

Curriculum Vitae: KATHERINE LUBY-PHELPS

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EDUCATION

B.S. Yale University, New Haven, CT, 1975, *cum laude*, Biology.

Ph.D. University of Colorado, 1981, Cell Biology,
Keith R. Porter, advisor (deceased).

Training Harvard University, 1981-1982, Carnegie Mellon, 1982-1985,
D. Lansing Taylor, advisor.

POSITIONS HELD

2012- Director, Electron Microscopy Core Facility, UT Southwestern Medical Center at Dallas

2004- Director, Live Cell Imaging Core Facility, UT Southwestern Medical Center at Dallas

2009- Full Professor, Dept. of Cell Biology, UT Southwestern Medical Center at Dallas

2003-2009 Associate Professor, Dept. of Cell Biology, UT Southwestern Medical Center at Dallas

2003-2004 Director, Cellular Imaging Core Facility, Simmons Comprehensive Cancer Center, UT Southwestern Medical Center at Dallas

2000-2003 Assistant Professor, Dept. of Cell Biology, Neurobiology & Anatomy, Medical College of Wisconsin

1999-2000 Interim Director, UT Southwestern Molecular & Cellular Imaging Facility

1990-2000 Assistant Professor, Department of Physiology, UT Southwestern Medical Center at Dallas

1990-2000 Director, Physiology Department Imaging Core Facility
1986-1990 Senior Research Scientist, Department of Chemistry, Carnegie Mellon University

TEACHING

Graduate Program: Cell Regulation, current member

Graduate Courses: *Optical Microscopy for Biomedical Research*, UT Southwestern, Cell Regulation graduate program, Course director, 2004-present – 50 contact hours including lab

Optical Microscopy, UT Southwestern, Biophysics graduate program course in Spectroscopy, Elliott Ross, director, two lectures and a demonstration, 2006-2013 – 5 contact hours

Cell Regulation Journal Club: 2009, 2010

Cell Biology Methods, UT Southwestern, MCB graduate Core Course, Kris Kamm/Leon Avery, director, one lecture, 2006-2007

Medical Courses: *Physiology*: Neurocytology, Synaptic Transmission, Brain Neurochemistry, UT Southwestern, 1990-2000.

Histology: Epithelia, Histology Lab (Medical College of Wisconsin), 2001-2003.

Short Courses: Faculty, *Optical Microscopy in the Biological Sciences*, UTHSCSA, 2000-2004.

Director, *Quantitative Light Microscopy*, Nikon Corp, 1991-1992.

Faculty, *Analytical and Quantitative Light Microscopy*, Woods Hole, MA, 1987-1990.

Faculty, *Analytical and Quantitative Light Microscopy*, Mendoza, Argentina, 1990.

OTHER PROFESSIONAL ACTIVITIES

- Editorial Board, *Experimental Biology and Medicine*, 2006-
- External Advisory Board, RCMI, UT San Antonio, 2006-

- Study section, Shared Instrumentation Program, NIH Division of Research Resources, 2008 to present, *ad hoc*
- Study section, NIH, Microscope Imaging, 2010, *ad hoc*
- Study section, NIH Director's Roadmap Initiatives, Technology Centers for Networks and Pathways (TCNP), 2004.
- Review Panel, National Science Foundation, Bioinstrumentation Program, 1993-1995, 1999.
- *Ad hoc* reviewer of manuscripts for *Nature*, *Science*, *Journal of Cell Biology*, *Biophysical Journal*, *J. Biomed. Optics*, *J. Microscopy*, *Proc. Nat. Acad. Sci. USA*, *Trends in Biochemical Sciences*, *Immunology*, *J. of Cell Science*, *Cell Motility and the Cytoskeleton*, *Journal of Cellular Physiology*, *J. of General Physiology*, *Experimental Cell Research*, *PLOS1*.

RESEARCH PUBLICATIONS (in chronological order)

1. **Luby, K.J.** and K.R. Porter. (1980). Control of Pigment Migration in Isolated Erythrocytes of *Holocentrus ascensionis*. I. Energy requirements. *Cell* 21:13-23.
2. **Luby-Phelps, K.J.** and K.R. Porter. (1982). Control of Pigment Migration in Isolated Erythrocytes of *Holocentrus ascensionis*. II. The Role of Ca²⁺. *Cell* 29:441-450. PMID: 6811138
3. **Luby-Phelps, K.**, P.A. Amato, and D.L. Taylor. (1984). Selective Immunocytochemical Detection of Fluorescent Analogs with Antibodies Specific for the Fluorophore. *Cell Motil* 4:137-149. PMID: 6428748
4. **Luby-Phelps, K.**, Frederick Lanni, and D.L. Taylor. (1985). The Behavior of a Fluorescent Analog of Calmodulin in Living 3T3 Cells. *J Cell Biol* 101:1245-1257. PMID: 4044638
5. **Luby-Phelps, K.**, D.L. Taylor, and F. Lanni. (1986). Probing the Structure of Cytoplasm. *J Cell Biol* 102:2015-2022. PMID: 2423529
6. **Luby-Phelps, K.**, Philip E. Castle, D.L. Taylor, and F. Lanni. (1987). Hindered Diffusion of Inert Tracer Particles in the Cytoplasm of 3T3 Cells. *Proc Natl Acad Sci USA* 84:4910-4913. PMID: 3474634
7. **Luby-Phelps, K.** and D.L. Taylor. (1988). Subcellular Compartmentalization by Local Differentiation of Cytoplasmic Structure. *Cell Motil Cytoskel* 10:28-37. PMID: 3180247

8. **Luby-Phelps, K.** (1988). Fluorescent Labeling of Polysaccharides. *Meth Cell Biol* 29:59-73. PMID: 2464120
9. Hou, L., **K. Luby-Phelps**, and F. Lanni. (1990). Brownian Motion of Inert Tracer Macromolecules in Polymerized and Spontaneously Bundled Mixtures of Actin and Filamin. *J Cell Biol* 110:1645-1654. PMID: 2110570
10. Hou, L., F. Lanni, and **K. Luby-Phelps**. (1990). Diffusion of Inert Tracers in F-actin Matrices: Toward a Model for Cytoplasmic Structure. *Biophys J* 58:31-43. PMID: 2116926
11. **Luby-Phelps, K.**, S. Mujumdar, R. Mujumdar, L. Ernst, W. Galbraith, and A. Waggoner. (1993). A Novel Fluorescence Ratiometric Method Confirms the Low Solvent Viscosity of the Cytoplasm. *Biophys J* 65:236-242. PMID: 8369435
12. Provance, D.W., Jr., A. McDowell, M. Marko, and **K. Luby-Phelps**. (1993). Cytoarchitecture of Size-Excluding Compartments in Living Cells. *J Cell Sci* 106:565-578. PMID: 7980739
13. Stauffer, P., H. Zhao, **K. Luby-Phelps**, R.L. Moss, R.A. Star, and S. Muallem. (1993). Gap Junction Communication Modulates $[Ca]_i$ Oscillations and Enzyme Secretion in Pancreatic Acini. *J Biol Chem* 268:19769-19775. PMID: 8366115
14. Tansey, M.G., **K. Luby-Phelps**, K.E. Kamm, and J.T. Stull. (1994). Ca^{2+} -dependent Phosphorylation of Myosin Light Chain Kinase Decreases the Ca^{2+} Sensitivity in Light Chain Phosphorylation within Smooth Muscle Cells. *J Biol Chem*. 269:9912-9920. PMID: 8144585
15. **Luby-Phelps, K.**, Hori, M., Phelps, J.M. and Won, D. (1995). Ca^{2+} - regulated Dynamic Compartmentalization of Calmodulin in Living Smooth Muscle Cells. *J. Biol. Chem*. 270: 21532-21538. PMID: 7665565
16. Janson, L., K. Ragsdale, and **K. Luby-Phelps**. (1996). Mechanism and size cutoff for steric exclusion from actin-rich cytoplasmic domains. *Biophys. J.* 71:1228-1234. PMID: 8873997
17. Jones, J.D. and **K. Luby-Phelps**. (1996). Tracer Diffusion through F-actin: Length and Crosslinking. *Biophys. J.* 71:2742-2750. PMID: 8913611
18. Lin, P.-j., **K. Luby-Phelps** and J.T. Stull. (1997). Binding of Myosin Light Chain Kinase to Cellular Actin-Myosin Filaments. *J. Biol. Chem*. 272:7412-7420. PMID: 9054442
19. Ragsdale, G.K., J. Phelps and **K. Luby-Phelps**. (1997). Viscoelastic Behavior of Fibroblasts in Response to Tensile Stress. *Biophys. J.* 73:2798-2808. PMID: 9370474

20. Han, J., **K. Luby-Phelps**, B. Das, X. Shu, Y. Xia, R.D. Mosteller, U.M. Krishna, J.R. Falck, M.A. White and D. Broek. (1997). Substrates and Products of P13-kinase Regulate Vav Activation of Rac-related GTPases. *Science* 279:558-560. PMID: 9438848
21. Lin, P-j, **K. Luby-Phelps**, and J.T. Stull. (1999). Properties of Filament-bound Myosin Light Chain Kinase. *J. Biol. Chem.* 274: 5987-5994. PMID: 10026225
22. Liao, B., B.M. Paschal and **K. Luby-Phelps**. (1999). Mechanism of Ca²⁺-dependent Nuclear Accumulation of Calmodulin. *Proc. Nat. Acad. Sci.* 96; 6217-6222 PMID: 10339568
23. Rozelle, A., L. M. Machesky, M. Yamamoto, M. H. E. Driessens, R. H. Insall, M. G. Roth, **K. Luby-Phelps**, G. Marriot, A. Hall and H. L. Yin. (2000). Phosphatidyl 4,5 bisphosphate induces the formation of actin comet tails from sphingolipid-cholesterol rich membranes through WASp family proteins and Arp2/3. *Cur. Biol.* 10 :311-20. PMID: 10744973
24. Whitehurst, A. W., J. L. Wilsbacher, You, Y., **Luby-Phelps, K.**, Moore, M. S., and M.H. Cobb. (2002). ERK2 enters the nucleus by a carrier-independent mechanism. *Proc Natl Acad Sci U S A* 99: 7496-501. PMID: 12032311
25. Mikami A, Tynan S.H., Hama T, **Luby-Phelps K**, Saito T, Crandall J.E., Besharse J.C., and R.B. Vallee. (2002). Molecular structure of cytoplasmic dynein 2 and its distribution in neuronal and ciliated cells. *J Cell Sci* 115:4801-4808. PMID: 12432068
26. **Luby-Phelps K**, Ning G, Fogerty J, Besharse J.C.. (2003). Visualization of Identified GFP-expressing Cells by Light and Electron Microscopy. *J Histochem Cytochem* 51:271-274 PMID: 12588954
27. Baker, S.A Freeman, K , **Luby-Phelps, K**, Pazour, G.J. and J.C. Besharse. (2003). An Intraflagellar Transport Complex is Conserved in the Sensory Cilia of Photoreceptors. *J. Biol. Chem.* 278: 34211-8. PMID: 12821668
28. Lee BH, Min X, Heise CJ, Xu BE, Chen S, Shu H, **Luby-Phelps K**, Goldsmith EJ, Cobb MH. (2004). WNK1 phosphorylates synaptotagmin 2 and modulates its membrane binding. *Mol Cell.* 15:741-51. PMID: 15350218
29. Willis, B.C., Liebler, J.M., **Luby-Phelps, K**, Nicholson, A.G., Crandall, E.D., du Bois, R.M. and Borok, Z. (2005) Induction of Epithelial-mesenchymal transition in alveolar epithelial cells by transforming growth factor-beta 1: Potential role in Idiopathic Pulmonary Fibrosis. *Am. J. Physiol.* 166:1321-32 PMID: 15855634
30. Sato, K., Yang, X.L., Yudate, T., Chung, J.S., Wu, J., **Luby-Phelps, K.**, Kimberly, R.P., Underhill, D., Cruz, P.D., Jr., and Ariizumi, K. (2006). Dectin-2 Is a Pattern Recognition Receptor for Fungi That Couples with the Fc Receptor γ Chain to Induce Innate Immune

Responses. *J Biol Chem* 281: 38854-38866. PMID: 17050534

31. Liang, C.L., Wang, T.T., **Luby-Phelps, K.**, and German, D.C. (2006). Mitochondria mass is low in mouse substantia nigra dopamine neurons: Implications for Parkinson's disease. *Exp Neurol*. 203:370-380. PMID: 17010972
32. Wen, Q. Gao, J. and **K. Luby-Phelps**, (2006) "Markov chain Monte Carlo data association for protein clusters tracking, *Proceedings of IEEE International Conference on Pattern Recognition (IEEE ICPR)*, (15% oral acceptance rate), vol. 1, pp. 1030-1033, Hong Kong, Aug. 20-24, 2006.
33. Wen, Q., Gao, J., and **Luby-Phelps, K.** (2006). Feature selection, matching, and evaluation for subcellular structure tracking. *Conf Proc IEEE Eng Med Biol Soc* 1: 3013-3016. PMID: 17946154
34. Qu, X. Zou, Z., Sun, Q., **Luby-Phelps, K.**, Cheng, P. Hogan, R. N., Gilpin, C. and Levine, B. (2007). Autophagy gene-dependent clearance of apoptotic cells during embryonic development. *Cell* 128: 931-46. PMID: 17350577
35. **Luby-Phelps, K.**, J. Fogerty, Baker, S. A., Pazour, G. J., and Besharse, J. C. (2008). Spatial distribution of intraflagellar transport proteins in vertebrate photoreceptors. *Vision Res.*, 48:413-23. PMID: 17931679
36. Gopinath, S., Wen, Q., Thakoor, N., **Luby-Phelps, K.** and J. X. Gao. (2008) A statistical approach for intensity loss compensation of confocal microscopy images. *J. Microscopy*. 230: 143-159. PMID: 18387049
37. Wen, Q. **Luby-Phelps, K.** and J. Gao, (2009) Tracking multiple subcellular structures using a sequential Monte Carlo approach, *International Journal of Data Mining & Bioinformatics*, vol. 3, no. 3, 314-342, 2009. PMID: 19623773
38. McMahon, KA, Zajicek, H, Li, W-P, Peyton, M, Minna, JD, Hernandez, VJ, **Luby-Phelps, K.**, and Anderson, RGW. (2009) SRBC/Cavin-3 is a caveolin adapter protein that regulates caveolae function. *EMBO J*. 28:1001-15. PMID: 19262564
39. Halberg, N., Schraw, T.D., Wan, Z.V., Kim, J-Y., Yi, J., Hamilton, M.P., **Luby-Phelps, K.** and P.E. Scherer. (2009) Systemic Fate of the Adipocyte-Derived Factor Adiponectin. *Diabetes*. 58: 1961-1970. PMID: 19581422
40. Wu, Z., **Luby-Phelps, K.**, Bugde, A., Molyneux, LA, Denard, B, Li, W-H., Suel, GM and D.L. Garbers (2009) Capacity for Stochastic Self-renewal and Differentiation in Mammalian Spermatogonial Stem Cells. *J Cell Biol*. 187: 513-24. PMID: 19948499
41. Zhou H, **Luby-Phelps K**, Mickey BE, Habib AA, Mason RP, Zhao D. (2009) Dynamic near-

infrared optical imaging of 2-deoxyglucose uptake by intracranial glioma of athymic mice. *PLoS One*. 4:e8051. PMID: 19956682

42. Feranchak AP, Lewis MA, Kresge C, Sathe M, Bugde A, **Luby-Phelps K**, Antich PP, Fitz JG. (2010) "Initiation of purinergic signaling by exocytosis of ATP-containing vesicles in liver epithelium." *Journal of Biological Chemistry* 285:8138-47. PMID: PMID: PMC2832965
43. Akins, M, **Luby-Phelps, K** and Mahendroo, M (2010) "Second harmonic generation imaging as a potential tool for staging pregnancy and predicting preterm birth." *J Biomed. Optics* 15(2):026020. PMID: PMC2874049
44. Hartman, IZ, Liu, P, Zehmer JK, **Luby-Phelps, K**, Jo, Y, Anderson, RG, and DeBose-Boyd, RA (2010) "Sterol-induced dislocation of HMG CoA reductase from ER membranes into the cytosol through a subcellular compartment resembling lipid droplets." *J. Biol. Chem* 285:19288-98. PMID: PMC2885207
45. Wu, M, Smith, CL, Hall, A, Lee, I, **Luby-Phelps, K**, Tallquist, MD (2010) "Epicardial spindle orientation controls cell entry into the myocardium", *Dev. Cell* 19:114-125. PMID: PMC2909470
46. Tu SW, Bugde A, **Luby-Phelps K**, Cobb MH. (2011) WNK1 is required for mitosis and abscission. *Proc. Nat. Acad. Sci.* 108: 1385-1390 PMID: 21220314.
47. Akins, M. L., **K. Luby-Phelps**, R. A. Bank, and M. Mahendroo (2011) Cervical softening during pregnancy: regulated changes in collagen cross-linking and composition of matricellular proteins in the mouse. *Biol Reprod* **84**:1053-1062.
48. Zhou, K., Y. Wang, X. Huang, **K. Luby-Phelps**, B. D. Sumer, and J. Gao (2011) Tunable, Ultrasensitive pH-Responsive Nanoparticles Targeting Specific Endocytic Organelles in Living Cells. *Angewandte Chemie International Edition*: epub, Apr 14.
49. Orvedahl, A, Sumpter, R, Xiao, G, Ng, A, Zou, Z, Tang, Y, Narimatsu, M, Gilpin, C, Sun, Q, Roth, M, Forst, CV, Wrana, JL, Zhang, YE, **Luby-Phelps, K**, Xavier, R, Xie, Y, and Levine, B. Image-Based Genome-Wide siRNA Screen Identifies Host Factors Involved in Selective Autophagy. *Nature* (epub: 23 October 2011).
50. Mundy, DI Li, WP, **Luby-Phelps, K** and Anderson, R.G.W. (2012) Caveolin Targeting to Late Endosome/Lysosomal Membranes is Induced by Perturbations of Lysosomal pH and Cholesterol Content. *Mol. Biol. Cell* 23(5):864-80.
51. Zhang, Y., Akins, ML, Murari K, Xi, J, Li, M-J, **Luby-Phelps, K**, Mahendroo, M, and Li, X (2012) A compact fiber-optic SHG scanning endomicroscope and its application to visualize cervical remodeling during pregnancy. *Proc. Nat. Acad. Sci.*, 109: 12878-83.

52. Sengupta S, Tu SW, Wedin K, Earnest S, Stippec S, **Luby-Phelps K**, Cobb MH. (2012) Interactions with WNK (with no lysine) family members regulate oxidative stress response 1 and ion co-transporter activity. *J Biol Chem.* 287:37868-79.
53. Pompey S, Zhao Z, **Luby-Phelps K**, Michaely P. (2013) Quantitative Fluorescence Imaging Reveals Point of Release for Lipoproteins during LDLR-dependent Uptake. *J Lipid Res.*, 54(3):744-53.
54. Sun, K., C.M. Kusminski, **K. Luby-Phelps**, S.B. Spurgin, Y.A. An, Q.A. Wang, W.L. Holland, and P.E. Scherer. (2014) Brown adipose tissue derived VEGF-A modulates cold tolerance and energy expenditure. *Molecular metabolism.* 3:474-483.
55. Lee, E., Y. Koo, A. Ng, Y. Wei, **K. Luby-Phelps**, A. Juraszek, R.J. Xavier, O. Cleaver, B. Levine, and J.F. Amatruda. (2014) Autophagy is essential for cardiac morphogenesis during vertebrate development. *Autophagy.* 10:572-587.
56. Acar, M., Kocherlakota, K., Murphy, M., Peyer, J., Oguro, H., Jaiyeola, C., **Luby-Phelps, K.**, Zhao, Z., Inra, C., Morrison, S. (2015) Deep imaging of bone marrow shows non-dividing stem cells are mainly perisinusoidal. *Nature* 526:126-130.

OTHER PUBLICATIONS (Including review articles and book chapters)

1. **Luby-Phelps, K.** and M. Schliwa. (1982). Pigment Migration in Chromatophores: A Model System for Intracellular Transport. In *Axoplasmic Transport*, D.G. Weiss, ed., Berlin: Springer Verlag, pp. 15-26.
2. **Luby-Phelps, K.** (1982). Cell Biology. In *McGraw Hill Encyclopedia of Science and Technology*, Fifth Edition.
3. **Luby-Phelps, K.J.** and K.R. Porter. (1983). Cell. In *Funk and Wagnall's New Encyclopedia, Revised*, pp. 397-403.
4. Taylor, D.L., P.A. Amato, **K. Luby-Phelps**, and P. McNeil. (1984). Fluorescent Analog Cytochemistry. *Trends Biochem Sci* 9:88-91.
5. Taylor, D.L., P.A. Amato, P.L. McNeil, **K. Luby-Phelps**, and L. Tanasugarn. (1986). Spatial and Temporal Dynamics of Specific Molecules and Ions in Living Cells. In *Applications of Fluorescence in the Biomedical Sciences*, D. L. Taylor, A. Waggoner, R. Murphy, F. Lanni and R. Birge, eds., New York: Alan R. Liss, pp. 347-376.

6. **Luby-Phelps, K.**, F. Lanni, and D.L. Taylor. (1988). (invited review) The Submicroscopic Properties of Cytoplasm as a Determinant of Cellular Function. *Ann Rev Biophys Biophys Chem* 17:369-396. PMID: 3293592
7. **Luby-Phelps, K.** (1990). The Cytoplasm of Living Cells as a Reversible Gel Network. In *Physical Networks*, W. Burchard and S.B.Ross-Murphy, eds., England: Elsevier, Ltd., pp. 345-357.
8. **Luby-Phelps, K.** (1993). (invited review) The Effect of Cytoarchitecture on the Transport and Localization of Protein Synthetic Machinery. *J Cell Biochem* 52:140-147. PMID: 8366131
9. **Luby-Phelps, K.** (1994). (invited review) Physical Properties of Cytoplasm. *Curr Opin Cell Biol* 6:3-9. PMID: 8167023
10. **Luby-Phelps, K.** (1994). (invited review) Constraints on Diffusion in the Cytoplasm of Living Cells. *Comments Mol Cell Biophys* 8:199-216.
11. **Luby-Phelps, K.** and R.A. Weisiger. (1996). Role of Cytoarchitecture in Cytoplasmic Transport. *Comp. Bioch. Physiol. B.* 115:295-306.
12. **Luby-Phelps, K.** (1999). (invited review) Cytoarchitecture and Physical Properties of Cytoplasm: Volume, Viscosity, Diffusion, Intracellular Surface Area. *Intl. Rev. Cytol.* 192: 189-221. PMID: 10553280
13. Besharse JC, Baker SA, **Luby-Phelps K**, Pazour GJ. (2003). Photoreceptor intersegmental transport and retinal degeneration: a conserved pathway common to motile and sensory cilia. *Adv Exp Med Biol.* 533:157-64. PMID: 15180260
14. Pompey, SN, Michaely, P, **Luby-Phelps, K** (2011) Quantitative Fluorescence Co-localization of Lipoproteins with the LDL Receptor. *Meth Mol Biol* 1008:439-53.
15. **Luby-Phelps, K.** (2013). The physical chemistry of cytoplasm and its influence on cell function: an update. *Mol Biol Cell.* 24:2593-2596.