirth C, Jovaisaite V, Durieux J, Matilainen O, Jordan SD, Quiros PM, Steffen KK, Williams EG, Mouchiroud L, Tronnes SU, Murillo V, Wolff SC, Shaw RJ, Auwerx J, **Dillin A**. Two Conserved Histone Demethylases Regulate Mitochondrial Stress-Induced Longevity. *Cell*. 2016.165(5):1209-23.
- Tian Y, Garcia G, Bian Q, Steffen KK, Joe L, Wolff S, Meyer BJ, **Dillin A**. Mitochondrial Stress Induces Chromatin Reorganization to Promote Longevity and UPR(mt). *Cell*. 2016.165(5):1197-208
- Seah NE, de Magalhaes Filho CD, Petrashen AP, Henderson HR, Laguer J, Gonzalez J, **Dillin A**, Hansen M, Lapierre LR. Autophagy-mediated longevity is modulated by lipoprotein biogenesis. *Autophagy*. 2016;12(2):261-72.
- Douglas PM, Baird NA, Simic MS, Uhlein S, McCormick MA, Wolff SC, Kennedy BK, **Dillin A**. Heterotypic Signals from Neural HSF-1 Separate Thermotolerance from Longevity. *Cell Rep*. 2015. 12(7):1196-204.
- Heimbucher T, Liu Z, Bossard C, McCloskey R, Carrano AC, Riedel CG, Tanasa B, Klammt C, Fonslow BR, Riera CE, Lillemeier BF, Kempfues K, Yates JR 3rd, O'Shea C, Hunter T, **Dillin A**. The Deubiquitylase MATH-33 Controls DAF-16 Stability and Function in Metabolism and Longevity.

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Cell Metab. 2015. 22(1):151-63.

Wilkinson DS, Jariwala JS, Anderson E, Mitra K, Meisenhelder J, Chang JT, Ideker T, Hunter T, Nizet V, **Dillin A**, Hansen M. Phosphorylation of LC3 by the Hippo kinases STK3/STK4 is essential for autophagy. *Mol Cell.* 2015. 57(1):55-68.

Patti GJ, Tautenhahn R, Johannsen D, Kalisiak E, Ravussin E, Brüning JC, **Dillin A**, Siuzdak G. Meta-analysis of global metabolomic data identifies metabolites associated with life-span extension. *Metabolomics.* 2014 Aug 1;10(4):737-743.

Baird NA, Douglas PM, Simic MS, Grant AR, Moresco JJ, Wolff SC, Yates JR 3rd, Manning G, **Dillin A**. HSF-1-mediated cytoskeletal integrity determines thermotolerance and life span. *Science.* 2014. 346(6207):360-3.

Fonslow BR, Moresco JJ, Tu PG, Aalto AP, Pasquinelli AE, **Dillin AG**, Yates JR 3rd. Mass spectrometry-based shotgun proteomic analysis of *C. elegans* protein complexes. *WormBook.* 2014 Jun 24:1-18.

Riera CE, Huising MO, Follett P, Leblanc M, Halloran J, Van Andel R, de Magalhaes Filho CD, Merkwirth C, **Dillin A**. TRPV1 pain receptors regulate longevity and metabolism by neuropeptide signaling. *Cell.* 2014. 157(5):1023-36.

Carrano AC, **Dillin A**, Hunter T. A Krüppel-like factor downstream of the E3 ligase WWP-1 mediates dietary-restriction-induced longevity in *Caenorhabditis elegans*. *Nat Commun.* 2014;5:3772.

Lapierre LR, De Magalhaes Filho CD, McQuary PR, Chu CC, Visvikis O, Chang JT, Gelino S, Ong B, Davis AE, Irazoqui JE, **Dillin A**, Hansen M. The TFEB orthologue HLH-30 regulates autophagy and modulates longevity in *Caenorhabditis elegans*. *Nat Commun.* 2013;4:2267.

Taylor RC and **Dillin A**. The UPR^{ER} is a Cell Non-Autonomous Regulator of Stress Resistance and Longevity. *Cell.* 2013; 153(7):1435-47.

Russell RC, Tian Y, Yuan H, Park HW, Chang YY, Kim J, Kim H, Neufeld TP, **Dillin A**, Guan KL. ULK1 induces autophagy by phosphorylating Beclin-1 and activating VPS34 lipid kinase. *Nat Cell Biol.* 2013; 15(7):741-50.

Riedel CG, Downen RH, Lourenco GF, Kirienko NV, Heimbucher T, West JA, Bowman SK, Kingston RE, **Dillin A**, Asara JM, Ruvkun G. DAF-16 employs the chromatin remodeller SWI/SNF to promote stress resistance and longevity. *Nat Cell Biol.* 2013;15(5):491-501.

Vilchez D, Boyer L, Lutz M, Merkwirth C, Morantte I, Tse C, Spencer B, Page L, Masliah E, Berggren WT, Gage FH, **Dillin A**. FOXO4 is necessary for neural differentiation of human embryonic stem cells. *Aging Cell.* 2013;12(3):518-22

Vilchez D, Boyer L, Morantte I, Lutz M, Merkwirth C, Joyce D, Spencer B, Page L, Masliah E, Berggren WT, Gage FH, and **Dillin A**. Regulation of FOXO4 and PSMD11/rpn-6 determines proteasome activity and human stem cell function. *Nature.* 2012. 489(7415):304-8.

Vilchez D, Morantte I, Liu Z, Douglas PM, Merkwirth C, Rodrigues APC, Manning G, and **Dillin A**. RPN-6/PSMD11 is a determinant of *C. elegans* longevity and proteasomal activity. *Nature.* 2012. 489(7415):263-8.

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Parrish AR, She X, Xiang Z, Coin I, Shen Z, Briggs SP, **Dillin A**, Wang L. Expanding the genetic code of *Caenorhabditis elegans* using bacterial aminoacyl-tRNA synthetase/tRNA pairs. *ACS Chem Biol.* 2012 Jul 20;7(7):1292-302.

Volovik Y, Maman M, Dubnikov T, Bejerano-Sagie M, Joyce D, Kapernick EA, Cohen E, **Dillin A**. Temporal requirements of heat shock factor-1 for longevity assurance. *Aging Cell.* 2012;11(3):491-9.

Mair W, Morantte I, Rodrigues AP, Manning G, Montminy M, Shaw RJ, **Dillin A**. Lifespan extension induced by AMPK and calcineurin is mediated by CRTCL-1 and CREB. *Nature.* 2011;470(7334):404-8. *PMCID: 3098900.*

Kim H, Scimia MC, Wilkinson D, Trelles RD, Wood MR, Bowtell D, **Dillin A**, Mercola M, Ronai ZA. Fine-tuning of Drp1/Fis1 availability by AKAP121/Siah2 regulates mitochondrial adaptation to hypoxia. *Mol Cell.* 2011;44(4):532-44.

Egan DF, Shackelford DB, Mihaylova MM, Gelino S, Kohnz RA, Mair W, Vasquez DS, Joshi A, Gwinn DM, Taylor R, Asara JM, Fitzpatrick J, Dillin A, Viollet B, Kundu M, Hansen M, Shaw RJ. Phosphorylation of ULK1 (hATG1) by AMP-activated protein kinase connects energy sensing to mitophagy. *Science.* 2011;331(6016):456-61. *PMCID: 3030664.*

Durieux J, Wolff S, Dillin A. The cell-non-autonomous nature of electron transport chain-mediated longevity. *Cell.* 2011;144(1):79-91. *PMCID: 3062502.*

Du D, Murray AN, Cohen E, Kim HE, Simkovsky R, Dillin A, Kelly JW. A kinetic aggregation assay allowing selective and sensitive amyloid-beta quantification in cells and tissues. *Biochemistry.* 2011;50(10):1607-17. *PMCID: 3051019.*

Cohen E, Du D, Joyce D, Kapernick EA, Volovik Y, Kelly JW, Dillin A. Temporal requirements of insulin/IGF-1 signaling for proteotoxicity protection. *Aging Cell.* 2010;9(2):126-34. *PMCID: 3026833.*

Mair W, Panowski SH, Shaw RJ, Dillin A. Optimizing dietary restriction for genetic epistasis analysis and gene discovery in *C. elegans*. *PLoS One.* 2009;4(2):e4535. *PMCID: 2643252.*

Cohen E, Paulsson JF, Blinder P, Burstyn-Cohen T, Du D, Estepa G, Adame A, Pham HM, Holzenberger M, Kelly JW, Masliah E, Dillin A. Reduced IGF-1 signaling delays age-associated proteotoxicity in mice. *Cell.* 2009;139(6):1157-69.

Carrano AC, Liu Z, Dillin A*, Hunter T. A conserved ubiquitination pathway determines longevity in response to diet restriction. *Nature.* 2009;460(7253):396-9. *PMCID: 2746748.* * Corresponding author

Bieschke J, Cohen E, Murray A, Dillin A, Kelly JW. A kinetic assessment of the *C. elegans* amyloid disaggregation activity enables uncoupling of disassembly and proteolysis. *Protein Sci.* 2009;18(11):2231-41. *PMCID: 2788278.*

Raices M, Verdun RE, Compton SA, Haggblom CI, Griffith JD, Dillin A, Karlseder J. *C. elegans* telomeres contain G-strand and C-strand overhangs that are bound by distinct proteins. *Cell.* 2008;132(5):745-57.

Baiga TJ, Guo H, Xing Y, O'Doherty GA, Dillin A, Austin MB, Noel JP, La Clair JJ. Metabolite induction of *Caenorhabditis elegans* dauer larvae arises via transport in the pharynx. *ACS Chem Biol.* 2008;3(5):294-304. *PMCID: 2692194.*

Panowski SH, Wolff S, Aguilaniu H, Durieux J, Dillin A. PHA-4/Foxa mediates diet-restriction-induced longevity of *C. elegans*. *Nature.* 2007;447(7144):550-5.

A. Dillin - CV

- Dong MQ, Venable JD, Au N, Xu T, Park SK, Cociorva D, Johnson JR, Dillin A, Yates JR, 3rd. Quantitative mass spectrometry identifies insulin signaling targets in *C. elegans*. *Science*. 2007;317(5838):660-3.
- Cohen E, Bieschke J, Perciavalle RM, Kelly JW, Dillin A. Opposing activities protect against age-onset proteotoxicity. *Science*. 2006;313(5793):1604-10.
- Wolff S, Ma H, Burch D, Maciel GA, Hunter T, Dillin A. SMK-1, an essential regulator of DAF-16-mediated longevity. *Cell*. 2006;124(5):1039-53.
- Raices M, Maruyama H, Dillin A, Karlseder J. Uncoupling of longevity and telomere length in *C. elegans*. *PLoS Genet*. 2005;1(3):e30. PMID: 1200426.
- Hansen M, Hsu AL, Dillin A, Kenyon C. New genes tied to endocrine, metabolic, and dietary regulation of lifespan from a *Caenorhabditis elegans* genomic RNAi screen. *PLoS Genet*. 2005;1(1):119-28. PMID: 1183531.
- Venable JD, Dong MQ, Wohlschlegel J, Dillin A, Yates JR. Automated approach for quantitative analysis of complex peptide mixtures from tandem mass spectra. *Nature methods*. 2004;1(1):39-45.
- Dillin A, Hsu AL, Arantes-Oliveira N, Lehrer-Graiwer J, Hsin H, Fraser AG, Kamath RS, Ahringer J, Kenyon C. Rates of behavior and aging specified by mitochondrial function during development. *Science*. 2002;298(5602):2398-401.
- Dillin A, Crawford DK, Kenyon C. Timing requirements for insulin/IGF-1 signaling in *C. elegans*. *Science*. 2002;298(5594):830-4.
- Arantes-Oliveira N, Apfeld J, Dillin A, Kenyon C. Regulation of life-span by germ-line stem cells in *Caenorhabditis elegans*. *Science*. 2002;295(5554):502-5.
- Dillin A, Rine J. Roles for ORC in M phase and S phase. *Science*. 1998;279(5357):1733-7.
- Dillin A, Rine J. Separable functions of ORC5 in replication initiation and silencing in *Saccharomyces cerevisiae*. *Genetics*. 1997;147(3):1053-62. PMID: 1208233.
- McCracken AA, Karpichev IV, Ernaga JE, Werner ED, Dillin AG, Courchesne WE. Yeast mutants deficient in ER-associated degradation of the Z variant of alpha-1-protease inhibitor. *Genetics*. 1996;144(4):1355-62. PMID: 1207689.
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