Peter J. Espenshade

May 22, 2015

DEMOGRAPHIC AND PERSONAL INFORMATION

Current Appointment

Johns Hopkins University School of Medicine

April 2013 to present Professor, Department of Cell Biology

Personal Data

Office Address: 725 North Wolfe St, Physiology 107B
Baltimore, MD 21205
Tel: (443) 287-5026
Fax: (410) 502-7826
Email: peter.espenshade@jhmi.edu

EDUCATION AND TRAINING

Undergraduate

1990 Bachelor of Arts, Princeton University; Molecular Biology

Doctoral/Graduate

1998 Doctor of Philosophy, Massachusetts Institute of Technology; Biology

Postdoctoral

1997 – 2002 University of Texas-Southwestern Medical Center; Molecular Cell Biology

PROFESSIONAL EXPERIENCE

1988	Summer Research Assistant, Lab of B. Weintraub; NIADDK-NIH
1989 - 1990	Undergraduate Thesis Research, Lab of M. Cole; Princeton University
1990 - 1991	Research Assistant, Lab of M. Cole; Princeton University
1991 - 1997	Graduate Student, Lab of C. Kaiser; Massachusetts Institute of Technology
1997 - 2002	Postdoctoral Fellow, Lab of M. Brown and J. Goldstein; University of Texas-Southwestern Medical Center
2002 - 2008	Assistant Professor, Department of Cell Biology, Johns Hopkins University School of Medicine
2008 - 2013	Associate Professor, Department of Cell Biology, Johns Hopkins University School of Medicine
2011-present	High Throughput Biology Center, Affiliated Faculty
2014-present	Associate Dean for Graduate Biomedical Education, Johns Hopkins University School of Medicine

RECOGNITION

Awards and Honors

1990	Phi Beta Kappa Honor Society, Princeton University
1990	Summa cum laude, Department of Molecular Biology, Princeton University
1992	Predoctoral fellowship, National Science Foundation
1998	National Research Service Award, National Institutes of Health – NHLBI
1998	Postdoctoral fellowship finalist, Life Science Research Foundation
2001	Career Award in the Biomedical Sciences, Burroughs Wellcome Fund
2003	JHU Nominee for Searle Scholars award
2004	JHU Nominee for Packard Foundation Fellowship for Science and Engineering
2004	Finalist for Distinguished Young Scholars in Medical Research Program, Keck Foundation

2006 Investigator in Pathogenesis of Infectious Disease, Burroughs Wellcome Fund
2006 Dean's Discretionary Fund Award, JHU-SOM
2008 American Heart Association Established Investigator Award
2009 Finalist for HHMI Early Career Investigator Award
2010 Speaker, Johns Hopkins University Alliance for Science and Technology Development
2012 American Society for Biochemistry and Molecular Biology, Avanti Young Investigator Award in Lipid Research
2014 Fellow of the American Association for the Advancement of Science

ORGANIZATIONAL ACTIVITES

Institutional Administrative Appointments

2011-present Associate Director, Scientific Foundations of Medicine, Genes to Society Curriculum
2013-present Director, Center for Innovation in Graduate Biomedical Education
2013 – 2014 Professorial Promotions Committee
2014 Associate Dean for Graduate Biomedical Education

Institutional Program Building

2013-2015 Director, Biomedical Careers Initiative funded by PhD Innovation Initiative, $200,000

Editorial Activities

2002-present Journal peer reviewer, 95 manuscripts for 40 journals, including: *Cell, Science, Nature, J. Cell Biol., PNAS, EMBO, Mol. Biol. Cell, J. Biol. Chem, Genes and Development, Mol. Microbiol., PLoS Genetics, PLoS Pathogens*

Scientific Review Groups

2001- present Ad hoc grant reviewer for US Army Research Office (1), Austrian Science Fund (2), Israel Science Foundation (1), Swiss National Science Foundation (1), Ireland Health Research Board (1), Wellcome Trust (2)
2005 International Research Scholars Program (Baltics, Central and Eastern Europe, Russia, and Ukraine), Howard Hughes Medical Institute
2008 JHU-Weizmann Partnership Proposal
2008 NIH INMP Study Section, Temporary Member, October 2008
2009 NIH INMP Study Section, Temporary Member, June 2009
2009-2012 NIH INMP Study Section, Permanent Member
2014 American Heart Association, Microbiology BSc2, Temporary Member
2014 NIH ZRG1 CB-C Study Section, Temporary Member

Professional Societies

2000-present American Society for Cell Biology
2004, 2005 Annual Meeting Abstract Programming Committee member
2004 Annual Meeting Local Arrangement Committee member
2004 Capitol Hill Day participant, Joint Steering Committee for Public Policy
2003-present American Association for the Advancement of Science
2003-present American Heart Association
2005-present American Society for Biochemistry and Molecular Biology
2014-present ASBMB, Executive Committee for the Lipid Research Division
2006-present American Society for Microbiology

Conference Organizer / Session Chair

2012 American Society for Biochemistry and Molecular Biology Annual Meeting, Session Chair
2012 Genetics Society of America, Annual Meeting, Session Chair
2013 7th International Fission Yeast Meeting, Session Organizer, London, UK

Invited Talks at National Meetings, International Meetings, and Universities – 81 (since 2002)

RESEARCH ACTIVITIES

Publications, Peer-Reviewed Original Research

1. Berberich S, Hyde-DeRuyscher N, **Espenshade PJ**, Cole M. *max* encodes a sequence-specific DNA-binding protein and is not regulated by serum growth factors. 1992. *Oncogene* 7:775-79.

2. Gimeno RE, **Espenshade PJ**, Kaiser CA. *SED4* encodes a yeast endoplasmic reticulum protein that binds Sec16p and participates in vesicle formation. 1995. *J. Cell Biol.* 131:325-38.

3. **Espenshade PJ**, Gimeno RE, Holzmacher E, Teung P, Kaiser CA. Yeast *SEC16* gene encodes a multidomain vesicle coat protein that interacts with Sec23p. 1995. *J. Cell Biol.* 131:311-24.

4. *Gimeno RE, * **Espenshade PJ**, Kaiser CA. COPII coat subunit interactions: Sec24p and Sec23p bind to adjacent regions of Sec16p. 1996. *Mol. Biol. Cell* 7:1815-23. *These authors contributed equally to the experiments in this paper.

5. Shaywitz DA, **Espenshade PJ**, Gimeno RE, Kaiser CA. COPII subunit interactions in the assembly of the vesicle coat. 1997. *J. Biol. Chem.* 272:25413-16.

6. Sakai J, Rawson RB, **Espenshade PJ**, Cheng D, Seegmiller AC, Goldstein JL, Brown MS. Molecular identification of the sterol-regulated luminal protease that cleaves SREBPs and controls lipid composition of animal cells. 1998. *Mol. Cell*. 2:505-14.

7. Roberg KJ, Crotwell M, **Espenshade PJ**, Gimeno RE, Kaiser CA. *LST1* is a *SEC24* homolog used for selective export of the plasma membrane ATPase from the ER. 1999. *J. Cell Biol.* 145:659-72.

8. Cheng D, **Espenshade PJ**, Slaughter CA, Brown MS, Goldstein JL. Secreted Site-1 protease cleaves peptides corresponding to luminal loop of sterol regulatory-element binding proteins. 1999. *J. Biol. Chem.* 274:22805-12.

9. **Espenshade PJ**, Cheng D, Goldstein JL, Brown MS. Autocatalytic processing of Site-1 protease removes propeptide and permits cleavage of sterol regulatory element-binding proteins. 1999. *J. Biol. Chem.* 274:22795-804.

10. DeBose-Boyd RA, Brown MS, Li WP, Nohturfft A, Goldstein JL, **Espenshade PJ**. Transport-dependent proteolysis of SREBP: relocation of site-1 protease from Golgi to ER obviates the need for SREBP transport to Golgi. 1999. *Cell* 99:703-12.

11. Nohturfft A, Yabe D, Goldstein JL, Brown MS, **Espenshade PJ**. Regulated step in cholesterol feedback localized to budding of SCAP from ER membranes. 2000. *Cell* 102:315-23.

12. Yang T, **Espenshade PJ**, Wright ME, Yabe D, Gong Y, Aebersold R, Goldstein JL, Brown MS. Crucial step in cholesterol homeostasis: sterols promote binding of SCAP to INSIG-1, a membrane protein that facilitates retention of SREBPs in the ER. 2002. *Cell* 110:489-500.

13. **Espenshade PJ**, Li WP, Yabe D. Sterols block binding of COPII proteins to SCAP, thereby controlling SCAP sorting in ER. 2002. *PNAS* 99:11694-99.

14. Hughes AL, Todd BL, **Espenshade PJ**. SREBP pathway responds to sterols and functions as an oxygen sensor in fission yeast. 2005. *Cell* 120:831-42.

15. Todd BL, Stewart EV, Burg JS, Hughes AL, **Espenshade PJ**. SREBP is a principal regulator of anaerobic gene expression in fission yeast. 2006. *Mol. Cell. Biol.* 26:2817-31.

16. Hughes AL, Powell DW, Bard M, Eckstein J, Barbuch R, Link AJ, **Espenshade PJ**. Dap1/PGRMC1 binds and regulates cytochrome P450 enzymes. 2007. *Cell Metabolism* 5:143-49.

17. Chang YC, Bien CM, Lee H, **Espenshade PJ** *, Kwon-Chung KJ*. Sre1p, a regulator of oxygen sensing and sterol homeostasis, is required for virulence in *Cryptococcus neoformans*. 2007. *Mol. Microbiol.* 64:614-29. *Corresponding authors.

18. Hughes AL, Lee CY, Bien CM **Espenshade PJ**. 4-Methyl sterols regulate fission yeast SREBP-Scap under low oxygen and cell stress. 2007. *J. Biol. Chem.* 282:24388-96.

19. Lee H, Bien CM, Hughes AL, **Espenshade PJ**, Kwon-Chung KJ, Chang YC. Cobalt chloride, a hypoxia-mimicking agent, targets sterol synthesis in the pathogenic fungus *Cryptococcus neoformans*. 2007. *Mol. Microbiol.* 65:1018-33.

20. Sehgal A, Lee CY, **Espenshade PJ**. SREBP controls oxygen-dependent mobilization of retrotransposons in fission yeast. 2007. *PLoS Genet.* 3:1389-96.

21. Sehgal A, Hughes BT, **Espenshade PJ**. 2008. Oxygen-dependent, alternative promoter controls translation of *tco1*$^{+}$ in fission yeast. *Nucl. Acids Res.* 36:2024-2031.

22. Hughes BT, **Espenshade PJ**. 2008. Oxygen-regulated degradation of fission yeast SREBP by Ofd1, a prolyl hydroxylase family member. *EMBO J*. 27:1491-1501.

23. Hughes AL, Stewart EV, **Espenshade PJ**. 2008. Identification of 23 mutations in fission yeast Scap that constitutively activate SREBP. *J. Lipid Res.* 49:2001-12.

24. Burg JS, Powell DW, Chai R, Hughes AL, Link AJ, **Espenshade PJ**. 2008. Insig regulates HMG-CoA reductase by controlling enzyme phosphorylation in fission yeast. *Cell Metabolism* 8:522-31.

25. Lee CY, Stewart EV, Hughes BT, **Espenshade PJ**. 2009. Oxygen-dependent binding of Nro1 to the prolyl hydroxylase Ofd1 regulates SREBP degradation in yeast. *EMBO J.* 28:135-43.

26. Hughes BT, Nwosu CC, **Espenshade PJ**. 2009. Degradation of SREBP precursor requires the ERAD components UBC7 and HRD1 in fission yeast. *J. Biol. Chem.* 284:20512-21.

27. Chang YC, Ingavale SS, Bien CM, **Espenshade PJ**, Kwon-Chung KJ. 2009. Conservation of the SREBP pathway and its pathobiological importance in *Cryptococcus neoformans*. *Eukaryot Cell.* 8:1770-79.

28. Bien CM, Chang YC, Nes WD, Kwon-Chung KJ, **Espenshade PJ**. 2009. *C. neoformans* Site-2 protease is required for virulence and survival in the presence of azole drugs. *Mol Microbiol.*74:672-90.

29. Porter JR, Burg JS, **Espenshade PJ** *, Iglesias PA*. 2010. Ergosterol regulates SREBP cleavage in fission yeast. *J. Biol. Chem.* 285:41051-61. *Corresponding authors.

30. Stewart EV, Nwosu CC, Tong Z, Roguev A, Cummins TD, Kim DU, Hayles J, Park HO, Hoe KL, Powell DW, Krogan NJ, **Espenshade PJ**. 2011. Yeast SREBP cleavage activation requires the Golgi Dsc E3 ligase complex. *Mol. Cell* 42:160-71.

31. Yeh TL, Lee CSY, Amzel LM, **Espenshade PJ** *, Bianchet MB*. 2011. The hypoxic regulator of sterol synthesis Nro1 is a nuclear import adaptor. *Structure* 19:503-14. *Corresponding authors.

32. Burg JS, **Espenshade PJ**. 2011. Glucose controls phosphoregulation of HMG-COA reductase through the PP2A-related phosphatase Ppe1 and Insig in fission yeast. *J. Biol. Chem.* 286:27139-46.

33. Lee CSY, Yeh TL, Hughes BT, **Espenshade PJ**. 2011. Regulation of the Sre1 hypoxic transcription factor by oxygen-dependent control of DNA binding. *Mol. Cell* 44:225-234.

34. Stewart EV, Lloyd SJ, Burg JS, Nwosu CC, Lintner RE, Daza R, Russ C, Ponchner K, Nusbaum C, **Espenshade PJ**. 2011. Yeast SREBP cleavage requires Cdc48 and Dsc5, a ubiquitin regulatory X domain-containing subunit of the Golgi Dsc E3 ligase. *J. Biol. Chem.* 287:672-81.

35. Porter JR, Burg JS, **Espenshade PJ**, Iglesias PA. 2012. Identifying a static nonlinear structure in a biological system using noisy, sparse data. *J. Theoretical Biol.* 300:232-41.

36. Ryan CJ, Roguev A, Patrick K, Xu J, Jahari H, Tong Z, Beltrao P, Shales M, Qu H, Collins SR, Kliegman, JI, Jiang L, Kuo D, Tosti E, Kim H, Edelmann W, Keogh M, Greene D, Tang C, Cunningham P, Shokat KM, Cagney G, Svensson JP, Guthrie C, **Espenshade PJ**, Ideker T, Krogan NJ. 2012. Hierarchical modularity and the evolution of genetic interactomes across species. *Mol. Cell.* 46:691-704.

37. Porter JR, Lee CSY, **Espenshade PJ***, Iglesias PA*. 2012. Regulation of SREBP during hypoxia requires Ofd1-mediated control of both DNA binding and degradation. *Mol. Biol. Cell* 23:3764-3774. *Corresponding authors.

38. Lloyd SJ, Raychaudhuri S, **Espenshade PJ**. 2013. Subunit architecture of the Golgi Dsc E3 ligase required for Sterol Regulatory Element-Binding Protein (SREBP) cleavage in fission yeast. *J. Biol. Chem.* 288:21043-21054.

39. Cheung R, **Espenshade PJ**. 2013. Structural requirements for Sterol Regulatory Element-Binding Protein (SREBP) cleavage in fission yeast. *J. Biol. Chem.* 288:20351-20360.

40. Brookheart RT, Lee CY, **Espenshade PJ**. 2014. Casein kinase 1 regulates sterol regulatory element-binding protein (SREBP) to control sterol homeostasis. *J. Biol. Chem.* 289:2725-2735.

41. Shao W, **Espenshade PJ**. 2014. Sterol Regulatory Element-binding Protein (SREBP) cleavage regulates Golgi-to-Endoplasmic Reticulum recycling of SREBP Cleavage-activating Protein (SCAP). *J. Biol. Chem.* 289:7547-7557.

42. Tong Z, Kim MS, Pandey A, **Espenshade PJ**. 2014. Identification of candidate substrates for the Golgi Tul1 E3 ligase using quantitative diGly proteomics in yeast. *Mol. Cell Proteomics* 13:2871-82.

43. Gong X, Li J, Shao W, Wu J, Qian H, Ren R, **Espenshade PJ***, Nieng Y*. 2015. Crystal structure of the WD40 domain of SCAP from fission yeast reveals the molecular basis for SREBP recognition. *Cell Research* 25:401-11. *Corresponding authors.

44. Raychaudhuri S, **Espenshade PJ**. 2015. Endoplasmic reticulum exit of Golgi-resident Defective for SREBP Cleavage (Dsc) E3 ligase complex requires its activity. *J. Biol. Chem.* jbc.M114.630863.

Educational Publications

Invited Review Articles

1. **Espenshade PJ**. SREBPs: Sterol-regulated transcription factors. 2006. *J. Cell Sci.* 119:973-976.

2. **Espenshade PJ**, Hughes AL. Regulation of sterol synthesis in eukaryotes. 2007. *Annu. Rev. Genet.* 41:401-427.

3. Osborne TO, **Espenshade PJ**. 2009. Evolutionary conservation and adaptation in the mechanism that regulates SREBP action: what a long strange tRIP it's been. *Genes and Dev*. 23: 2578-2591.

4. Bien CM, **Espenshade PJ**. 2010. SREBP in fungi - Hypoxic transcription factors linked to pathogenesis. *Eukaryotic Cell*. 9:352-9.

5. Burg JS, **Espenshade PJ**. 2011. Regulation of HMG-CoA reductase in mammals and yeast. *Prog. Lipid Res.* 50:403-10.

6. Raychaudhuri S, Young BP, **Espenshade PJ***, Loewen CJR*. 2012. Regulation of lipid metabolism: a tale of two yeasts. *Curr. Opin. Cell Bio.* 24:502-508. *Corresponding authors.

7. Shao W, **Espenshade PJ**. 2012. Expanding roles for SREBP in metabolism. *Cell Met.* 16:414-419.

Book Chapters

1. **Espenshade PJ**, Goldstein JL, and Brown MS. SREBPs: Gene regulation through controlled protein trafficking. 2003. In Handbook of Cellular Signaling (Bradshaw R, Dennis E, eds). Academic Press, San Diego, CA.

2. Radhakrishnan A, Sun LP, **Espenshade PJ**, Goldstein JL, Brown MS. 2009. "Chapter 298: The SREBP pathway: Gene regulation through sterol sensing and gated protein trafficking." In Handbook of Cell Signaling, 2nd edition (Bradshaw R, Dennis E, eds). Academic Press, San Diego.

3. Kwiterovich PO, **Espenshade PJ**. 2009. "Chapter 8:Disorders of LDL Metabolism," pp. 88-104. In The Johns Hopkins University Textbook of Dyslipidemia (Kwiterovich PO, ed.) Wolters Kluwer/Lippincott Williams & Wilkens, Philadelphia, PA.

4. **Espenshade PJ**. Cholesterol Synthesis and Regulation. In: W.J. Lennarz and M.D. Lane (eds.) The Encyclopedia of Biological Chemistry, Elsevier Inc., Oxford. In press.

Conference Papers

1. Porter JR, Iglesias PA, Burg JS, **Espenshade PJ**. 2011. Overcoming Data Limitations to Identify a Static Nonlinearity in a Biological Signaling Cascade. 45th Annual Conference on Information Sciences and Systems, Baltimore, MD. March 23-25, 2011.

Other Media

1. **Espenshade PJ**. Sterols Regulate ER-to-Golgi Transport of SREBP Cleavage Activating Protein (SCAP). ASCB Image & Video Library. June 2007:VID-32.

Extramural Funding

GRANTS (Current)

7/01/04 – 3/30/18	Regulation of cellular cholesterol homeostasis R01 HL77588 National Institutes of Health – NHLBI Role: PI
7/01/13 - 6/30/15	Function of the Prolyl Hydroxylase Ofd1 in Translation American Heart Association – Grant in Aid Role: PI
8/16/13 - 7/31/15	Mechanisms of host adaptation for *Candida albicans* R21 National Institutes of Health – NIAID Role: PI
4/01/15 - 3/31/17	Lipid Metabolism as a Target for Pancreatic Cancer Therapy Hopkins - Allegheny Health Network Cancer Research Fund Role: PI
4/01/15 - 3/31/16	Identification of Lipid Homeostasis Regulators Using Proximity-based Biotinylation Johns Hopkins-University of Maryland Diabetes Research Center Pilot and Feasibility Program Role: PI

GRANTS (Previous)

4/01/98 – 3/31/01	Isolation of a key regulator of cholesterol homeostasis F32 HL009993 National Institutes of Health – NHLBI Role: PI

9/01/01 – 12/31/06	Molecular mechanism of cholesterol homeostasis in mammalian cells Institutional Proposal #03020215 Burroughs Wellcome Fund Role: PI
7/01/04 – 6/30/05	Regulation of cellular cholesterol homeostasis Institutional Proposal #04051766 W.M. Keck Foundation Role: PI
7/01/07 – 6/31/09	Oxygen sensing and adaptation to host tissue hypoxia in *C. neoformans* R21 AI072186 National Institutes of Health – NIAID Role: PI
7/15/09 – 6/30/11	ARRA Supplement - Regulation of cellular cholesterol homeostasis R01 HL77588 National Institutes of Health – NHLBI Role: PI
8/01/09 - 7/31/11	Functional studies of PGRMC1 in cholesterol homeostasis R21 HL094774 National Institutes of Health – NHLBI Role: PI
9/01/11 – 2/29/12	Methodology for identification of E3 ubiquitin ligase substrates Mini-Driving Biological Projects Technology Center for Networks, Pathways and Dynamics of Lysine Modification Role: PI
7/01/06 – 6/30/12	Oxygen-sensing and adaptation to host tissue hypoxia in the human fungal pathogen *Cryptococcus neoformans* Investigator in Pathogenesis of infectious Disease - Institutional Proposal #06041690 Burroughs Wellcome Fund Role: PI
1/01/12 - 12/31/12	SREBP pathway as a target for pancreatic cancer therapy Pilot Project - Sol Goldman Pancreatic Cancer Research Center Role: PI
1/01/08 – 12/31/12	Regulation of cellular sterol homeostasis in eukaryotes Established Investigator Award 0840100N American Heart Association Role: PI
1/01/13 – 6/30/13	Methodology for identification of direct E3 ubiquitin ligase substrates Midi-Driving Biological Projects Technology Center for Networks, Pathways and Dynamics of Lysine Modification Role: PI
7/01/12 - 6/30/14	SREBP pathway as a target for pancreatic cancer therapy Pancreatic Cancer Action Network – AACR Innovative Grant Role: PI