

## CURRICULUM VITAE

### **Personal Data:**

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**Place of Birth:** Pittsburgh, Pennsylvania, July 13, 1947

**Citizenship:** U.S.A.

**Marital Status:** Married, two children

### **Education and Training:**

**B.S.** 1970, Catholic University of America, Washington, D.C., Zoology.

**M.S.** 1980, Catholic University of America, Washington, D.C., Microbiology,  
Thesis: Isolation, ultrastructure, and numerical taxonomy of  
autochthonous bacteria from bathypelagic fish intestine.

**Ph.D.** 1992, Johns Hopkins University School of Medicine, Baltimore, MD.  
Cell Biology/Biochemistry, Biochemistry, Cellular and Molecular Biology  
Program. Thesis: Characterization and purification of an inhibitor of  
endothelial cell proliferation from normal adult vitreous humour.

### **Professional Experience:**

Technician, Dept. of Ophthalmology, Johns Hopkins University

School of Medicine, 1973 - 1976. Biologist. Studied toxicity and metabolism of I69 dyes for possible use in retinal and choroidal angiography.

Research Staff, Dept. of Ophthalmology, Johns Hopkins University

School of Medicine, 1976 - 1979. Biologist and animal microsurgeon. Studied experimental angiogenesis and its inhibition.

Research Associate, Dept. of Ophthalmology, Johns Hopkins University

School of Medicine, 1979 –1986. Cell Biologist/Biochemist using cell culture assays and experimental angiogenesis models to evaluate angiogenic and antiangiogenic substances. Morphologic and enzyme histochemical studies on the development of the retinal vasculature and retinopathy of prematurity. Principal Investigator of studies to determine the feasibility of using hematoporphyrin phototherapy on ocular tumors.

Instructor, Dept. of Ophthalmology, Johns Hopkins University School of

Medicine, 1986 – 1992. Cell Biologist/Biochemist using cell culture assays and experimental angiogenesis models to evaluate angiogenic and antiangiogenic growth factors during purification.

Immunohistochemistry was used to identify angiogenic and anti-angiogenic growth factors in diabetic and sickle cell retinopathies.

*In vivo* and *in vitro* studies on the effects of low level microwave irradiation on the eye and brain.

Assistant Professor, Dept. of Ophthalmology, Johns Hopkins University

School of Medicine, 1992 – 1996. Cell Biologist/Biochemist studying angiogenic and antiangiogenic growth factors and the

causes of vaso-occlusion in diabetic and sickle cell retinopathy. Also investigating normal vasculogenesis and abnormal angiogenesis in the canine model of retinopathy of prematurity and the role adenosine plays in these processes.

Associate Professor, Dept. of Ophthalmology, Johns Hopkins University School of Medicine, 1996 – 2005. Cell Biologist/Biochemist using cell culture assays, experimental angiogenesis models, immunohistochemistry, and *in situ* hybridization to evaluate angiogenic and antiangiogenic growth factors and their roles in diabetic and sickle cell retinopathies. Investigating the causes of vaso-occlusion in diabetic and sickle cell retinopathy. Also investigating normal and abnormal vasculogenesis in the canine model of retinopathy of prematurity and the role adenosine plays in these processes. Developing bioerodable polymer delivery of antiangiogenic agents and nonviral gene delivery systems for the treatment of ocular neovascularization.

Professor, Dept. of Ophthalmology, Johns Hopkins University School of Medicine, 2005 – present. Cell Biologist/Biochemist using cell culture assays, experimental angiogenesis models, immunohistochemistry, and *in situ* hybridization to evaluate angiogenic and antiangiogenic growth factors and their roles in diabetic and sickle cell retinopathies and age-related macular degeneration. Also investigating normal vasculogenic processes in retinal and choroidal vascular development and abnormal angiogenesis in the canine model of retinopathy of prematurity. Developing nanoparticles for delivery of antiangiogenic genes for the treatment of ocular neovascularization. Also using biosensors of oxidative stress to sense generation of oxygen radicals and delivery of antioxidant genes to control the injury from oxidative stress.

## RESEARCH INTERESTS

**Angiogenic and anti-angiogenic growth factors:** The involvement of angiogenic [adenosine, acidic and basic fibroblast growth factors (a and bFGF), vascular endothelium growth factor (VEGF)], stromal derived factor-1 and anti-angiogenic [transforming growth factor-b's (TGF-b) and vitreous inhibitor of angiogenesis], thrombospondin-1, endostatin, and pigment epithelial-derived factor (PEDF) in vasculogenic and angiogenic processes in the eye using biochemistry, immunohistochemistry, enzyme histochemistry, *in situ* hybridization and *in vitro* cell assays. The vasculogenic processes of interest include development of the retinal and choroidal vasculatures. Angiogenesis is studied by the Lutty lab in age-related macular degeneration (AMD), diabetic and sickle cell retinopathies, retinopathy of prematurity, and corneal neovascularization. Recent studies demonstrate that three antiangiogenic factors (thrombospondin-1, endostatin, and PEDF) are reduced or missing in AMD choroid and retinal pigment epithelium, making the AMD choroid susceptible to choroidal neovascularization.

**Angioblasts or vascular precursors:** We wish to determine the growth factors and substratum that drive the differentiation of angioblasts into endothelial cells within retina using immunohistochemistry, enzyme histochemistry, and *in situ* hybridization. We are determining how this process is affected by hyperoxia and hypoxia. We have developed *in vitro* systems to dissect the event using endothelial cells of adult and neonatal (angioblasts) retinal origin. We have shown that these cells are pluripotent and may be useful in delivering therapeutic genes to the eye.

**Vaso-occlusion mechanisms that cause nonperfusion of the retinal and choroidal vasculatures in diabetic and sickle cell retinopathy and AMD.** The mechanisms under investigation are imbalance in components of the fibrinolytic system, increased aggregation and adhesiveness of platelets, adhesion of sickled erythrocytes in sickle cell disease, and neutrophil adhesion to endothelium in choroid and retina.

**Therapies for angiogenesis and oxidative stress in the eye.** My lab is developing non-viral gene therapies for controlling angiogenesis in the eye using nanoparticles. We also

have developed a biosensor for oxidative stress that will activate therapeutic genes in a cell only when the cell is experiencing oxidative stress.

## RESEARCH ACTIVITIES

### Peer Reviewed Scientific Articles:

1. **Lutty, G.A.** and Kues, H.A. Dyes can be deadly. Laser Focus 59-61, May 1975.
2. **Lutty, G.A.** The acute intravenous toxicity of biological stains, dyes, and other fluorescent substances. Toxicity and Applied Pharmacology 44: 225-249, 1978.
3. Patz, A., Brem, S., Finkelstein, D., **Lutty, G.A.**, and Bennett, A. A new approach to the problem of retinal neovascularization. Ophthalmology 85: 626-637, 1978.
4. Patz, A., **Lutty, G.A.**, Bennett, A., and Coughlin, W.R. Inhibitors of neovascularization in relation to diabetic and other proliferative retinopathies. Trans Am Ophthalmol Soc 76:102-107, 1978.
5. **Lutty, G.A.** A correlation between cyanine dye structures and their toxicity in mice. Bull. of Nippon Kankoh-Shikiso Kenkyusho 50:24-50, 1979.
6. **Lutty, G.A.** An intraperitoneal survey of biological stains, dyes, and other fluorescent substances. Bull of Nippon Kankoh-Shikiso Kenkyusho 50:24- 50, 1979.
7. Glaser, B.M., D'Amore, P.A., **Lutty, G.A.**, Fenselau, A.H., Michels, R., Patz, A. Chemical mediators of intraocular neovascularization. Trans Ophthal Soc UK 100:369-373, 1980.
8. Fournier, G.A., **Lutty, G.A.**, Watt, S., Fenselau, A., Patz, A. A corneal micropocket assay for angiogenesis in the rat eye. Invest Ophthalmol Vis Sci 21:351-354, 1981.
9. **Lutty, G.A.**, Thompson, D.C., Gallup, J.Y., Mello, R.J., Patz, A., and Fenselau, A. Vitreous: An inhibitor of retinal extract-induced neovascularization. Invest Ophthalmol Vis Sci 24:52-56, 1983.
10. **Lutty, G.A.**, Liu, S.H., and Prendergast, R. Angiogenic lymphokines of activated T cell origin. Invest Ophthalmol Vis Sci 24:1595-1601, 1983.
11. Prendergast, R.A., **Lutty, G.A.**, and Scott, A.L. Directed inflammation: The phylogeny of lymphokines. Devel Compar Immunology 7:629-32, 1983.

12. Flower, R.W., McLeod, D.S., **Lutty, G.A.**, Wajer, S., and Goldberg, B. Retinal vascular development in dog. Invest Ophthalmol Vis Sci 26:957-968, 1985.
13. Kues, H.A., Hirst, L.W., **Lutty, G.A.**, D'Anna, S.A., and Dunkelberger, G.R. Effects of 2.45 GHz microwaves on primate corneal endothelium. Bioelectromagnetics 6:177-188, 1985.
14. **Lutty, G.A.**, Mello, R.J., Chandler, C., Fait, C., Bennett, A., and Patz, A. Regulation of cell growth by vitreous humor. J Cell Science 76:53-65, 1985.
15. **Lutty, G.A.**, Chandler, C., Bennett, A., Fait, C., and Patz, A. Presence of endothelial cell growth factor activity in normal and diabetic vitreous. Current Eye Research 5:9-17, 1986.
16. Hochheimer, B.F., **Lutty, G.A.**, and D'Anna, S. Ocular fluorescein toxicity. Applied Optics 26:1473-1479, 1987.
17. **Lutty, G.**, Fortune, M., and Hochheimer, B. Improving the efficiency of hematoporphyrin phototherapy of ocular tumors. Photochemistry and Photobiology 46:383-392, 1987.
18. McLeod, D.S., **Lutty, G.A.**, Wajer, S., and Flower, R.W. Visualization of a developing vasculature. Microvascular Research 33:257-269, 1987.
19. Young, E. and **Lutty, G.A.** Modulation of human lymphocyte proliferation by normal bovine vitreous. Invest Ophthalmol Vis Sci 28:753-756, 1987.
20. McGuigan, L., Quigley, H., **Lutty, G.A.**, Enger, C., and Young, E. The effects of D-penicillamine and daunorubicin on conjunctival fibroblast proliferation and collagen synthesis. Invest Ophthalmol Vis Sci 29:112-118, 1988.
21. Zweier, J.L., Kuppusamy, P., and **Lutty, G.A.** Measurement of endothelial cell free radical generation: Evidence for a central mechanism of free radical injury in postischemic tissues. PNAS, USA 85:4046-4050, 1988.
22. Hanneken, A., **Lutty, G.A.**, McLeod, D., Robey, F., Harvey, A., and Hjelmeland, L. Localization of basic FGF to the microvasculature in the fetal bovine retina J Cell Physiology 138:115-120, 1989.
23. Hanneken, A., de Juan, E., **Lutty, G.A.**, Fox, G., Schiffer, S., Nicolson, M. and Hjelmeland, L. Altered distribution of basic fibroblast growth factor in diabetic retinopathy. Arch Ophthalmol 109:1005-1011, 1991.
24. **Lutty, G.A.**, Ikeda, K., Chandler, C., and McLeod, D.S. Localization of tissue plasminogen activator in diabetic and non-diabetic retina and choroid. Invest Ophthalmol Vis Sci 32:237-245, 1991.
25. **Lutty, G.A.**, Ikeda, K., Chandler, C. and McLeod, D. Immunohistochemical

- localization of transforming growth factor- $\beta$ 1 in human photoreceptors. Current Eye Research 10:61-74, 1991.
26. Kues, H., Monahan, J., D'Anna, S., McLeod, D., **Luty, G.A.**, and Koslov, S. Increased sensitivity of the non-human primate eye to microwave radiation following ophthalmic drug pretreatment. Bioelectromagnetics 13:379-393, 1992.
  27. Phelan, A., Lange, D, Kues, H. and **Luty, G.A.** Modification of membrane fluidity in melanin containing cells following exposure to low level microwave irradiation. Bioelectromagnetics 13:131-146, 1992.
  28. **Luty, G.A.** and McLeod, D.S. A new technique for visualization of the human retinal vasculature. Arch Ophthalmol 110:267-276, 1992.
  29. Pasquale, L.R., Dorman-Pease, M.E., **Luty, G.A.**, Quigley, H.A., and Jampel, H.D. Immunolocalization of TGF- $\beta$ 1, TGF- $\beta$ 2, and TGF- $\beta$ 3 in the anterior segment of the human eye. Invest Ophthal Vis Sci 34:23-30, 1993.
  30. **Luty, G.A.**, Merges, C., Threlkeld, A. B., Crone, S., and McLeod, D.S. Heterogeneity in localization of isoforms of TGF- $\beta$  in human retina, vitreous, and choroid. Invest Ophthal Vis Sci 34:477-487, 1993.
  31. McLeod, D.S., Goldberg, M.F., and **Luty, G.A.** Dual perspective analysis of vascular formations in sickle cell retinopathy. Arch Ophthalmol 111:1234-1245, 1993.
  32. **Luty, G.A.**, Merges, C., Crone, S., and McLeod, D.S. Immunohistochemical insights into sickle cell retinopathy. Curr Eye Res 13:125-138, 1994.
  33. Zweier, J.L., Broderick, R., Kuppusamy, P., Thompson-Gorman, S., and **Luty, G.A.** Determination of the mechanism of free radical generation in human aortic endothelial cells exposed to anoxia and reoxygenation. J Biol Chem 269:1-7, 1994.
  34. Zweier, J.L., Kuppusamy, P., Thompson-Gorman, S., Klunk, D., and **Luty, G.A.** Measurement and characterization of free radical generation in reoxygenated human endothelial cells. Am J Physiol 266:C700-C708, 1994.
  35. **Luty, G.A.**, McLeod, D.S., Pachnis, A., Costantini, F., Fabry, M.E., and Nagel, R.L. Retinal and choroidal neovascularization in a transgenic mouse model of sickle cell disease. Am J Pathol 145:490-497, 1994.
  36. McLeod, D.S. and **Luty, G.A.** High resolution histological analysis of the human choroidal vasculature. Invest Ophthalmol Vis Sci 35:3799-3811, 1994.

37. Wajer, S.D., McLeod, D.S., and **Lutty, G.A.** Confocal microscopic imaging of fluorescently labeled sickle erythrocytes in the retinal vasculature. Johns Hopkins APL Technical Digest 15:336-341, 1994.
38. McLeod, D.S. and **Lutty, G.A.** Menadione-dependent alpha glycerophosphate and succinate dehydrogenases in the developing canine retina. Current Eye Res. 14:819-826, 1995.
39. McLeod, D.S., Lefer, D.J., Merges, C., and **Lutty, G.A.** Enhanced expression of intracellular adhesion molecule-1 and P-selectin in the diabetic human retina and choroid. Am J Pathol, 147: 642-653, 1995.
40. **Lutty, G.A.**, McLeod, D.S., Merges, C., Diggs, A., and Plouét, J. Localization of VEGF in human choroid and retina. Arch Ophthalmol 114:971-977, 1996
41. McLeod, D.S., Brownstein, R., and **Lutty, G.A.** Vaso-obliteration in the canine model of oxygen-induced retinopathy. Invest Ophthalmol Vis Sci 37: 300-311, 1996.
42. McLeod, D.S., Crone, S.N., and **Lutty, G.A.** Vasoproliferation in the neonatal dog model of oxygen-induced retinopathy. Invest Ophthalmol Vis Sci 37: 1322-1333, 1996.
43. **Lutty, G.A.**, Phelan, A., McLeod, D.S., Suzuka, S., Fabry, M., and Nagel, R. A rat model for sickle cell-mediated vaso-occlusion in retina. Microvascular Res, 52: 270-280, 1996.
44. Fukushima, I., McLeod, D.S., and **Lutty, G.A.** Intrachoroidal microvascular abnormality, a previously unreported form of choroidal neovascularization. Am J Ophthalmol 124:473-487, 1997.
45. **Lutty, G.A.**, Cao, J., and McLeod, D.S. Relationship of polymorphonuclear leukocytes (PMNs) to capillary dropout in the human diabetic choroid. Am J Pathol 151:707-714, 1997.
46. McLeod, D.S., Fukushima, A., Goldberg, M.F., and **Lutty, G.A.** Histopathology of neovascularization in sickle cell retinopathy. Am J Ophthalmol, 124:455-472, 1997.
47. Asrani, S., Zou, S., D'Anna, S., **Lutty, G.A.**, Viores, S., Goldberg, M.F., and Zeimer, R. Feasibility of laser-targeted photo-occlusion of the choriocapillary layer in rats. Invest Ophthalmol Vis Sci 38:2702-2710, 1997.
48. Kunz Mathews, M., Merges, C., McLeod, D.S., and Lutty, G.A. Vascular endothelial growth factor and vascular permeability changes in human diabetic retinopathy. Invest Ophthalmol Vis Sci 38:2729 –

- 2741, 1997.
49. Ellis, E.A., Grant, M.B., Murray, F.T., Wachowski, M.B., Guberski, D.L., Kubilis, P.S., and **Luty, G.A.** Increased NADH oxidase in the retina of BB/WOR diabetic rat. Free Radical Biology and Medicine 24:111-120, 1998.
  50. Prendergast R.A., Iliff C.E., Coskuncan N.M., Caspi R.R., Sartani G., Tarrant T.K., **Luty G.A.**, and McLeod D.S. T cell traffic and the inflammatory response in experimental autoimmune uveoretinitis. Invest Ophthalmol Vis Sci 39:754-762, 1998.
  51. Cao J., McLeod D.S., Merges C., **Luty G.A.** Choriocapillaris degeneration in human diabetes. Arch Ophthalmol 116:589-597, 1998.
  52. Linsenmeier, R., Braun, R., McRipley, M., Padnick, L., Ahmed, J., Hatchell, D., McLeod D., **Luty G.A.** Retinal hypoxia in long term diabetic cats. Invest Ophthalmol Vis Sci 39:1647-1657, 1998.
  53. **Luty, G.A.**, Merges, C., McLeod, D.S., Wajer, S.D., Suzuka, S.M., Fabry, M.E., Nagel, R.L. Nonperfusion of retina and choroid in transgenic mouse models of sickle cell disease. Current Eye Res 17:438-444, 1998.
  54. **Luty, G.A.**, Kunz, M., Merges, C., and McLeod, D.S. Adenosine stimulates canine retinal capillary endothelial cell migration and tube formation. Current Eye Res 17:594-609, 1998.
  55. McLeod, D.S., D'Anna, S.A., and **Luty G.A.** Clinical and histopathological features of canine oxygen-induced proliferative retinopathy. Invest Ophthalmol Vis Sci 39:1918-1932, 1998.
  56. Cao, J., Kunz-Mathews, M., McLeod, D.S., Merges, C., Hjelmeland, L. and **Luty, G.A.** Angiogenic factors in human proliferative sickle cell retinopathy. Brit J Ophthalmol 83:838-846, 1999.
  57. Handa, J.T., Verzijl, N., Matsunaga, H., Aotaki-Keen, A., **Luty, G.A.**, Koppele, J.M., Miyata, T., Hjelmeland, L. Increase of advanced glycosylation endproduct pentosidine in Bruch's membrane. Invest Ophthalmol Vis Sci, 40:775-779, 1999.
  58. **Luty, G.A.**, Grunwald, J., Majji, A.B., Uyama, M., Yoneya, S. Changes in choriocapillaris and retinal pigment epithelium (RPE) in age-related macular degeneration. Mol Vis, 5:35, 1999.
  59. Mishima, K., Handa, J., Aotaki-Keen, A., **Luty, G.A.**, Morse, L., and Hjelmeland, L.M. Senescence-associated b-galactosidase histochemistry for the primate eye. Invest Ophthalmol Vis Sci

- 40: 1590-1593, 1999.
60. **Lutty, G.A.**, Merges, C., and McLeod, D.S. 5'Nucleotidase and adenosine during retinal vasculogenesis and oxygen-induced retinopathy. Invest Ophthalmol Vis Sci 41: 218-229, 2000.
61. Taomoto, M., McLeod, D.S., Merges, C., and **Lutty, G.A.** Localization of adenosine A2a receptor in retinal development and oxygen-induced retinopathy. Invest Ophthalmol Vis Sci 41:230-243, 2000.
62. **Lutty, G.A.** Diabetic choroidopathy. Focus Diabetic Retinopathy 7:10-13, 2000.
63. Lu, S.-T., Mathur, S.P., Stuck, B., Zwick, H., D'Andrea, J.A., Zirix, J.M., Merritt, J.H., **Lutty, G.A.**, McLeod, D.S., and Johnson, M. "Effects of high peak power microwaves on the retina of the Rhesus monkey." Bioelectromagnetics, 21:439-454, 2000.
64. Wajer, S.D., Taomoto, M., McLeod, D.S., McCally, R.L., Nishiwaki, H., Fabry, M.E., Nagel, R.L., and **Lutty, G.A.** Velocity measurements of normal and sickle red blood cells in the rat retinal and choroidal vasculatures. Microvascular Res, 60:281-293, 2000.
65. Liu, S.H., Gottsch, J.D., Vinos, S.A., Derevjani, N.L., McLeod, D.S., and **Lutty, G.A.** EMAP cytokine expression in developing retinas of normal and retinal degeneration (rd) mutant mice. J Neuroimmunology 114:28-34, 2001.
66. **Lutty, G.A.**, Taomoto, M., Cao, J., McLeod, D.S., Vanderslice, P., McIntyre, B.M., Fabry, M.E., and Nagel, R.L. Inhibition of TNF- $\alpha$ -induced sickle RBC retention in retina with a VLA-4 antagonist. Invest Ophthalmol Vis Sci 42:1349-1355, 2001.
67. Kunz Mathews, M., McLeod, D.S., Merges, C., Cao, J. and **Lutty, G.A.** Neutrophils and leukocyte adhesion molecules in sickle cell retinopathy. Brit J Ophthalmol 86:684-690, 2002.
68. McLeod, D.S., Taomoto, M., Cao, J., Zhu, Z., Witte, L., and **Lutty, G.A.** Localization of VEGF receptor-2 (VEGF-2 or KDR/Flk-1) and effects of blocking VEGFR-2 during normal retinal vasculogenesis and oxygen-induced retinopathy. Invest Ophthalmol Vis Sci 43:474-482, 2002.
69. Tolentino, M.J., McLeod, D.S., Taomoto, M., Otsuji, T., Adamis A.P., **Lutty, G.A.** Pathologic features of VEGF-induced retinopathy in the non-human primate. Am J Ophthalmol 133:373-385, 2002.
70. McLeod, D.S., Taomoto, M., Otsuji, T., Green, W.R., Sunness, J.S., and **Lutty,**

- G.A.** Quantifying changes in RPE and choriocapillaris in eyes with age-related macular degeneration. Invest Ophthalmol Vis Sci, 43: 1986-1993, 2002.
71. Otsuji, T., McLeod, D.S., Hansen, B., and **Lutty, G.A.** Immunohistochemical staining and morphometric analysis of the monkey choroid. Exp Eye Res, 75:201-208, 2002.
72. **Lutty, G.A.**, Otsuji, T., Taomoto, T., Merges, C.A., McLeod, D.S., Kim, S.Y., Vanderslice, P., Suzuka, S., Fabry, M.E. and Nagel, R.E. Mechanisms for sickle RBC retention in choroid. Curr. Eye Res. 25: 163-171, 2002.
73. **Lutty, G.A.** and McLeod, D.S. Retinal vascular development and oxygen-induced retinopathy: a role for adenosine. Progress in Retinal and Eye Research 22:95-111, 2003.
74. Kim, S.Y., Mocanu, C., McLeod, D.S., Bhutto, I.A., Merges, C., Eid, M., Tong, P. and **Lutty, G.A.** Expression of pigment epithelium-derived factor (PEDF) and vascular endothelial growth factor (VEGF) in sickle cell retina and Choroid. Exp. Eye Res. 75:433-445, 2003.
75. Kim SY, Johnson MA, McLeod DS, Alexander T, Otsuji T, Steidl SM, Hannsen, BC, **Lutty, GA.** Retinopathy in monkeys with spontaneous type 2 diabetes. Invest. Ophthalmol. Vis. Sci. 45:4543-4553, 2004.
76. Chan-Ling T, McLeod DS, Hughes S, Baxter L, Chu Y, Hasegawa T, **Lutty, GA.** Astrocyte-endothelial cell relationships during human retinal vascular development. Invest. Ophthalmol. Vis. Sci. 45:2020-2032, 2004.
77. Bhutto IA, Kim SY, McLeod D.S., Merges CA, Fukai N, Olsen BR, **Lutty, G.A.** Retinal and choroidal localization of collagen XVIII and the endostatin portion of collagen XVIII in aged human control and in age-related macular degeneration subjects. Invest. Ophthalmol. Vis. Sci. 45:1544-1552, 2004.
78. Johnson M, **Lutty GA**, McLeod DS, Otsuji T, Flower RW, Sandagar G, Alexander T, Steidl S, Hansen B: Ocular structure and function in a monkey with spontaneous diabetes mellitus. Exp. Eye Res. 80:37-42, 2005.

79. Kim, S.Y., Johnson, M.A., McLeod, D.S., Alexander, T., Hansen, B.C., **Lutty, G.A.** Neutrophils are associated with capillary closure in spontaneously diabetic monkeys retina. *Diabetes*, 54: 1534-1542, 2005.
80. Ash, J.D., McLeod, D.S., **Lutty, G.A.** Transgenic expression of leukemia inhibitory factor (LIF) blocks normal vascular development but not pathological neovascularization. *Mol. Vis.* 11:298-308. 2005.
81. **Lutty, G.A.**, McLeod, D.S. Phosphatase enzyme histochemistry for studying vascular hierarchy, pathology, and endothelial cell dysfunction in retina and choroid. *Vision Res.* 45:3504-11, 2005.
82. Emerson, G.G., **Lutty, G.A.** Effects of sickle cell disease on the eye: clinical features and treatment. *Hematol Oncol Clin North Am.* 19:957-73, 2005.
83. Yamada, Y., Ishibashi, K., Ishibashi, K., Bhutto, I.A., Tian, J., **Lutty, G.A.**, Handa, J.T. The expression of advanced glycation endproduct receptors in RPE cells associated with basal deposits in human maculas. *Exp Eye Res.* 82:840-8, 2006.
84. Bhutto, I.A., McLeod, D.S., Hasegawa, T., Kim, S.Y., Merges, C., Tong, P. and **Lutty, G.A.** Pigment epithelium-derived factor (PEDF) and vascular endothelial growth factor (VEGF) in aged human choroid and eyes with age-related macular degeneration. *Exp. Eye Res.* 82:99-110, 2006.
85. Mancini, E.A., Hillery, C.A., Bodian, C.A., Zhang, Z.G, **Lutty, G.A.**, Collier B.S. Pathology of Berkeley sickle cell mice: similarities and differences with human sickle cell disease. *Blood* 15;107:1651-8, 2006.
86. Prow, T, Grebe R, Merges C, Smith JN, McLeod DS, Leary JF, **Lutty GA.** Nanoparticle tethered antioxidant response element as a biosensor for oxygen-induced toxicity in retinal endothelial cells. *Mol. Vision* 12:616-625, 2006.
87. Prow, T, Smith JN, Grebe R, Salazar, JH, Wang N, Kotov N, **Lutty GA,** Leary JF. Construction, gene delivery, and expression of DNA tethered nanoparticles. *Mol. Vision* 12:606-15, 2006.
88. Uno, K., Bhutto, I.A., McLeod, D.S., Merges, C., and **Lutty, G.A.** Impaired expression of thrombospondin-1 in eyes with age-related macular degeneration. *Brit. J. Ophthalmol.* 90:48-54, 2006.
89. Bhutto, I.A., McLeod, D.S., Merges, C., Hasegawa, T., **Lutty, G.A.**

- Localization of SDF-1 and CXCR4 in retina and choroid of aged human eyes and in eyes with age-related macular degeneration. *Brit. J. Ophthalmol.* 90:906-910, 2006.
90. **Luty, G.A.**, Merges, C., Grebe, R., Prow, T., McLeod, D.S. Canine retinal angioblasts are multipotent. *Exp. Eye Res.* 83:183-193, 2006.
91. McLeod, D., Hasegawa, T., Prow, T., Merges, C., **Luty, G.A.** The initial fetal human retinal vasculature develops by vasculogenesis. *Dev. Dynamics* 235:3336-3347, 2006.
92. Uno, K., Merges, C.A., Grebe, R., **Luty, G.A.**, Prow, T.W. Hypoxia inhibits several critical aspects of vascular development. *Dev Dyn.* 236:981-90, 2007.
93. Hasegawa, T., McLeod, D.S., Bhutto, I.A., Prow, T., Merges, C.A., Grebe, R., **Luty, G.A.** The Human Choriocapillaris Develops by Hemo-vasculogenesis. *Dev Dyn*, in press, 2007

### Book Chapters:

1. Prendergast, R.A., **Luty, G.A.**, Liu, S. H., Thompson, D.C., and Patz, A. Seastar factor (SSF): Effects on vertebrate inflammation and experimental corneal neovascularization. in Phagocytosis - Past and Future, Eds. Karnovsky, M. L. and Bolis, L. Academic Press, Inc., 1982.
2. **Luty G.A.** and Goldberg, M.F. "Ophthalmic Complications." In Sickle Disease: Basic Principles and Clinical Practice. Ed. Embury S.H., Hebbel R.P., Narla M., Steinberg, M. Raven Press, N.Y., 1994.
3. Fekrat, S., **Luty, G.A.**, Goldberg, M.F. "Hemoglobinopathies." In Retina-Vitreous-Macula. Ed. Guyer, D.R., Yannuzzi, L.A., Chang, S., Shields, J.A., Green, W.R. W.R. Saunders, Philadelphia, 1999
4. Harlan, J.B., Fekrat, S., **Luty, G.A.**, and Goldberg, M.F. "Hemoglobinopathies." In Retina (Vol. 2), Ed. A.P. Schachat, Mosby, St. Louis, 2001
5. **Luty, G.A.**, and Ogura, Y. "Involvement of leukocytes in diabetic retinopathy and choroidopathy." In Molecular Mechanisms of Microvascular Disorders. Ed. Schmid-Schönbein, G.W. and Granger, N.D. Springer Verlag, New York, 2003.

6. **Lutty, G.A.** "Large animal models of retinopathy of prematurity." In Proceedings of the Third International Symposium on Retinopathy of Prematurity. Ed. G.A. Lutty, T. Chan-Ling, D. Phelps. Molecular Vision Press, Atlanta, 2006.
7. Bhutto, I. and **Lutty, G.** "The vasculature of choroid." In Encyclopedia of the Microvasculature. Ed. D. Shepro., Elsevier, San Diego, 2006.
8. Emerson, G., Harlan, J.B., Fekrat, S., **Lutty, G.A.**, and Goldberg, M.F. "Hemoglobinopathies." In Retina (Vol. 2). Ed. A.P. Schachar, Mosby, St. Louis, 2006.
9. Palmer, E., Phelps, D.L., Spencer, R., and **Lutty, G.A.** "Retinopathy of Prematurity." In Retina (Vol. 2). Ed. A.P. Schachar, Mosby, St. Louis, 2006.
10. **Lutty, G.A.** "Sickle cell retinopathy and hemoglobinopathies. Histopathology of sickle cell retinopathy." In Retinal Vascular Diseases. Ed. A.M. Jousen, T.W. Gardner, B. Kirchhof, S. J. Ryan, Springer-Verlag, Munchen, 2007.
11. **Lutty, G.A.**, and McLeod, D.S. "Angiogenesis in sickle cell retinopathy." In Retinal and Choroidal Angiogenesis. Ed. J.S. Penn. Springer, New York, in press, 2007.
12. Prow, T., and **Lutty, G.A.** "Toxicity of nanoparticles in the eye." In Nanotoxicity: Characterization, Dosing, and Health Effects. Ed. L. Tran and N. Monteiro-Riviere, Informa Healthcare, New York, 2007.

**Editorial Activities:**

Executive Editor for *Experimental Eye Research*, March 1998-present.

Editorial Board Member of *Microvascular Research*, January 1999-present.

Guest Editor: *Investigative Ophthalmology and Visual Science*, 2001-present.

Proceedings of the Third International Symposium on Retinopathy of Prematurity.

Editors G. A. Lutty, T. Chan-Ling, D. Phelps. Molecular Vision Press, Atlanta, 2006.

Reviewer for *Nature Medicine*, *Proceedings of the National Academy of Sciences*, *Investigative Ophthalmology and Visual Science*, *Archives of Ophthalmology*, *Current Eye Research*, *Experimental Eye Research*, *Graefes Archives of Ophthalmology*, *Ophthalmology*, *FASEB Journal*, and *American Journal of Pathology*

**Professional Societies:**

Association for Research in Vision and Ophthalmology  
International Society for Eye Research  
New York Academy of Sciences  
American Society for Investigative Pathology

**Advisory Committees:**

Ad hoc member of the SBIR Review group, NIH (1998).

Ad hoc member of the Visual Science C Study Section, NIH (2001-present).

Ad hoc member of the COBRE (Centers of Biological Research Excellence), NIH (2002).

Ad hoc member of review panel, Wellcome Trust Scientific Review Board, London, UK (1999-present).

Member RO3 Study Section, NEI, NIH, November 2002.

Ad hoc member of review panel, Medical Research Council, London, UK (2000-present).

Ad hoc member of review panel, Fight for Sight, Institute of Ophthalmology, London, UK (2002).

Ad hoc member of review panel, American Diabetes Association Review Panel (2002-03).

Ad hoc member of review panel, Juvenile Diabetes Association Review Panel (2003).

Ad hoc member, Foundation Fighting Blindness Center Grant Review Panel (2004).

## RECOGNITION

### **Awards:**

American Heart Association Established Investigator Award

“Vaso-occlusive processes in diabetic eye” 1994

Research to Prevent Blindness, Lew Wasserman Merit Award. 1997

Paul Henkind Memorial Lectureship, Macula Society, 2003

### **Invited Talks:**

November, 1994. Invited Speaker, XI International Congress of Eye Research, Delhi, India.

April, 1995. Invited Speaker, Sickle Cell Interactions with Endothelium Symposium, Experimental Biology Meeting, Atlanta, GA.

March, 1996. Broadhurst Distinguished Lectureship, Schepens Eye Institute, Harvard School of Medicine, Boston, MA.

- November, 1996. Distinguished Lecturer, Ophthalmology/Immunology Lecture Series, Casey Eye Institute, Oregon Sciences University, Portland, OR.
- September, 1997. Keynote Speaker, 5<sup>th</sup> International Symposium on Ocular Circulation and Neovascularization, Kyoto, Japan.
- September, 1997. Invited Speaker, Juvenile Diabetes Foundation International, Oxford Workshop on Diabetic Retinopathy, Oxford, UK.
- November, 1997. Loris and David Rich Lectureship in Visual Science, University of Alabama School of Medicine, Birmingham, AL.
- July, 1997. Invited Speaker, International Business Communications Meeting on "Angiogenesis Targets," San Francisco, CA.
- July, 1998. Invited Speaker, XIII International Congress of Eye Research, Paris, France.
- September, 1999. Visiting Professor Lecture, Scheie Eye Institute, University of Pennsylvania, Philadelphia, PA.
- February, 2000. Invited Speaker, Third International Symposium on Ocular Pharmacology and Pharmaceutics, Lisbon, Portugal.
- June, 2000. Keynote Speaker, Korean Retinal Society Annual Meeting, Seoul, Korea.
- February, 2001. Visiting Professor Lecture, Scheie Eye Institute, University of Pennsylvania, Philadelphia, PA.
- September, 2001. State of the Art Keynote Invited Lecture, 37<sup>th</sup> Annual Meeting of the European Association for the Study of Diabetes. Glasgow, Scotland, UK.
- December, 2001. Visiting Lecturer Pro Tempore Distinguished Lecture Series, The Cole Eye Institute, Cleveland Clinic Foundation, Cleveland, OH.
- November, 2001. Invited Speaker, IX Biennial Western Eye Research Conference, Lake Tahoe, CA.

March, 2002. Distinguished Lecturer, Photomedicine Lecture Series, Wellman Laboratory, Massachusetts General Hospital, Harvard University, Boston , MA.

February, 2003. Distinguished Lecturer, Louisiana State University School of Medicine, New Orleans, LA.

March, 2003. Paul Henkind Memorial Lecture, Macula Society, Naples, FL.

March, 2003. Broadhurst Distinguished Lectureship, Schepens Eye Institute, Harvard School of Medicine, Boston, MA.

April, 2003. Distinguished Neuroscience and Pharmacology Lecturer, University of Florida, Gainesville, FL.

July, 2003. Distinguished Visiting Scholar, University of Oklahoma Health Sciences Center and McGee Eye Institute, Oklahoma City, OK.

December, 2003. Keynote Speaker, Japanese Ophthalmic Pathology Society, Fukuoka, Japan.

June, 2004. Invited Speaker. CME Meeting on Age-related Macular Degeneration, Johns Hopkins Hospital. Baltimore, MD.

October, 2004. Two Invited Lectures. Retinal and Choroidal Angiogenesis Meeting, Vanderbilt University, Nashville, TN.

March, 2005. Invited Speaker. IBC Meeting. Ocular Angiogenesis, Massachusetts Institute of Technology, Boston, MS.

April, 2005. Invited Speaker. The Ninth Annual Vision Research Conference: Imaging the Retina, Ft. Lauderdale, FL.

September 14-16, 2006. Keynote speaker. World Retinopathy of Prematurity Meeting, Vilnius, Lithuania.

February 23-24, 2007. Invited Speaker. Angiogenesis 2007. Miami, Florida.

March 16-18, 2007. Keynote Speaker. Ocular Ischemia Meeting, Vienna, Austria.