Curriculum Vitae for Academic Promotion
The Johns Hopkins University School of Medicine

(Signature) _____ July 19, 2019
Peter L. Gehlbach, M.D., Ph.D.

DEMOGRAPHIC AND PERSONAL INFORMATION

Current Appointments

2000 - Present	Inaugural Maumenee Scholar, Department of Ophthalmology, Wilmer Eye Institute, the Johns Hopkins University School of Medicine, Baltimore, Maryland
2012 - Present	Director, Department of Ophthalmology, Wilmer Eye Institute Echography Center, The Johns Hopkins University School of Medicine, Baltimore, Maryland Active Clinical Staff, full-time, the Johns Hopkins Hospital, Baltimore, Maryland
2014 - Present	Associate Professor Department of Electrical and Computer Engineering, Whiting School of Engineering, the Johns Hopkins University, Baltimore, Maryland
2018 - Present	Professor, Department of Ophthalmology, Retina Division, Wilmer Eye Institute, the Johns Hopkins University School of Medicine, Baltimore, Maryland

Personal Data

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Education and Training

Undergraduate

1978-1982	B.A.	Biology	University of Vermont, Burlington, VT

Doctoral/graduate

1982-1986	M.D.	Medicine	University of Vermont College of Medicine, Burlington, VT
1990-1994	Ph.D.	Cell & Integrative Physiology	University of Minnesota, School of Medicine, Minneapolis, MN (Advisor, Dr. Richard Purple)

Postdoctoral

1986-1987	Intern	General Surgery	University of Health Sciences, Chicago Medical School, Chicago, IL
1987-1990	Resident	General Surgery	University of Health Sciences,

			Chicago Medical School, Chicago, IL
1995-1995	Fellow	Protein Chemistry	Washington University, Saint Louis, MO (Advisor Dr. Carmelo Romano)
1995-1998	Resident	Ophthalmology	Washington University, Saint Louis, MO
1998-1999	Fellow	Medical Retina	Casey Eye Institute, O.H.S.U., Portland, OR
1999-2000	Fellow	Surgical Retina	Casey Eye Institute, O.H.S.U., Portland, OR
2000-2001	Fellow/ Instructor	Retina, Maumenee Clinician-Scientist Scholar	Johns Hopkins University School of Medicine, Baltimore, MD
2003-2004	Certificate	Business of Medicine	Johns Hopkins University, Carey School of Business, Baltimore, MD
2007	Certificate	Business of Science	Kellogg School of Management, Northwestern University, Chicago, IL

Professional Experience

1981-1983	Research Assistant, Department of Medical Microbiology, University of Vermont, College of Medicine, Burlington, VT
1989-1991	Basic Life Support Instructor, Affiliate the Minnesota Life Support Program, Prior certification in Advanced Cardiac Life Support, Advanced Trauma Life Support, Pediatric Life Support, Neonatal Life Support, Minneapolis, MN
1989-1992	Teaching Assistant, Department of Physiology, University of Minnesota School of Medicine, Minneapolis, MN
1991-1994	Research Assistant, University of Minnesota School of Medicine, Minneapolis, MN
1991-1995	Associate Clinical Staff, Department of Emergency Medicine, St. Paul Ramsey Medical Center, St. Paul, MN
1994	Emergency Medicine Clinical Practice, Emergency Medicine Locums: Formerly credentialed at Coastal, N.E.S. and Spectrum, Minneapolis, MN
1994-1995	Staff Physician, Pro Care Urgent Care Centers, Shoreview, MN; Maple Grove, MN; and Elk River, MN
1996-1998	Clinical Staff, Department of Ophthalmology, St. Louis Veterans Administration Medical Center, St. Louis, MO
1998-1999	Retina Section Staff, Department of Ophthalmology, Portland Veterans Administration Medical Center, Portland, OR
1998-2000	Clinical Instructor, Vitreoretinal Diseases and Surgery, Casey Eye Institute, Oregon Health Sciences University, Portland, OR
2000-2001	Instructor, Department of Ophthalmology/Retina, the Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD

2001-2007	Assistant Professor, Department of Ophthalmology/Retina, the Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD
2004-2008	Inaugural Director, Department of Ophthalmology/Retina, the Wilmer Gene Vector Core, Johns Hopkins University, School of Medicine, Baltimore, MD
2007 - 2018	Associate Professor, Department of Ophthalmology/Retina, the Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD
2008 - 2017	Associate Professor, Biomedical Engineering, Whitaker Biomedical Engineering Institute, Johns Hopkins University, Baltimore, MD
2008-2013	Director, Department of Ophthalmology, Retina Fellowship Program, the Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD
2012 - Present	Director, Department of Ophthalmology, Echography Center, the Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD
2014 - Present	Associate Professor, the Department of Electrical and Computer Engineering, Whiting School of Engineering, Johns Hopkins University, Baltimore, MD

PUBLICATIONS

Original Research [OR]

1. **Gehlbach PL**, Purple RL. An electrical artifact associated with the ERG-jet gold foil electrode. Invest Ophthalmol Vis Sci. 1993; 34(8): 2596-9.
2. **Gehlbach PL**, Purple RL, Hallaway PE, Hedlund BE, Schultz LM. Polymer conjugation reduces deferoxamine induced retinopathy in an albino rat model. Invest Ophthalmol Vis Sci 1993; 34(10): 2871-2877.
3. **Gehlbach PL**, Purple RL. Enhancement of retinal recovery by conjugated deferoxamine after ischemia-reperfusion. Invest Ophthalmol Vis Sci 1994; 35: 669-676.
4. **Gehlbach PL**, Purple RL. A paired comparison of the vascular ligation and increased intraocular pressure models of retinal ischemia. Curr Eye Res 1994; 13(8): 597-602.
5. Gurdian SJ, **Gehlbach PL**, Hunyor AP, Robertson JE. Retinal detachment associated with subthreshold retinopathy of prematurity. J. Pediatr Ophthalmol Strabismus 2001; 38(5): 279-83.
6. Mori K, Ando A, **Gehlbach PL**, Nesbit D, Takahashi K, Goldsteen D, Penn M, Chen T, Mori K, Melia M, Phipps S, Moffat D, Brazzell K, Liau G, Dixon KH, Campochiaro PA. Inhibition of choroidal neovascularization by intravenous injection of adenoviral vectors expressing secretable endostatin. Am J Pathol 2001; 159(1): 313-20.
7. Mori K, Duh E, **Gehlbach PL**, Ando A, Takahashi K, Pearlman J, Yang H, Zack D, Ettyreddy D, Brough D, Wei L, Campochiaro PA. Pigment Epithelium-Derived Factor inhibits retinal and choroidal neovascularization. J Cell Physiol 2001; 188: 153-163.
8. Ohno-Matsui K, Hirose A, Yamamoto S, Sakia J, Okamoto N, **Gehlbach PL**, Duh P, Hackett S, Chang M, Bok D, Zak D, Campochiaro PA. Inducible expression of VEGF in adult mice causes severe proliferative retinopathy and retinal detachment. Am J Pathol 2002; 160(2): 711-719.

9. Duh E, Yang H, Suzuma I, Miyagi M, Youngman E, Mori K, Katai M, Yan L, Suzuma K, West K, Davarya S, Tong P, **Gehlbach PL**, Pearlman J, Crabb J, Aiello L, Campochiaro PA, Zak D. Pigment epithelium-derived factor (PEDF) suppresses ischemia-induced retinal neovascularization and VEGF-induced migration and growth. Invest Ophthalmol Vis Sci 2002; 43(3): 821-829.

10. Mori K, **Gehlbach PL**, Ando A, Wahlin K, Gunther V, McVey D, Wei L, Campochiaro PA. Intraocular adenoviral vector-mediated gene transfer is increased in proliferative retinopathies. Invest Ophthalmol Vis Sci 2002; 43(5): 1610-1615.

11. Mori K, **Gehlbach P**, Yamamoto S, Duh E, Zack DJ, Li Q, Berns KI, Raisler BJ, Hauswirth WW, Campochiaro PA. AAV-mediated gene transfer of pigment epithelium-derived factor inhibits choroidal neovascularization. Invest Ophthalmol Vis Sci 2002; 43(6): 1994-2000.

12. Mori K, **Gehlbach P**, Ando A, Dyer G, Lipinsky E, Chaudhry AG, Hackett SF, Campochiaro PA. Retina-specific expression of PDGF-B versus PDGF-A; vascular versus nonvascular proliferative retinopathy. Invest Ophthalmol Vis Sci 2002; 43(6): 2001-2006.

13. Mori K, **Gehlbach PL**, Nishiyama Y, Deguchi T, Yoneya S. The ultra-late phase of indocyanine green angiography for healthy subjects and patients with age-related macular degeneration. Retina 2002; 22(3): 309-316.

14. Mori K, **Gehlbach PL**, Ando A, McVey D, Wei L, Campochiaro P. Regression of ocular neovascularization in response to increased expression of pigment epithelium-derived factor. Invest Ophthalmol Vis Sci 2002; 43(7): 2428-34.

15. **Gehlbach PL,** Demetriades AM, Yamamoto S, Deering T, Xiao WH, Duh EJ, Yang HS, Lai H, Kovesdi I, Carrion M, Wei L, Campochiaro PA. Periocular gene transfer of sFlt-1 suppresses ocular neovascularization and vascular endothelial growth factor-induced breakdown of the blood-retinal barrier. Hum Gene Ther 2003; 14(2): 129-41.

16. **Gehlbach PL**, Demetriades AM, Yamamoto S, Deering T, Duh EJ, Yang HS, Cingolani C, Lai H, Wei L, Campochiaro PA. Periocular injection of an adenoviral vector encoding of pigment epithelium-derived factor inhibits choroidal neovascularization. Gene Ther 2003; 10(8): 637-46.

17. Okoye G, Zimmer J, Sung J, **Gehlbach PL**, Deering T, Nambu H, Hackett S, Melia M, Esumi N, Zack DJ, Campochiaro PA. Increased expression of brain-derived neurotrophic factor preserves retinal function and slows cell death from rhodopsin mutation or oxidative damage. J Neurosci 2003; 23(10): 4164-4172.

18. Takita H, Yoneya S, **Gehlbach PL**, Duh EJ, Wei LL, Mori K. Intraocular gene transfer of pigment epithelium-derive factor protects the retina from ischemic injury by reducing retinal cell apoptosis. Invest Ophthalmol Vis Sci 2003; 44(10): 4497-504.

19. Mori K, **Gehlbach PL**, Sano A, Deguchi T, Yoneya S. A comparison of epiretinal membranes, of differing pathogenesis, using optical coherence tomography. Retina 2004; 24(1): 57-62.

20. Mori K, **Gehlbach PL**, Yoneya S, Shimizu K. Asymmetry of choroidal venous vascular patterns in the human eye. Ophthalmology 2004; 111(3): 507-12.

21. Duh EJ, Ying HS, Haller J, de Juan E, Humayun M, **Gehlbach PL**, Melia M, Pieramici D, Harlan JB, Campochiaro PA, Zack DJ. Vitreous levels of pigment epithelium-derived factor (PEDF) and vascular endothelial growth factor (VEGF): implications for ocular angiogenesis. Am J Ophthalmol 2004; 137(4): 668-74.

22. Imai D, Yoneya S, **Gehlbach PL**, Wei LL, Mori K. Intraocular gene transfer of pigment epithelium-derived factor rescues photoreceptors form light-induced cell death. J Cell Physiol 2005; 202(2): 570-8.

23. Mori K, **Gehlbach PL**, Ito YN, Yoneya S. Decreased arterial dye-filling and venous dilation in the macular choroid associated with age-related macular degeneration. Retina 2005; 25(4): 430-437.

24. Tian J, Ishibashi K, Ishibashi K, Reiser K, Grebe R, Biswal S, **Gehlbach PL**, Handa JT. AGE-induced aging to the rpe/choroid in the d-galactose treated mouse: a comprehensive transcriptional aging response induced by advanced glycation endproducts. Proc Natl Acad Sci U.S.A. 2005; 02(33): 11846-51.

25. Anzai K, Yoneya S, **Gehlbach PL**, Imai D, Wei LL, Mori K. Laser therapy targets and enhances adenovirus vector mediated gene transfer in the rat retina. Invest Ophthalmol Vis Sci 2005; 46(10): 3883-91.

26. Zhang C, **Gehlbach P**, Gongora C, Cano M, Fariss R, Hose S, Nath A, Green WR, Goldberg MF, Zigler JS Jr, Sinha D. A potential role for γ- and β-crystallins in vascular remodeling of the eye. Dev Dyn 2005; 234(1): 36-47.

27. **Gehlbach P**, Hose S, Zhang C, Cano M, Lei B. Barnstable C, Goldberg, MF, Zigler, SJ Jr, Sinha D. Developmental abnormalities in the Nuc1 rat retina: a spontaneous mutation that affects neuronal and vascular remodeling and retinal function. Neuroscience 2006; 137(2): 447-61.

28. Ghazi NG, Dibernardo C, Ying H, Mori K, **Gehlbach PL.** Optical coherence tomography of peripheral retinal lesions in enucleated human eye specimens with histological correlation. Am J Ophthalmol 2006; 141(4): 740-2.

29. Ghazi NG, Dibernardo C, Ying H, Mori K, **Gehlbach PL**. Optical coherence tomography of enucleated human eye specimens with histological correlation: origin of the outer "red line". Am J Ophthalmol 2006; 141(4): 719-726.

30. Ito YN, Ito M, Takita H, Yoneya S, Peyman GA, **Gehlbach PL**, Mori K**.** Transpupillary thermotherapy-induced modification of angiogenesis- and coagulation-related gene expression in the rat posterior fundus. Mol Vis 2006; 20(12): 802-10.

31. Herretes S, Olan Suwan-apichon O, Pirouzmanesh A, Reyes J MG, Broman AT, Cano M., **Gehlbach PL**, Gurewitsch E, Duh EJ, Behrens A. Human amniotic fluid in the treatment of acute ocular alkali burns. Am J Ophthalmol 2006; 142(2): 271-8.

32. Mori K, Saito S, **Gehlbach PL**, Yoneya S. Treatment of stage 2 macular hole by intravitreous injection of expansile gas and induction of posterior vitreous detachment. Ophthalmology 2007; 114(1): 127-33.

33. Ramey NA, Park CY, **Gehlbach PL**, Chuck RS. Imaging mitochondria in living corneal endothelial cells using autofluorescence microscopy**.** Photochem Photobiol 2007; 83(6): 1325-9.

34. Mori K, Yoneya S**, Gehlbach PL**. Choroidal perfusion delay and hyperpermeability in exudative retinal detachment induced by panretinal scatter photocoagulation. Retinal Cases & Brief Reports 2007; 1(2): 68-69.

35. Mori K, Horie K, Kawasaki I, Yoneya S, **Gehlbach PL**, Awata T, Okazaki Y, Satoshi I. Association of the HTRA1 gene variant with age-related macular degeneration in the Japanese population. J Hum Genet 2007; 52(7): 636-41.

36. Demetriades AM, Deering T, Liu H, Lu L, **Gehlbach PL**, Packer JD, Mac Gabhann F, Popel AS, Wei L, Campochiaro PA. Trans-scleral delivery of antiangiogenic proteins. J Ocul Pharmacol Ther 2008; 24(1): 70-9.

37. Ying HS, Symons RCA, Louie K, Solomon SD, **Gehlbach, PL**. Accidental nd:YAG laser-induced choroidal neovascularization. Lasers Surg Med 2008; 40(4): 240-2.

38. Park CY, Chuck RS, Cano M, Yew M, Nguyen V, Parker J, Mori K, **Gehlbach PL**. Periocular triamcinolone enhances intraocular gene expression following delivery by adenovirus. Invest Ophthalmol Vis Sci 2008; 49(1): 399-406.

39. Mori K, **Gehlbach PL**, Kabasawa S, Kawasaki I, Oosaki M, Iizuka H, Awata T, Yoneya S. Coding and noncoding variants in the CFH gene and cigarette smoking influence the risk of age-related macular degeneration in a Japanese population. Invest Ophthalmol Vis Sci 2007; 48(11): 5315-9.

40. Castro-Combs J, Noguera G, Cano M, Yuw M, **Gehlbach PL**, Behrens A. Corneal reepithelization is modulated by topical application of amniotic fluid in an ex-vivo organ culture model. Exp Eye Res 2008; 87(1): 56-63.

41. Park CY, Zhuang W, Lekhanont K, Zhang C, Cano M, Lee Woo-Seok, **Gehlbach P**, Chuck R. Lacrimal gland inflammatory cytokine gene expression in the botulinum toxin b-induced murine dry eye model. Mol Vis 2007; 13(29): 2222-32.

42. Cano M, Reyes J, Park CY, Gao X, Mori K, Chuck RS, **Gehlbach PL**. Sulphoraphane inhibits redox fluorometry shifts in retinal pigment epithelium cells following oxidative challenge. Invest Ophthalmol Vis Sci 2008; 49(6): 2602-12.

43. Takita H, Yoneya S, **Gehlbach PL**, Wei LL, Mori K. An Empty $E1^-$, $E3^-$, $E4^-$ Adenoviral vector protects photoreceptors from light-induced degeneration. J Ocul Biol Dis Inform 2008; 1(1): 30-6.

44. Cano M, **Gehlbach PL**. PPAR-α Ligands as Potential Therapeutic Agents for Wet Age-Related Macular Degeneration. PPAR Research 2008; Article ID 821592: 1-5.

45. Chen P, Hamilton M, Kroeger K, Carrion M, MacGill RS, Reiter C, Campochiaro PA, **Gehlbach P**, Brough DE, Wei L, King CR, Bruder JT. Persistent expression of pedf in the eye using high-capacity adenovectors. Mol Ther 2008; 16(12): 1986-94.

46. Cano M, Karagiannis ED, Soliman M, Bakir B, Zhuang W, Popel AS, **Gehlbach PL**. A peptide derived from type 1 thrombospondin repeat-containing protein wisp-1 inhibits corneal and choroidal neovascularization. Invest Ophthalmol Vis Sci 2009; 50(8): 3840-5.

47. Park CY, Kohanim S, Zhu L, **Gehlbach PL**, Chuck RS. Immunosuppressive property of dried human amniotic membrane. Ophthalmic Res 2009; 41(2): 112-3.

48. Shin YJ, Nishi Y, Engler C, Kang J, Hashmi S, Jun AS, **Gehlbach PL**, Chuck RS. The effect of phacoemulsification energy on the redox state of cultured human corneal endothelial cells. Arch Ophthalmol 2009; 127(4): 435-41.

49. Iordachita I, Sun Z, Balicki M, Kang JU, Phee SJ, Handa J, **Gehlbach P**, Taylor R.

A sub-millimetric, 0.25 mN resolution fully integrated fiber-optic force-sensing tool for retinal microsurgery. Int J Comput Assist Radiol Surg. 2009 Jun; 4(4):383-90.

50. Sun Z, Balicki M, Kang J, Handa J, **Gehlbach P**, Taylor R, and Iordachita I. A Sub-Millemetric, 0.25 mN Resolution Fully Integrated Fiber-Optic Force Sensing Tool for Retinal Microsurgery. Int J Comput Assist Radiol Surg. 2009; 4(4): 383–390.

51. **Gehlbach P**, Li T, Hatef E. Statins for age-related macular degeneration. Cochrane Database Syst Rev 2009; 8(3): CD006927.

52. Balicki M, Taylor R, Han JH, **Gehlbach P**, Handa J, Iordachita I. Single fiber optical coherence tomography microsurgical instruments for computer and robot-assisted retinal surgery. Med Image Comput Assist Interv 2009; 12(Pt 1): 108-115. (**Best CAI Paper Award**)

53. Balicki M, Uneri A, Iordachita I, Handa J, **Gehlbach P**, Taylor R. Micro-force sensing in robot assisted membrane peeling for vitreoretinal surgery. Med Image Comput Comput Assist Interv. Med Image Comput Comput Assist Interv 2010; 13(Pt 3): 303–310. (**Runner-up for best medical robotics paper**)

54. Park CY, Yang SH, Chuck RS, **Gehlbach PL**, Park CG. The role of indoleamine 2, 3 dioxygenase in retinal pigment epithelial cell mediated immune modulation. Ocul Immunol Inflamm 2010; 18(1): 24-31.

55. Mori K, Horie-Inoue K, **Gehlbach PL**, Takita H, Kabasawa S, Kawasaki I, Ohkubo T, Kurihara S, Iizuka H, Miyashita Y, Katayama S, Awata T, Yoneya S, Inoue S. Phenotype and genotype characteristics of age-related macular degeneration in a Japanese population. Ophthalmology 2010; 117(5): 928-38.

56. Wu T, Fujihara M, Tian J, Jovanovic M, Grayson C, Cano M, **Gehlbach P**, Margaron P, Handa JT. Apolipoprotein b100 secretion by cultured arpe-19 cells is modulated by alteration of cholesterol levels. J Neurochem. 2010; 114(6): 1734-44.

57. Shin YJ, Tata DB, Waynant RE, **Gehlbach PL**, Chuck RS. Fluorometric determination of the redox state and distribution of mitochondria in human malignant glioblastoma cells grown on different culturing substrates. Photomed Laser Surg 2010; 28 Suppl 1: S105-10.

58. Sznitman R, Rother D, Handa J, **Gehlbach P**, Hager GD, Taylor R. Adaptive multispectral illumination for retinal microsurgery. Med Image Comput Assist Interv 2010; 13(Pt 3): 465-72.

59. Tsuchihashi T, Mori K, Horie-Inoue K, **Gehlbach PL**, Kabasawa S, Takita H, Ueyama K, Okazaki Y, Inoue S, Awata T, Katayama S, Yoneya S. Complement factor h and high-temperature requirement a-1 genotypes and treatment response of age-related macular degeneration. Ophthalmology. 2011; 118(1): 93-100.

60. Kang JU, Han J-H, Liu X, Zhang K, Song CG, **Gehlbach P**. Endoscopic functional fourier domain common path optical coherence tomography for microsurgery. IEEE J of Sel Top in Quantum Electron 2010; 16(4): 781-792.

61. Utine CA, **Gehlbach PL**, Zimmer-Galler I. Akpek E. Permanent keratoprosthesis combined with pars plana vitrectomy and silicone oil injection for visual rehabilitation of chronic hypotony and corneal opacity. Cornea 2010; 29(12): 1401-5.

62. Uneri A, Balicki MA, Handa J, **Gehlbach P**, Taylor RH, Iordachita I. New steady-hand eye robot with micro-force sensing for vitreoretinal surgery. Proc IEEE RAS EMBS Int Conf Biomed Robot Biomechatron 2010; 2010(26-29): 814–819.

63. Imai D, Mori K, Horie-Inoue K, **Gehlbach PL**, Awata T, Inoue S, Yoneya S. CFH, VEGF, and PEDF genotypes and the response to intravitreous injection of bevacizumab for the treatment of age-related macular degeneration. J Ocul Biol Dis Infor 2010; 3(2): 53-9.

64. Sznitman R, Basu A, Richa R, Handa J, **Gehlbach P**, Taylor RH, Jedynak B, Hager GD. Unified detection and tracking in retinal microsurgery. Med Image Comput Assist Interv

2011; 14(Pt 1): 1-8**.** (**Runner-up for best paper in medical robotics and CAI systems**).

65. Kabasawa S, Mori K, Horie-Inoue K, **Gehlbach PL**, Inoue S, Awata T, Katayama S, Yoneya S. Associations of cigarette smoking but not serum fatty acids with age-related macular degeneration in a Japanese population. Ophthalmology 2011; 118(6): 1082-8.

66. Paskowitz DM, Nguyen QD, **Gehlbach P**, Handa JT, Solomon S, Stark W, Shaikh O, Semba C, Gadek TR, Do DV. Safety, tolerability, and bioavailability of topical SAR 1118, a novel antagonist of lymphocyte function-associated antigen-1: a phase 1b study. Eye (Lond) 2012; 26(7): 944-9.

67. Kang JU, Huang Y, Zhang K, Ibrahim Z, Cha J, Lee WP, Brandacher G, **Gehlbach PL**. Real-time three-dimensional Fourier-domain optical coherence tomography video image guided microsurgeries. J Biomed Opt 2012; 17(8): 081403-1.

68. Dokey A, Ramulu PY , Utine CA, Tzu JH, Eberhart CG, Shan S, **Gelhbach PL**, Akpek EK. Chronic hypotony associated with Boston type I keratoprosthesis**.** Am J Ophthalmol 2012; 154(2): 266-271.

69. **Gehlbach P**, Li T, Hatef E. Statins for age-related macular degeneration. Cochrane Database Syst Rev 2012; 14(3): CD006927.

70. Sunshine S, Balicki M, He X, Olds K, Kang JU, **Gehlbach P**, Taylor R, Iordachita I, Handa JT. A force-sensing microsurgical instrument that detects forces below human tactile sensation. Retina 2013; 33(1): 200-6.

71. Gonenc B, Balicki MA, Handa J, **Gehlbach P**, Riviere CN, Taylor RH, and Iordachita I. Evaluation of a micro-force sensing handheld robot for vitreoretinal surgery. Rep U S 2012; 2012: 4125–4130.

72. Cutler N, Balicki M, Finkelstein M, Wang J, **Gehlbach P**, McGready J, Iordachita I, Taylor R, Handa JT. Auditory force feedback substitution improves surgical precision during simulated ophthalmic surgery. Invest Ophthalmol Vis Sci 2013; 54(2): 1316-24.

73. **Gehlbach PL**, Chuck RS, Park CG, Yong Park C. Viral transgene expression delivered by repeat intraocular adenoviral vector injection: in vivo live imaging study. Mol Imaging 2012; 11(5): 361-71.

74. Mori K, Kanno J, **Gehlbach PL**, Yoneya S. Montage images of spectral-domain optical coherence tomography in eyes with idiopathic macular holes. Ophthalmology 2012; 119(12): 2600-8.

75. Song C, **Gehlbach PL**, Kang JU. Active tremor cancellation by a "smart" handheld vitreoretinal microsurgical tool using swept source optical coherence tomography. Opt Express 2012; 20(21): 23414-21.

76. Song C, **Gehlbach PL**, Kang JU. Ball lens fiber optic sensor based smart handheld microsurgical instrument. Proc. of SPIE Int Soc Opt Eng. 2013; 8576: 857601-9.

77. Sophie R, Hafiz G, Scott AW, Zimmer-Galler I, Nguyen QD, Ying H, Do DV, Solomon S, Sodhi A, **Gehlbach P**, Duh E, Baranano D, Campochiaro PA. Long-term outcomes in ranibizumab-treated patients with retinal vein occlusion: the role of progression of retinal nonperfusion. Am J Ophthalmol 2013; 156(4): 693-705.

78. Song C, Park DY, **Gehlbach PL**, Park SJ, Kang JU. Fiber-optic OCT sensor guided "SMART" micro-forceps for microsurgery. Biomedical Optics Express 2013; 4(7): 1045-1050.

79. Gonenc B, Handa J, **Gehlbach P**, Taylor RH, Iordachita I. Design of 3-DOF force sensing micro-forceps for robot assisted vitreoretinal surgery. Conf Proc IEEE Eng Med Biol Soc. 2013; 2013: 5686–5689.

80. Liu X, Yong H, **Gehlbach P**, Kang JU. Freehand OCT with real-time lateral motion tracking. Progress in Biomedical Optics and Imaging - Proceedings of SPIE 2013; 85711: 1-6.

81. Balicki M, Richa R, Vagvolgyi B, Kazanides P, **Gehlbach P**, Handa J, Kang J, Taylor R. Interactive OCT annotation and visualization for vitreoretinal surgery. Augmented Environments for Computer-Assisted Interventions. Lecture Notes in Computer Science 2013; 7815: 142-152.

82. Wells TS, Yang S, MacLachlan RA, Handa JT, **Gehlbach P**, Riviere C. Comparison of baseline tremor under various microsurgical conditions. Conf Proc IEEE Int Conf Syst Man Cybern 2013; 2013: 1482–1487.

83. Gonenc, B, Handa J, **Gehlbach P**, Taylor RH, Iordachita I. A comparative study for robot assisted vitreoretinal surgery: micron vs. the steady-hand robot. IEEE Int Conf Robot Autom 2013; 2013: 4832–4837.

84. He X, Balicki M, **Gehlbach P**, Handa J, Taylor RT, Iordachita I. A novel dual force sensing instrument with cooperative robotic assistant for vitreoretinal surgery. IEEE Int Conf Robot Autom 2013; 2013: 213–218.

85. He X, Handa J**, Gehlbach P**, Taylor R, Iordachita I. A sub-millimetric 3-DOF force sensing instrument with integrated fiber Bragg grating for retinal microsurgery. IEEE Trans Biomed Eng 2014; 61(2): 522–534.

86. Gonenc B, Feldman E, **Gehlbach P**, Handa J, Taylor RH, Iordachita I. Towards robot-assisted vitreoretinal surgery: Force-sensing micro-forceps integrated with a handheld micromanipulator. IEEE Int Conf Robot Autom 2014; 2014: 1399–1404.

87. He X, Balicki M, **Gehlbach P**, Handa J, Taylor R, Iordachita I. A multi-function force sensing instrument for variable admittance robot control in retinal microsurgery. IEEE Int Conf Robot Autom 2014; 2014: 1411–1418.

88. Ueyama K, Mori K, Shoji T, Omata H, **Gehlbach PL**, Brough DE, Wei LL, Yoneya S. Ocular localization and transduction by adenoviral vectors and serotype-dependent and can be modified by inclusion of RGD fiber modifications. PLOS One 2014; 9(9): e108071.

89. Gonenc B, **Gehlbach P**, Handa J, Taylor RH, Iordachita I. Motorized force-sensing micro-forceps with tremor cancelling and controlled micro-vibrations for easier membrane peeling. Proc IEEE RAS EMBS Int Conf Biomed Robot Biomechatron 2014; 2014: 244–251.

90. He X, **Gehlbach P**, Handa J, Taylor R, Iordachita I. Development of a miniaturized 3-DOF force sensing instrument for robotically assisted retinal microsurgery and preliminary results. Proc IEEE RAS EMBS Int Conf Biomed Robot Biomechatron 2014; 252–258.

91. Ahmad S, Akpek EK, **Gehlbach PL**, Dunlap K, Ramulu PY. Predictors of visual outcomes following Boston type 1 keratoprosthesis implantation. Am J Ophthalmol 2015; 159(4): 739-747.

92. Gyeong WC, Yong H, Hye RK, Ki-Young K, Taylor RH, **Gehlbach PL**, Kang JU. Injection-depth-locking axial motion guided handheld micro-injector using CP-SSOCT. Conf Proc IEEE Eng Med Biol Soc 2014; 2014: 6163-6166.

93. He X, **Gehlbach P**, Handa J, Taylor R, Iordachita I. Toward robotically assisted membrane peeling with 3-DOF distal force sensing in retinal microsurgery. Conf Proc IEEE Eng Med Biol Soc. Conf Proc IEEE Eng Med Biol Soc 2014; 6859–6863.

94. Gupta A, Gonenc B, Balicki M, Olds K, Handa J, **Gehlbach P**, Taylor RH, Iordachita I. Human eye phantom for developing computer and robot-assisted epiretinal membrane peeling. Conf Proc IEEE Eng Med Biol Soc 2014; 2014: 6864–6867.

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Abstracts

Peer Reviewed and Published Abstracts, also Presented at National and International Meetings as Formal, Full Length Posters with Subject Expert, Moderated Discussions.

1. Z. Li, M. Shahbazi, N. Patel, E. O. Sullivan, P. Chalasani, H. Zhang, K. Vyas, A. Deuget, P. L. Gehlbach, I. Iordachita, G.-Z. Yang, and R. H. Taylor, "An Image-Based Control Framework for Teleoperated Semi-Autonomous Retina Endomicroscopy Scanning." International Symposium of Medical Robotics (ISMR), Atlanta, Georgia, April 4-5, 2019 (Best Poster Award).

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Schauer BA, Purple RL, **Gehlbach PL**. *Retinal Toxicity of the Iron Chelator L1™ in an Albino Rat Model.* Submitted as a final report to Ciba-Geigey, Inc., March 1994.

Extramural Sponsorship

Current Grants:

04/01/17 – 03/31/20	Enabling Technology for Safe Robot-assisted Surgical Micromanipulation RO-1 National Institute of Biomedical Imaging and Technology Total Direct Costs: $1,120,358 Role: Co-Investigator, Percent effort: 4.2% in year one; 8.4% in year two and three.

Previous Grants:

1992	Funding to Determine the Potential Ocular Toxicity of the Oral Iron Chelator, L1. Biomedical Frontiers, Inc. Ciba-Geiger, Co-PI.
1992	Funding for the Study of Ischemia/Reperfusion Injury in the Cat Retina. Minnesota Medical Foundation, Co-PI.
1993	Development of Techniques that Augment G.I. Motility. Co-PI. North Star Research Foundation Grant.
2001-2002	Molecular Biology of Endogenous Inhibitors of Angiogenesis in Retinopathy of Prematurity. Knights Templar Eye Foundation, Inc. Direct Cost: $30,000. Role: PI, 10% effort
1/1/01-11/30/04	Treatment of Ocular Neovascularization by Gene Transfer. File #10-2001-412. Juvenile Diabetes Research Foundation International. Ford Motor Company Truck Plant Advanced Postdoctoral Research Fellowship. Direct Cost: $180,000. Role: PI, Equipment grant
4/1/01– 3/31/06	Treatment of Ocular Neovascularization by Increased Expression of Endogenous Inhibitors. NIH, EY13420. Direct Cost: $988,000. Role: PI, Percent effort: 90%
2002-2003	Electroretinography Equipment Grant Alexander and Margaret Stewart Trust Total Direct Cost: $25,000 Role: PI, Equipment grant
2002– 2003	Technology Development Grant for Studies Relating to the Development of Adenovirus Vectors for the Purpose of Inhibiting Ocular Neovascularization. GenVec, Inc. Direct Cost: $30,000 Role: PI, Percent effort: <10%
7/01/03 – 6/30/05	Thrombospondin 1 Transgenic Mouse in Models of Ocular Neovacularization. Alexander and Margaret Stewart Trust Direct Cost: $25,000 Role: PI, Animal costs grant
7/1/03 – 6/30/05	Evaluation of Gutted Adenovirus Vectors Containing Pigment-Epithelium Derived Factor. Alexander and Margaret Stewart Trust Total Direct Cost: $50,000

	Role: PI, Percent effort <10% Supported vector development costs
7/1/03 – 6/30/07	Gutted Adenovirus Vector Gene Transfer in Ocular Neovascularization. Research to Prevent Blindness Career Development Award (competitive). Total Direct Cost: $150,000. Role: Principal Investigator, Percent effort 20%
2005-2006	Gene Therapy Approaches to Retinitis Pigmentosa.William Weiss Award Direct Cost: $8,500 Role: PI, Percent effort 2%
2005-2006	Age Related Macular Degeneration. Jack and Gail Baylin Philanthropic Fund Direct Cost: $6,655 Role: PI, Percent effort 2%
4/1/05-3/31/07	Advanced Glycation Endproduct medicated Cholesterol deposition in Bruch's membrane Of APoB100+/+LDLR-/-Mice. American Health Assistance Foundation Macular Degeneration Research. Direct Cost: $99,545. Role: Co-PI. Percent effort 10%
7/1/05-6/30/07	Wilmer Gene Therapy Vector Core. Wilmer Eye Institute. Total Direct Cost: $1,500,000 Role: Director, Percent effort 30%
7/1/05-6/30/07	Uncovering a Novel Indication for Atorvastatin: Delaying the Progression of Age-related Macular Degeneration. Pfizer Atorvastatin Research Awards Program. Direct Cost: $50,000. Role: PI, Percent effort 5%
9/27/05 – 6/30/07	Collaborative Noninvasive Molecular Imaging and Ocular and CNS Gene Therapy. Funds for Medical Discovery Direct Cost: $50,000 Role: PI, Percent effort 2%
7/1/05 – 6/30/07	Corneal Gene Therapy and Fibroblast Biology Wilmer Eye Institute Vector Core Total Direct Cost: $500,000. Role: PI, Percent effort 10%
7/1/07-6/30/08	Antiangiogenic Peptides for Treatment of Prevalent Ocular Diseases Fight for Sight Direct Costs: $20,000. Awardee: Cano M, Mentor/PI Gehlbach P, Percent effort 2%
1/1/2007 – 2009	Early Treatment of Macular Degeneration. QLT Corporation. Vancouver, B.C. Canada Direct Costs: $1,450,000. Role: Co-PI, Percent effort 5%

12/5/12	Low Cost and Retinal Portable Imager NIH, STTR (phase II) Application EY020318 Direct Costs: (JHU Subcontract): $327,869 Status: Awarded to Vasoptic Role: Co-Investigator (Co-PIs, Dr. Thakor, Nitish & Dr. Regae, Abishek) Percent Effort: 7%
7/1/08 – 6/30/13	A Microsurgical Assistant System, RO1 EB007969-01A1 National Institutes of Health Direct Cost: $3,747,342 Role: Co-Investigator, Percent Effort: 7% PI: Taylor, Russell
9/91/11 – 8/31/13	Low Cost Retinal Imagers for Early Detection of Diabetic Retinopathy Coulter Foundation Grant Direct Costs: $150,000, Role: Primary Clinician Investigator, Percent effort: 13%
08/01/11 – 07/31/16	OCT-Guided Free-hand Semi-automated Microsurgical Tools for Enhanced Retinal Surgery RO1EY021540-01A1 National Eye Institute Total Direct Costs: $1,125,000 Role: Co-PI (Clinician project leader) Percent effort: 17% No cost extension to 7/31/17
09/01/16 - 06/30/17	SMART Surgical Tools: Optical Coherence Sensor Guided Microsurgical Tools with Enhanced Surgical Functions Maryland TEDCO Maryland Innovation Initiative Total Direct Costs: $100,000 Role: Co-Investigator, Percent effort: 10%
07/01/16 – 06/30/17	Optical Coherence Tomography Image and Sensor Guided Microsurgical Tools with Enhanced Surgical Functions Coulter Foundation Grant Total Direct Costs: $90,000 Role: Co-PI, Percent effort: 10%

Research Program Building/Leadership

2005-2007	Director Wilmer Gene Therapy Center: Directed founding operational activity including CRB2 space development, equipment ordering/installation/testing, negotiating access to vector technology, developing a vector inventory, training staff and establishing a core function for producing custom adenovirus, recombinant adeno associated virus and lenti virus, gene therapy vectors for the broader Johns Hopkins Research Community.
2007- Present	Clinician expert/ophthalmology liaison: between the Wilmer Eye Institute and the Whiting School of Engineering. Jointly appointed

and funded in both areas with continuous bridging research programs in ophthalmological microsurgical tool development.

EDUCATIONAL ACTIVITIES

Educational Publications

Teaching (Classroom Instruction)

1998-1999	Moderator Casey Eye Institute Fluorescein Angiography Conference, Weekly presentations to Ophthalmology Residents and Fellows, Casey Eye Institute, Oregon Health Sciences University, Portland, OR.
2001-2012	Attending Faculty, Vitreoretinal Fellows Bimonthly Surgical Retina Teaching Conference, (Monthly participant). The Wilmer Eye Institute, Johns Hopkins School of Medicine, Baltimore, Maryland
April 2002	Instructor, Surgical Management of PDR, April 2002, Ophthalmology Residents, Wilmer Eye Institute, the Johns Hopkins University School of Medicine, Baltimore, Maryland.
2004-2005	Year 2 Medical School Students: -Nonproliferative Diabetic Retinopathy, Proliferative Diabetic Retinopathy, -"Dry" Age Related Macular Degeneration, - "Wet" Age Related Macular Degeneration, -Ocular Manifestations of HIV. (5 topics, one day of lecture) The Johns Hopkins University School of Medicine, Baltimore, Maryland.
2004-2005	Undergraduate Biomedical Engineering Project Co-Adviser: Innovative Clinician Unlimited (ICU), Team Leader: Blanka Sharma. Department of Biomedical Engineering, Johns Hopkins University; Result: Winner the North American Title in the business plan competition. Finalist: the International Competition. Whitaker Biomedical Engineering Institute.
2005-2006	Design Principles in Cervical Spine Systems Team Adviser: Undergraduate Biomedical Engineering students, Team 6. Design and engineering of therapeutic cervical spine systems: Undergraduate Biomedical Engineering, Johns Hopkins University, winter and spring academic sessions. Result: Patent through Whitaker Biomedical Engineering Institute. Invited member, the panel of judges for the B.M.E. Design Team Projects 2006-07.
2005-2008	Basic Science Lectures: Year 1 Medical Students: Human Gross Anatomy Course. "Ocular Anatomy", the Center for Functional Anatomy and Evolution. Clinical Case Studies and Anatomical Correlations. Johns Hopkins University School of Medicine, Baltimore, Maryland.
2005-2012	Ophthalmology Residents Lecture Series: "Proliferative Retinopathy" Wilmer Eye Institute, the Johns Hopkins University School of Medicine, Baltimore, Maryland.
2007 - Present	Year 3-4 Medical Students: Clinical rotation in Ophthalmology. Retina Experience: Wilmer Retina Clinics.

2009-2010	Improved Ocular Medication Delivery System Team Adviser: Undergraduate Biomedical Engineering students, Design and engineering of therapeutic eye drop systems: Undergraduate Biomedical Engineering, Johns Hopkins University, winter and spring academic sessions. Result: Report of Invention, BME stipend award winner.
2009-2011	Biomedical Engineering Student Design Day 2010; May 4, 2010 Fool-proof Eye Dropper**:** Co- Sponsors: Dr. Peter Gehlbach, Dr. Michael Boland, Department of Ophthalmology. First Place Finish in the Design Day competition.
2013	Year 2 Medical School Students: -Nonproliferative Diabetic Retinopathy, Proliferative Diabetic Retinopathy. The Johns Hopkins University School of Medicine, Baltimore, Maryland Director.

Teaching (Clinical Instruction):

2001-2008	Medical Students, Clinical Skills Course, (3 hours) each year .The Wilmer Eye Institute, Johns Hopkins University School of Medicine, Baltimore, Maryland. In Clinic Experience: Medical Student rotation.
2001 - Present	Clinical preceptor, Medical Student Clinic Experience: Near weekly one day experiences for third year and fourth year medical students. Medical students interested in Ophthalmology as specialty frequently rotate for a two to four week period to earn letters of recommendation.
2001 - Present	Clinical preceptor, weekly vitreoretinal clinic, one half to two full days per week of instruction to vitreoretinal fellows, ophthalmology residents and visiting retina practitioners from around the world. Wilmer Eye Institute, Johns Hopkins Hospital, Johns Hopkins University School of Medicine, Baltimore, Maryland.
2008-2013	Vitreoretinal Fellows: Director the Wilmer Eye Institute Vitreoretinal Fellowship Education Program
2010 - Present	**Course Type: Retina** Clinical Clerkship (& Basic Research) Department/Division: Ophthalmology/Retina Course Director: Dr. Peter Gehlbach Telephone Number: 410-502-3494 or 410-502-0782 Faculty: Dr. Gehlbach Availability/Duration: One student each semester; 4½ weeks Prerequisites: Completion of basic sciences portion of an approved medical school program; an interest in ophthalmology, retina, or vision science as a career. Drop Period: 2 months Description: Exposure to medical and surgical retina practice and retina research. There will be assigned readings and a retina related

project that will contribute to a publication level document. Visitation to the retina laboratory where in vitro and in vivo work related to retinal disease is on-going and will be incorporated into the experience.

Teaching (Surgical Instruction):

2001- Present	Clinical preceptor, Attending teaching surgeon: Weekly, surgical technique and decision making in vitreoretinal surgery, The Wilmer Operating Rooms, (1.0 days per week intra-operative experience for retina fellows and ophthalmology residents with associated preoperative and postoperative supervision). The Wilmer Eye Institute Operating Rooms, Johns Hopkins University School of Medicine, Baltimore, Maryland
2006 - Present	Clinical preceptor, Attending teaching surgeon: *only in years without an ACS Retina trained Chief Assistant Chief of Service*. Serves on average one day every other month as teaching ACS vitreoretinal surgeon for the ophthalmology resident service. The Wilmer Eye Institute Operating Rooms, Johns Hopkins University School of Medicine, Baltimore, Maryland.
2001 – Present	Attending teaching surgeon on call: One week every other month. Responsibility: Supervision of emergency and surgical care of vitreoretinal patients with vitreoretinal fellows and ophthalmology residents. The Wilmer Eye Institute Operating Rooms, Johns Hopkins University School of Medicine, Baltimore, Maryland.
2009 - Present	Biomedical Engineering Masters Program; Ophthalmological Clinical Needs Assessment Phase of Thesis Development. (4) Biomedical Engineering masters students in clinic and OR for two week periods with needs assessment guidance and mentoring. July-August, 2009.
2009 - Present	Marybeth Camerer (Academic Program Manager).
2009 – 2017	Biomedical Engineering Undergraduate Program; Ophthalmological Clinical Needs Assessment Phase of project development (4-6 students) and with successful projects: Biomedical Engineering undergraduate students in clinic, laboratory and OR for a one year period with guidance and mentoring on their annual project. In the last year I served as the clinical PI on two design teams. Team 14 is developing a novel approach to the complicated intraocular lens; and Team 2 is developing novel approaches to the eye with hypotony.
2014	CBID (Center for Bioengineering Innovation & Design) Graduate Student Elective Rotation – Ophthalmology with observation in the operating theater. July 21-25, 2014. Aaron Chang and Kraitat Mairin

Teaching: (Laboratory Instruction):

2003-2008	Marisol Cano, Ph.D. Post-doctoral Research Fellow Department of Ophthalmology: Ocular Angiogenesis, Ocular Oxidative Injury. (2004-2005 Knights Templer Award Winner; 2006-2007, Susan Bressler Research Award Winner; 2007-2008, Fight for Sight Research Award, 2008, Sheila West Research Grant Award Winner)
2004-2005	Johns Hopkins University Undergraduate Research Program for Academic Credit, Department of Biophysics: Fall Semester 2004 - Spring Semester 2005 (Brian Lee, entered private industry)
2005-2006	Johns Hopkins University Undergraduate Research Program for Academic Credit, Department of Biophysics: Fall Semester 2005 – spring and Fall Semester 2006. (Viet Nguyen) (Entered U.T.S.W. Medical School, Dallas Texas)
2005-2007	Choul Park, M.D., Ph.D. Post-doctoral Research Fellow Department of Ophthalmology: Retinal Pigment Epithelial Biology and Gene Therapy in Molecular Imaging of the Eye. (Samsung Award winner; Fund for Medical Discovery participant)
2006-2007	Juan Miguel Castro, M.D. Post-doctoral Research Fellow Department of Ophthalmology: Corneal Gene Therapy and Fibroblast Biology. 2005-2007 (Peter Gehlbach Research Award Winner via Walter J. Stark committee)
2007-2008	Elham Hatef, M.D. Post-doctoral research Fellow Department of Ophthalmology: Molecular Genetics and Epidemiology of the Marfan syndrome In Ocular Disease. 2007-2008. (Marfan Foundation Award Winner, 2007-2008)
2007	Carlo Salvarani Johns Hopkins University Undergraduate Research Program for Academic Credit, Department of Behavioral Biology: Spring Semester 2007
2008	Belal Bakir, the University of Maryland. Visiting Medical Student Laboratory Rotation Angiogenesis and Gene Therapy, returning for full postdoctoral fellowship research year 2008-2009
2007-2008	Ian Pitha, M.D., Ph.D., Collaborative Advisor. Dartmouth University Post-doctoral Research Fellow. Department of Pharmacology, Dartmouth University, Hanover, NH. (Research Year in the Laboratory of Dr. Michael Sporn.)
2007-2008	Navin Gupta, M.D. Post-doctoral Research Fellow: Gene Therapy Approached to Proliferative Vitreoretinopathy. (2008 Julia A Haller Research Grant Award winner)–Accepted at the University of California, Department of Ophthalmology Postdoctoral research and retina clinical fellowship.
2007-2008	Mohamed Soliman, M.D., Post-doctoral Research Fellow: Antiangiogenic Properties of de Novo Peptides Synthesized by a Bioinformatics-based Methodology. (2008 A. Edward Maumenee Research Grant Award winner). -Matched at Strong Hospital Internal Medicine Residency Program, an affiliate of Princeton University.

2016 - Present — Jeremy Chae, D.V.M., Ph.D., Post-doctoral Research Fellow: Animal Models of Eye Disease, Surgical Approaches.

Teaching (Laboratory Course Offerings):

2004-2007 — **Course Title: Gene Therapy: Vector Construction and Preclinical Application**

Course Type: basic research/laboratory tutorial

Department/Division: Ophthalmology

Course Directors: Dr. Peter Gehlbach

Faculty: Dr. Peter Gehlbach and Laboratory Associates

Description: The Wilmer Gene Therapy Vector Core, under the direction of Peter Gehlbach, M.D., Ph.D. is offering a research elective intended to expose students to the basics of construction and use of viral vectors for gene transfer. Exposure to techniques involving creation of adenovirus, rAAV and lentivirus vectors as well as the use of SiRNA and ShRNA is possible. Instruction on the use of vectors *in vitro* and in animal models of disease is available. The elective can span one or more academic periods. Each student will learn the basics of vector production and will be assigned a mentor for the preclinical application portion of the course. Completion of the assigned project should be at a level that may merit inclusion in publication, in a scholarly journal.

Availability/Duration: Each Semester; summer experience is sometimes open but should be arranged in advance. Prerequisite(s): A biology course with a lab experience. Molecular biology and cell biology are helpful but not mandatory.

Drop Period: 1 month; **Prior students: Carlos Salvarini, Viet Nguyen**

2004-2007 — **Course Title: Gene Therapy: Models of Ocular Disease**

Course Type: Basic and preclinical research

Department/Division: Ophthalmology

Course Directors: Dr. Peter Gehlbach

Faculty: Dr. Peter Gehlbach and Laboratory Associates

Description: The Wilmer Retina Service is offering a research elective intended to expose students to the basics of using *in vitro* models and animal models of ocular disease to the study of blinding eye conditions. A particular emphasis is placed on understanding the processes of angiogenesis, vasculogenesis, oxidative injury, AGE formation and other important aspects of ocular disease development. The elective can span one or more academic periods. Each student will be assigned a project and will work with a mentor to complete this assignment at a level that may merit inclusion in publication, in a scholarly journal. Availability/Duration: Each

Semester, summer experience may be available but must be arranged through the course director in advance.

Prerequisite(s): A biology course with laboratory. Molecular biology and cell biology are helpful but not required. Prior students: Brian Lee.

Continuing Medical Education Instruction

2001 **Gehlbach PL** (Invited Speaker) JHU Continuing Medical Education. Gene Therapy Update: Retinal and Choroidal Neovascularization. Current Concepts in Ophthalmology. Baltimore, MD. December 6, 2001.

2005 **Gehlbach PL** (Invited Speaker) JHU Continuing Medical Education Course on Diabetic Retinopathy and Venous Occlusive Disease "What's New in Diabetic Retinopathy and Venous Occlusive Disease" Persistent Diabetic Macular Edema: What is OCT Telling Us? Turner Auditorium, Johns Hopkins University School of Medicine, Friday, October 28, 2005.

2006 **Gehlbach PL** (Invited Moderator and Discussant) JHU Continuing Medical Education Course Update on Age-related Macular Degeneration "Neovascular AMD" Turner Auditorium, Johns Hopkins University School of Medicine. May 13, 2006.

2006 **Gehlbach PL** (Invited Moderator and Panelist) JHU Continuing Medical Education Course: What's New in Diabetic Retinopathy and Venous Occlusive Disease? Turner Auditorium. Johns Hopkins University School of Medicine. November 3, 2006.

2007 **Gehlbach PL** (Invited Speaker) Continuing Medical Education. Geographic Atrophy-Treatments on the Horizon: "Macula 2007". Turner Auditorium, Johns Hopkins University School of Medicine. January 13, 2007.

2007 **Gehlbach PL** (Invited Speaker) Continuing Medical Education. What's New in Diabetic Retinopathy and Venous Occlusive Disease? Vector Mediated Treatments: Could It Apply to Diabetic Retinopathy? Thomas B. Turner Auditorium, Johns Hopkins University School of Medicine, Baltimore, MD. October 12, 2007.

2008 **Gehlbach PL** (Invited Speaker) Continuing Medical Education. Age-Related Macular Degeneration in 2008, New Answers and New Questions, May 17, 2008. Genetics in AMD: What Should We Tell Our Patients*?* Tilgham Auditorium, Johns Hopkins University School of Medicine, Baltimore, MD.

2009 **Gehlbach PL** (Invited Speaker) Continuing Medical Education. Age-Related Macular Degeneration in 2009: The Paradigm Continues to Evolve. June 13, 2009 Thomas B. Turner Auditorium, Johns Hopkins University School of Medicine, Baltimore, MD.

2011 **Gehlbach PL** (Invited Speaker) Continuing Medical Education. Diabetic Retinopathy and Venous Occlusive Disease Course. Vitrectomy for Proliferative Diabetic Retinopathy; and (Moderator) Surgical Case

Presentations. Johns Hopkins University School of Medicine, Turner Auditorium. November 11, 2011.

2011 **Gehlbach PL** (Invited Speaker) Continuing Medical Education. The Role of Retinal Surgery in Proliferative Diabetic Retinopathy. Current Concepts in Ophthalmology. Johns Hopkins University School of Medicine, Turner Auditorium. December 2, 2011.

2012 **Gehlbach PL** (Retina Program Chair/Invited Speaker). Continuing Medical Education. 25th Annual Current Concepts in Ophthalmology. Vitreomacular Adhesion: Observation vs. Ocriplasmin vs. Vitrectomy; and Introduction of Smiddy Lecture. Johns Hopkins University School of Medicine, Turner Auditorium. December 6, 2012.

2013 **Gehlbach PL** (Invited Panelist) Continuing Medical Education. Macula 2013. Retinal Tears and Detachment: What's a Retina Specialist to Do? Thomas B. Turner Building, Johns Hopkins University School of Medicine, Baltimore, Maryland. January 19, 2013.

2013 **Gehlbach PL** (Invited Speaker and Panel Leader) Continuing Medical Education. 6th Annual Evidence Based Care in Optometry Conference: Evidenced Based Care in Retina: 2013 Highlights. BWI Marriott, Linthicum Heights, Maryland. March 10, 2013.

2013 **Gehlbach PL** (Invited Speaker and Panel Discussant) Continuing Medical Education. What's New in Diabetic Retinopathy and Venous Occlusive Disease? Vitrectomy for Proliferative Diabetic Retinopathy; and Surgical Case Presentations. Thomas B. Turner Building, Johns Hopkins University School of Medicine, Baltimore, Maryland. October 11, 2013.

2013 **Gehlbach PL** (Retina Program Chair/Invited Speaker) Continuing Medical Education. 26th Annual Current Concepts in Ophthalmology. Cooperative Management of the Complicated Lens by the Anterior and Posterior Segment Surgeon. Johns Hopkins University School of Medicine, Turner Auditorium. December 6, 2013.

2014 **Gehlbach PL** (Invited Lecturer) Continuing Medical Education. Could Robots Ever Do Retina Surgery? Seventh Annual Evidenced Based Care in Optometry Conference. Maritime Institute, Linthicum Heights, Maryland. March 9, 2014.

2014 **Gehlbach PL** (Invited Speaker) Continuing Medical Education. What's New in Diabetic Retinopathy and Venous Occlusive Disease? Vitrectomy for Proliferative Diabetic Retinopathy. Thomas B. Turner Building, Johns Hopkins University School of Medicine, Baltimore, Maryland. November 21, 2014.

2014 **Gehlbach PL** (Retina Program Chair/Invited Speaker) Continuing Medical Education. 27th Annual Current Concepts in Ophthalmology. Cooperative Management of the Complicated Lens by the Anterior and Posterior Segment Surgeon. Johns Hopkins University School of Medicine, Turner Auditorium. December 5, 2014.

2015 **Gehlbach PL**. (Session Chair and Invited Discussant) 74nd Wilmer Residents Association Clinical Meeting. Retinal Detachment/Proliferative

		Vitreoretinopathy After Open Globe (Dean Eliott); Lucenticell: Sustained Intravitreal Cell Based Production of Ranibizumab (Brad Barnett); Axial Myopia in Marfan Syndrome and Elucidation of Therapeutic and Genetic Modifiers of Disease Progression (Jefferson Doyle). Tilghman Auditorium, Johns Hopkins Hospital. June 19, 2015.
2015	**Gehlbach PL**.	(Invited Speaker) What's New in Diabetic Retinopathy and Venous Occlusive Disease? Vitrectomy for Proliferative Diabetic Retinopathy. William H. Welch Medical Library Building, Johns Hopkins University School of Medicine, Baltimore, Maryland. October 30, 2015.
2015	**Gehlbach PL**.	(Retina Program Chair/Invited Speaker) 28th Annual Current Concepts in Ophthalmology. Cooperative Management of the Complicated Lens by the Anterior and Posterior Segment Surgeon. Johns Hopkins University School of Medicine, Turner Auditorium. December 4, 2015.
2016	**Gehlbach PL**.	(Session Chair and Invited Discussant) 75th Wilmer Residents Association Clinical Meeting. When and How Should Extrafovel Choroidal Neovascular Lesions (EF-CNV) Be Treated? An Analysis of Data from the Macular Photocoagulation Study (MPS) (Jithin Yohannan) Albert H. Owens, Jr. Auditorium, Johns Hopkins Hospital, June 10, 2016.
2016	**Gehlbach PL**.	(Invited Speaker) What's New in Diabetic Retinopathy and Venous Occlusive Disease? Vitrectomy for Proliferative Diabetic Retinopathy. Chevy Chase Auditorium, Johns Hopkins University School of Medicine, Baltimore, Maryland. November 4, 2016.
2016	**Gehlbach PL**.	(Retina Program Chair/Invited Speaker) 29th Annual Current Concepts in Ophthalmology. Current Management of the Complicated Lens. Johns Hopkins University School of Medicine, Turner Auditorium, Baltimore, Maryland. December 2, 2016.
2017	**Gehlbach PL.**	(Invited Speaker) 30th Annual Current Concepts in Ophthalmology. Cooperative Management of the Complicated Lens. Johns Hopkins University School of Medicine, Turner Auditorium, Baltimore, Maryland. December 1, 2017.
2018	Gehlbach PL.	Retina's Believe It or Not: Case Challenge for Young Retina Specialists Honolulu, on April 28, 2018.
2018	Gehlbach PL	Manuscript Review: JAMA Ophthalmology. AMA Education Center, October 16, 2018.
2018	Gehlbach PL	(Invited Speaker) 31th Annual Current Concepts in Ophthalmology. Cooperative Management of the Complicated Lens. Johns Hopkins University School of Medicine, Turner Auditorium, Baltimore, Maryland. November 30, 2018.
2018	Gehlbach PL	Peer Review of : Intraocular application of fibrin glue as an adjunct to pars plana vitrectomy for rhegmatogenous retinal detachment. *Retina.* December 4,2018.
2019	Gehlbach PL	Johns Hopkins Retinal Degenerations and Clinical Electrophysiology Course. February 1-2, 2019.

2019	Gehlbach PL	Retina World Congress. March 21-24, 2019.

Mentoring

Mentoring (Premedical-doctoral Advisees):

2001-2004	Advisor, Tye Deering, Undergraduate research technician. Accepted Graduate Studies (Ph.D.) the University of Virginia. Top class rank student.
2003-2004	Advisor, Kevin Callahan, Undergraduate research, accepted: Graduate Studies (Ph.D.), University of Rochester, NY
2003-2006	Advisor, Brian Rogers, Undergraduate research technician. Accepted into the M.D., Ph.D. program at Drexler University.
Fall 2004-Spring 2005	Faculty sponsor of Brian Lee, Johns Hopkins University Undergraduate Research Program for Academic Credit, Department of Biophysics: Accepted a position in private industry.
Winter 2007-Spring 2007	Faculty sponsor of Carlo Salvarani, Johns Hopkins University Undergraduate Research Program for Academic Credit, Department of Behavioral Biology: Premedical.
Fall 2005- Spring 2006	Faculty sponsor of Viet Nguyen, Johns Hopkins University UndergraduateResearch Program for Academic Credit, Department of Biophysics. Accepted into Medical School U.T.S.W. in Dallas TX)

Mentoring (Extramural Medical Students):

2007-2009	Belal Bakir	Current position, private practice in ophthalmology, Chicago. Formerly Medical Director, Diabetes Initiative, Maryland Department of Health and Mental Hygiene.
2013	Edmund Tsu	Dartmouth University School of Medicine Current Resident at NYU
2015	Faith Birnbaum	Brown University School of Medicine Current ophthalmology applicant
2015	Clayton Ellis Wisely	Ohio State University School of Medicine Current ophthalmology applicant

Mentoring (Extramural Residents):

2001-present	Kristi Lin, M.D	Fellowship in Retina.

Mentoring (Post-doctoral Research Advisees):

2005-2006	Faculty co-sponsor of Choul Park Post-doctoral Research Fellow, Retinal Pigment Epithelial Biology and Gene Therapy in Molecular Imaging of the Eye. (Fund for Medical Discovery) Current Head of Cornea and Refractive Surgery Department, Seoul South Korea
2005-2007	Faculty co-sponsor Juan Miguel Castro, Post-doctoral research fellow, Corneal Gene Therapy and Fibroblast Biology. (Corneal Gene Therapy). Ophthalmology resident applicant.
2004-2005	Faculty sponsor Marisol Cano, Ph.D. Post-doctoral Research Fellow, Ocular Angiogenesis, Ocular Oxidative Injury. (Knights Templer Award)
2005	Akrit Sodhi, M.D., Ph.D. Resident in Ophthalmology. Current resident in the Wilmer Ophthalmology Resident Program. (Winner: Wilmer Research Grant Award
2006-2007	Faculty sponsor of Elham Hatef, M.D. Post-doctoral Research Fellow, Ocular Genetics and Epidemiology of Ocular Disease Faculty Sponsor, Robert Wheelock Ph.D. Research Fellow, Protein Chemistry of the lens
2012-2015	Mahsa Salehi O.D., Clinical Retina exposure for optometrists.

Mentoring (Clinical Fellows):

2000	David Kent, M.D.	Vitreoretinal	Private practice: Limerick, Ireland
2000	Joel Pearlman, M.D.	Vitreoretinal	Private practice: Sacramento, CA
2001	Byron Ladd, M.D.	Vitreoretinal	Private practice: Richmond, VA
2001	Eugene Ng, M.D.	Vitreoretinal	Next position: Harvard Business School; Current Position: Biotech Industry
2001	Thomas Hwang, M.D.	Vitreoretinal	Associate Professor, Casey Eye Institute, Oregon Health Sciences University, Portland, OR
2001	Sharon Solomon, M.D.	Vitreoretinal	Associate Professor of Ophthalmology Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD
2001-2007	Ed Quinlin, M.D.	Vitreoretinal	Private practice: Tuscon, AZ
2001	Howard Ying, M.D., Ph.D.	Vitreoretinal	Professor of Ophthalmology and Vice Chair, Boston University, Boston, MA

2001	Nine Yepez, M.D.	Vitreoretinal	Private practice, New Jersey
2002-2003	Rajendra Apte, M.D. Ph.D.	Vitreoretinal	Professor of Ophthalmology, Washington University, St. Louis, MO
2002-2003	Eyal Margilit, M.D., Ph.D.	Vitreoretinal	Associate Professor, University of Nebraska, Department of Ophthalmology, Omaha, Nebraska.
2002-2004	Wen-Shiang Lee, M.D., Ph.D	Vitreoretinal	Assistant Professor of Ophthalmology, Bascom Eye Institute, University of Miami, Miami, FL
2003-2004	Diana Do, M.D.	Vitreoretinal	Professor and Vice Chairman The Department of Ophthalmology, the University of Nebraska, Omaha, Nebraska
2004-2004	John Huang, M.D.	Vitreoretinal	Private practice: Connecticut
2002-2003	Eyal Margolit, M.D., Ph.D.	Vitreoretinal	Professor of Ophthalmology University of Nebraska, Department of Ophthalmology, Omaha, Nebraska.
2005-2006	Eric Tourville, M.D.	Vitreoretinal	Private practice: Quebec City, Canada
2005-2006	Brian Kim, M.D.	Vitreoretinal	Professor and Chief: Department of Ophthalmology, University of Vermont, Burlington, Vermont
2005-2006	Eggbert Saavedra, M.D., Ph.D		Private Practice: Tuscon, AZ
2005-2007	Joanna Oda, M.D.		Private Practice: San Francisco, CA
2005-2007	Heather Casparis M.D.		Hôpital ophtalmique Jules Gonin Av. de France 15, CP 133, 1000 Lausanne 7
2005-2007	Sayjal Patal M.D.		Retina Practice: U.S. Navy, San Diego, CA

2006-2008	Margaret Chang, M.D.	Private Practice: Sacramento, CA
2006-2008	Henry Wiley, M.D.	Academic Retina: Staff Ophthalmologist The National Institutes of Health, Bethesda, MD
2006-2008	Andrew Symons, M.D.	Head of Ophthalmology at Royal Melbourne Hospital, Melbourne, Australia
2007-2009	Shawn Wilker, M.D.	Private Retina Practice: Central Florida
2007-2009	Rahul Khurana, M.D.	Private Practice: Northern California
2007-2009	Jeong-Hyeon Sohn, M.D.	Academic Retina: U.T.S.A., San Antonio, Texas
2008-2010	Ben Kim, M.D.	Academic Retina: Assistant Professor of Ophthalmology, the University of Pennsylvania, Philadelphia, PA
2008-2010	Akrit Sodhi, M.D., Ph.D.	Academic Retina: Assistant Professor of Ophthalmology, the Wilmer Eye Institute, Johns Hopkins University School of Medicine, Baltimore, MD
2008-2010	Bryan Propes, M.D.	Retina Surgeon: US Navy, San Diego, CA
2009-2011	Muge Kesen, M.D.	Academic Retina: Assistant Professof of Ophthalmology, the University of West, Morgantown, WV
2009-2011	Thomas Lee, M.D.	Clinical Assistant Professor of Ophthalmology, University of Ottawa, Cananda
2009-2011	Shiri Soudry, M.D.	Academic Retina U.C.S.F. San Francisco, CA
2010-2012	Ala Moshiri, M.D., Ph.D.	Assistant Professor of Opthalmology: University

		of California at Davis, Sacramento, CA
2010-2012	Henry Leder, M.D.	Private practice: Baltimore, MD
2010-2012	Adam Wenick, M.D., Ph.D.	Academic Retina: Assistant Professor of Ophthalmology, the Wilmer EyeInstitute, Johns Hopkins University School of Medicine, Baltimore, MD
2011-2013	Claudia Krispel, M.D., Ph.D.	Private practice, Las Vegas, NV
2011-2013	Nguyen (Khoi) Ha, M.D.	Private practice, Colton, CA
2012-2014	Connie Chen, M.D.	Academic Affiliate: Virginia Mason Hospital Seattle, Washington
2012-2014	Syed Mahmood Shah, MBBS	Academic Retina: Assistant Professor of Ophthalmology, the Wilmer Eye Institute, Johns Hopkins University School of Medicine, Baltimore, MD
2013-2015	Yannis Paulis, M.D., Ph.D.	Assistant Professor of Ophthalmology The University of Michigan, Ann Arbor, MI
2013-2015	Ian Han, M.D.	Assistant Chief of Service Ophthalmology, the Wilmer Eye Institute, Johns Hopkins University School of Medicine, Baltimore, MD Current: Assitant Professor of Ophthalmology, University of Iowa, Iowa City, IA
2014-2016	David Poon, M.D.	Private Practice: Long Island, NY
2014-2016	Lisa He, M.D.	Private Practice: San Francisco, CA Academic affiliate, Stanford University Palo Alto, CA
2015 - Present	Roomasah Channa, M.D.	Current senior vitreoretinal fellow

2015-present	Alice Yang, M.D.	Current senior vitreoretinal fellow

Mentoring Programs:

1991-1993	Associate Mentor M.D., Ph.D. Summer Research Programs. University of Minnesota School of Medicine
2006-2010	Monthly, Biomedical Engineering Team 6, mentor meetings. Locations: Clarke Hall and Cancer Research Building II. November–April, 2006-2010
2009-2010	Biomedical Engineering Master's Program (2009-10): Christopher Courville
2013 - Present	Advisor, the Ophthalmology Interest Group; Geisel School of Medicine at Dartmouth University. (To increase medical student exposure to the field of ophthalmology, to introduce research opportunities, coordinate shadowing, and provide medical students with guidance and mentorship as they progress through medical schools with small academic). Advisor to Founder, Edmund Tsui, Dartmouth. 2015 participant, Faith Birnbaum of Brown.

Thesis Committees:

2006	Thesis committee member for Manos Karagiannis (Ph.D. Candidate)
	Department of Biomedical Engineering. Johns Hopkins University School of Engineering. Mentor: Aleksander Popel, Ph.D. Accepted postdoctoral position in the laboratory of Dr. Robert Langer, Massachusetts Institute of Technology, Boston, Massachusetts 2008. Engineering, Whiting School of Engineering.
07/15/10	Thesis committee member for Marcin Balicki. Whiting School of Engineering. Johns Hopkins University, Preliminary Examination. Mentor: Russell Taylor, Head of the E.R.C. Whiting School of Engineering. Johns Hopkins University.
05/25/12	GBO Thesis Committee Member (Ph.D. Candidate) Yong Huang The Johns Hopkins University, Department of Electrical and Computer Engineering. Mentor Jin Kang, Chairman the School of Electrical Engineering.
08/10/10	Chair Thesis Committee (Ph.D. Candidate) Kang Zang. Whiting School of Engineering. Johns Hopkins University (August 11, 2010). Mentor: Jin Kang, Chairman the School of Electrical Engineering.
03/25/11	Chair Thesis Committee (Ph.D. Candidate) Xuan Liu. Whiting School of Engineering. Johns Hopkins University, (June 24, 2010). Final Defense March 25, 2011. Mentor: Jin Kang, Chairman the School of Electrical Engineering, Whiting School of Engineering.
09/19/2013	Thesis committee member for Marcin Balicki. Whiting School of Engineering. Johns Hopkins University, Final Thesis Defense. Mentor: Russell Taylor, Head of the E.R.C. Whiting School of Engineering. Johns Hopkins University.
01/23/2014	GBO Thesis Committee Member (Ph.D. Candidate) Xingchi He. The Johns Hopkins University, Department of CIST Engineering. Mentor Iulian Iordachita.

04/22/2014	GBO Thesis committee member (alternate examiner) (Ph.D. Candidate) Jaepyeong "Richard" Cha. The Johns Hopkins University, Department of Electrical Engineering. Mentor Jin Kang, Chairman.
01/26/2015	GBO Thesis Committee Member (alternate examiner) (Ph.D. Candidate) Berk Gonenc. The Johns Hopkins University, Department of CIST Engineering. Mentor Iulian Iordachita.
03/12/2015	Thesis committee member (co-referee) (Ph.D. Candidate) Patrick Steiner.
	GCB Graduate School for Cellular and Molecular Biology; University of Bern, Switzerland. Ophthalmic Technology Lab, ARTORG Center, University of Bern, Switzerland Mentor: Dr. Jens H. Kowal; Co-mentors: Dr. Boris Povazay and Dr. Raphael Snitzman.
05/12/2015	GBO Chair thesis committee (Ph.D. Candidate) Gyeong Woo Cheon. The Johns Hopkins University, Department of Electrical Engineering. Mentor Jin Kang, Chairman.
06/30/2015	Thesis Committee Member (Ph.D. Candidate) Xingchi He. The Johns Hopkins University, Department of CIST Engineering. Mentor Iulian Iordachita.
11/20/2015	GBO thesis committee (Ph.D. Candidate) Jeremy Chae. The Johns Hopkins University, Department of Biomedical Engineering. Mentor Jennifer Elisseeff.
10/15/2016	Thesis Committee Member (Ph.D. Candidate) Gyeong Woo Cheon. The Johns Hopkins University, Department of Electrical and Computer Science Engineering, Whiting School of Engineering. Mentor Jin Kang
5/19/2017	Thesis Committee Member (Ph.D. Candidate) Berk Gonenc. The Johns Hopkins University, Department of Mechanical Engineering, Laboratory for Computational Sensing and Robotics, Whiting School of Engineering. Mentor Iulian Iordichita

RESEARCH ACTIVITIES

Research Focus

My thesis work focused on basic mechanisms of microvascular ischemia and reperfusion injury and its effects on neural tissue. This led to a focus on pathological angiogenesis in retinal disease, research into novel therapeutic approaches, and a complimentary surgical retina track. The last 10 years have focused on developing technology directed at overcoming therapeutic barriers in retinal disease, including overcoming human physiological limitations in microsurgery. The concept of "SMART" high precision tools, working on the single micron scale, that "sense" the surgical target and initiate tool responses that are beyond human capability are one of the evolving results of this focus.

Research Program Building/Leadership

-Foundational work on ischemia and reperfusion injury in the retinal microvasculature.
-Foundational work on pathological angiogenesis in animal models of retinal disease.
-Inaugural Director of the Wilmer Gene Therapy Vector Core
-Foundational work on gene therapy for retinal disease

-Interdisciplinary program building between the Wilmer Eye Institute, the Whiting School of Engineering, and the Whitaker School of Biomedical Engineering. Extensive "interdisciplinary bridge building" leading to successful collaborations over the last eight years as evidenced by 37 peer reviewed journal articles and 27 peer reviewed full length conference proceedings as ophthalmic clinical scientist on ophthalmology directed engineering projects. Current grants (4), including two NIH RO1s total direct costs being $1,120, 358 (pending award); $1,125,000 presently on no cost extension; $100,000 TEDCO; $90,000 Coulter Foundation. Completed grants including NIH RO1 EB007969-01A1 $3,747,342 and NIH STTR EY020318 $327,869 and Coulter Foundation $150,000. Total current, pending and completed grant funding since July of 2008 is greater than $6.6 million. Gifts in support of the work exceed $1.7 million. The collaboration has yielded 13 successful Ph.D. examinations and thesis defenses. There have been no less than four biomedical engineering team projects at Wilmer resulting from the collaboration. There is a resulting portfolio of 15 domestic patents, 13 international patents, 28 international patents filed, 2 pending patents, 5 ordinary utility patents. The portfolio has had several holdings licensed and those companies have benefited from significant venture capitalizations. The present technology is progressing on the commercialization pathway in accordance with recognition as being among the outstanding projects at JHU.

Research Demonstration Activities:

Prior research demonstrations provided, include but are not limited to: Alcon, QLT, Sclera Inc., GenVec Inc., Auris Surgical Robots, Marriott Foundation, Zeiss, Lutronics, Carnegie Mellon University, Coulter Foundation, Charles Rivers Laboratories, National Institutes of Health and a number of Donors/Friends of the Wilmer, Whiting and Whitaker Institutes, Johns Hopkins University, and others.

Inventions, Patents and Copyrights

(In various stages of prosecution)

Published Inventions, Patents and Copyrights: (In various stages of prosecution)

Domestic Patents:

12/09/1992 Hoey M, **Gehlbach P**. Smooth Muscle Chemical Pacemaker. Application No. 07987748. Publication No. 5383873.

12/08/1993 Hoey M, **Gehlbach P**. Smooth Muscle Chemical Pacemaker. Application No. 94905347. Publication No. 0673242.

12/08/1993 Hoey M, **Gehlbach P**. Smooth Muscle Chemical Pacemaker. Application No. 2151055. Publication No. 2151055.

01/24/1995 **Gehlbach P**, Hoey M. Smooth Muscle Chemical Pacemaker. Application No. 07987748. Patent No. 5383873.

01/03/2008 **Gehlbach P**, Cortes HM, Davenport MS, Harrison RM, Hwang K, Kapp GM, Lee CY, Lerman JA, Li T, Wong JC. Multifunctional Neck Brace. Application No. 11798041. Publication No. 20080004556.

01/07/2010 **Gehlbach P**, Sinha D, Hose S, Zigler Jr. S, Cano M. Use of Crystallin for the Modulation of Angiogenesis. Application No. 12309026. Publication No. 20100004168.

01/11/2010 Balicki MA, Taylor RH, Hager GD, Gehlbach PL, Handa JT, Kumar R. Visual Tracking and Annotation of Clinically Important Anatomical

Landmarks for Surgical Interventions. Application No. 10827611. Publication No. 2493387.

08/02/2011 Campachiaro PA, **Gehlbach P**. Selective Induction of Apoptosis to Treat Ocular Disease by Expression of PEDF. Application No. 11938562. Publication No. 20080132464. Patent No. 7989426.

08/02/2011 Taylor RH, Balicki MA, Handa JT, **Gehlbach PL,** Iordachita I, Uneri A. Method for Presenting Force Sensor Information Using Cooperative Robot Control and Audio Feedback. Application No. 11815199. Publication No. 2600813.

08/02/2011 Taylor RH, Balicki MA, Handa JT, **Gehlbach PL**, Iordachita I, Uneri A. Micro-Force Guided Cooperative Control for Manipulation of Delicate Tissue. Application No. 11815201. Publication No. 2600789.

07/20/2011 Kang JU, **Gehlbach P**, Taylor RH, Zhang K. Surface Tracking and Motion Compensation Surgical Tool System. Application No. 11810348. Publication No. 2595586.

05/05/2011 Balicki MA, Taylor RH, Kang JU, **Gehlbach PL**, Handa, JT, Han J. Surgical Instrument with Integrated Optical Sensor. Application No. 12917168. Publication No. 20110106102.

06/09/2012 Balicki MA, Taylor RH, Hager GD, **Gehlbach, PL**, Handa JT, Kumar R. Visual tracking and annotation of clinically important anatomical landmarks for surgical interventions. Application No. 13505058. Publication No.2011053921

05/16/2013 Kang JU, **Gehlbach P**, Taylor RH, Zhang K. Surface Tracking and Motion Compensating Surgical Tool System. Application No. 13811077. Publication No. 20130123759.

11/14/2013 Taylor, RH, Balicki MA, Handa JT, **Gehlbach PL**, Iordachita I, Uneri A. Micro-force Guided Cooperative Control for Surgical Manipulation of Delicate Tissue. Application No. 13813738. Publication No. 20130304258.

01/24/2014 Kang JU, **Gehlbach PL**. Fiber Optic Distal Sensor Controlled Drug Injector. Application No. 14163491. Publication No. 20150209527.

02/20/2014 Taylor, RH, Balicki MA, Handa JT, **Gehlbach PL**, Iordachita I, Uneri A. Method for Presenting Force Sensor Information Using Cooperative Robot Control and Audio Feedback. Application No. 13813727. Publication No. 20140052150.

07/27/2015 Gonenc B, Iordachita I, Taylor RH, Riviere C, **Gehlbach P**, Handa J. Micromanipulation Systems and Methods. Application No. 14810277. Publication No. 20160030240.

07/30/2015 Kang JU, **Gehlbach PL.** Fiber Optic Distal Sensor Controlled Drug Injector. Application No. 14163491. Publication No. 20150209527.

08/25/2015 Kang JU, Billings SD, **Gehlbach PL**, Handa JT, Huang Y, Taylor RH, Yang Yi. High-efficiency illumination system. Application No. 13642436. Patent No. 9116262.

10/22/2015 Kang, JU, **Gehlbach PL**. Fiber Optic Distal Sensor Controlled Micro-Manipulation Systems and Methods. Application No. 14256695. Publication No. 20150297404.

10/29/2015 Kang, JU, **Gehlbach PL**. Motion-Compensated Micro-Forceps system and methods. Application No. 14261264. Publication No. 20150305761.

04/26/2016 Taylor RH, Billings SD, **Gehlbach PL**, Hager GD, Handa JT, Kang JU, Vagvolgyi B, Sznitman R, Pezzementi Z. Programmable Multispectral Illumination System for Surgery and Visualization of Light-Sensitive Tissues. Application No. 13387950. Patent No. 9320428. PCT 1044596. Published 2/24/2017.

3/17/2017 The Talking Eye. Christoff A, Rollend D, Gehlbach P, Repka M, Beatty J .

3/17/2017 A Miniaturized Triaxial Force Sensor with Independent Axial and Transverse Force Sensing. Iordachita I, He X, Taylor R, Handa J, Gehlbach P.

3/17/2017 Miniature Dexterous Manipulator for Therapeutic and Diagnostic Procedures in the Clinical setting where Tool Access is Limited. He X, Van Geirt V, Gehlbach P, Taylor R, Iordachita I.

2/24/2017 Force-sensing Motorized Micro-forceps and Method of Use in Microsurgery. Gonenc B, Iordachita I, Taylor R, Riviere C, Handa J, Gehlbach P.

2/24/2017 Fiber Optic Distal Sensor Controlled Surgical Blade. Gehlbach P, Kang J.

2/24/2017 Fiber Optic Distal Sensor Controlled Drug Injector. Gehlbach P, Kang J.

2/24/2017 Programmable Multispectral Illumination System for Surgery and Visualization of Light- sensitive Tissues. Gehlbach P, Pezzementi Z, Kang J, Handa J, Billings S, Vagvolgyi B, Sznitman R, Hager G, Taylor R.

3/6/2018 Fiber optic distal sensor controlled micro-manipulation systems and methods. Jin U Kang, Peter L Gehlbach. US Patent 9,907,696.

3/6/2018 Motion-compensated micro-forceps system and method. JU Kang, PL Gehlbach. US Patent 9,872,692.

5/10/2018 Manipulator Device and Therapeutic and Diagnostic Methods. X He, II Iordachita, V Van Geirt, P Gehlbach, R Taylor. US Patent App. 15/574,483.

8/14/2018 Surgical instrument and systems with integrated optical sensor. MA Balicki, RH Taylor, JU Kang, PL Gehlbach, JT Handa, J Han. US Patent App. 12/917,168.

8/14/2018 Surgical instrument and systems with integrated optical sensor. MA Balicki, RH Taylor, JU Kang, PL Gehlbach, JT Handa, J Han. US Patent App. 10/045,882.

1/29/2019 Fiber optic distal sensor controlled drug injector JU Kang, PL Gehlbach US Patent App. 14/163,491.

1/29/2019 Surgical system providing hands-free control of a surgical tool. X He, I Iordachita, Y Horise, RH Taylor, PL Gehlbach. US Patent App. 15/237,347.

1/29/2019 Programmable multispectral illumination system for surgery and visualization of light-sensitive tissues. RH Taylor, SD Billings, PL Gehlbach, GD Hager, JT Handa, JU Kang. US Patent App. 10/188,281.

1/29/2019 Surgical system providing hands-free control of a surgical tool. X He, I Iordachita, Y Horise, RH Taylor, PL Gehlbach. US Patent App. 10/188,552.

1/29/2019 Fiber optic distal sensor controlled drug injector. JU Kang, PL Gehlbach. US Patent App. 10/188,808.

1/29/2019 Programmable multispectral illumination system for surgery and visualization of light-sensitive tissues. RH Taylor, SD Billings, PL Gehlbach, GD Hager, JT Handa, JU Kang. US Patent App. 15/085,704.

4/3/2019 Device for intraocular pressure regulation is the setting of chronic hypotony. U.S. 62/651,792. C14822_P14822-01.

4/12/2019 Fiber Optic Distal Sensor Controlled Drug Injector. U.S. 10,188,808.

4/30/2019 Micromanipulation Systems and Methods. U.S. 14/810,277. C13009_387377.

International Patents:

01/22/1998 Australian Patent Number 685420 (1/22/98), European Patent Application Number 94905347.4

12/08/1993 Hoey M, **Gehlbach P**. Smooth Muscle Chemical Pacemaker. Publication No. WO/1994/013269. International Application No. PCT/US1993/011928. International Filing Date: 12/08/1993.

06/30/2006 **Gehlbach PL**, Sinha D, Cano M, Hose S, Zigler Jr. SJ. Use of Crystallin for the Modulation of Angiogenesis. Publication No. WO/2008/005021. International Application No. PCT/US2006/026450. International Filing Date: 06/30/2006.

08/05/2010 Taylor RH, Billings SD, **Gehlbach PL**, Hager GD, Handa JT, Kang JU, Vagvolgyi B, Sznitman R, Pezzementi Z. Programmable Multispectral Illumination System for Surgery and Visualization of Light-Sensitive Tissues. Publication No. WO/2011/017550. International Application No. PCT/US2010/044596. International Filing Date: 08/05/2010.

11/01/2010 Balicki MA, Taylor RH, Hager GD, **Gehlbach PL**, Handa JT, Kumar R. Visual Tracking and Annotation of Clinically Important Anatomical Landmarks for Surgical Interventions. Publication No. WO/2011/053921. International Application No. PCT/US2010/054988. International Filing Date: 11/01/2010.

04/20/2011 Kang JU, Billings SD, **Gehlbach P**, Handa J, Huang Y, Taylor RH, Yang Y. High Efficiency Illumination System. Publication No. WO/2012/011988. International Application No. PCT/US2011/033236. International Filing Date: 04/20/2011.

07/20/2011 Kang JU, **Gehlbach P**, Taylor RH, Zhang K. Surface Tracking and Motion Compensating Surgical Tool System. Publication No. WO/2012/012540. International Application No. PCT/US2011/044693. International Filing Date: 07/20/2011.

08/02/2011 Taylor RH, Balicki MA, Handa JT, **Gehlbach PL**, Iordachita I, Uneri A. Method for Presenting Force Sensor Information Using Cooperative Robot Control and Audio Feedback. Publication No. WO/2012/018821. International Application No. PCT/US2011/046276. International Filing Date: 08/02/2011.

08/02/2011 Taylor RH, Balicki MA, Handa JT, **Gehlbach PL**, Iordachita I, Uneri A. Micro-Force Guided Cooperative Control for Surgical Manipulation of Delicate Tissue. Publication No. WO/2012/018823. International

Application No. PCT/US2011/046278. International Filing Date: 08/02/2011.

10/07/2014 Kang J, Billings S, Handa J, **Gehlbach P**, Yang Y, Taylor RH, Huang Y. Compact High Efficient Multispectral LED Endoscopic Illumination System. International Application No. C10970.

10/07/2014 **Gehlbach P**, Campochiaro P. Periocular Gene Transfer For Retinal and Choroidal Diseases. International Application No. C03994.

04/16/2015 Kang JU, **Gehlbach PL**. Fiber Optic Distal Sensor Controlled Micro-Manipulation Systems and Methods. Publication No. WO/2015/161101. International Application No. PCT/US2015/026211. International Filing Date: 04/16/2015.

04/17/2015 Kang JU, **Gehlbach PL**. Motion-Compensated Micro-Forceps System and Method. Publication No. WO/2015/164216. International Application No. PCT/US2015/026506.

International Filing Date: 04/17/2015.

03/25/2015 Kang, J, Taylor RH, Zhang K, **Gehlbach P**. 1-D Surface Tracking and Motion Compensation Hand-held Microsurgical Tool System Based on Dynamic Common-Path Optical Coherence Tomography Sensor Value Proposition. International Application No.C11161. PCT/US2011/044693. Publication Date: 01/26/2012. International Filing Date: 07/20/2011.

03/25/2015 Handa J, Taylor RH, Iordachita I, **Gehlbach P**, Uneri A, Balicki M. Micro-force Guided Cooperative Control for Surgical Manipulation of Delicate Tissue. International Application No. C11172.

03/25/2015 Balicki M, **Gehlbach P**, Uneri A, Taylor RH, Handa J, Iordachita I. Method for Presenting Force Sensor Information Using Cooperative Robot and Audio Feedback. International Application No. C11167.

03/25/2015 Handa J, **Gehlbach P**, Taylor RH, Han JH, Balicki M, Kang J. Surgical Instrument with Integrated Forward Looking Optical Coherence Tomography. International Application No. C10900.

International Patent

File Date

11/01/2010 Visual Tracking and Annotation of Clinically Important Anatomical Landmarks for Surgical Interventions, Protection Filings – File Number, P10899-03, Patent Issued Number, 201080060214.8, China

Issue Date: 01/20/16; Publication: 11/14/12; Status Date: 03/31/16

11/01/2010 Visual Tracking and Annotation of Clinically Important Anatomical Landmarks for Surgical Interventions, Protection Filings – File Number, P10899-04, Patent Issued Number, 10827611.4, European Patent Office

Issue Date: none; Publication: 03/14/13; Status Date: 08/03/12

11/01/2010 Visual Tracking and Annotation of Clinically Important Anatomical Landmarks for Surgical Interventions, Protection Filings – File Number, P10899-05, Patent Issued Number, 2012-537171, Japan Issue Date: 07/10/15; Publication: 03/14/13; Status Date: 09/15/15

11/01/2010 Visual Tracking and Annotation of Clinically Important Anatomical Landmarks for Surgical Interventions, Protection Filings - File Number, P10899-06, Patent Issued Number, 10-2012-7013988, Korea Rep Of

Issue Date: None; Publication: None; Status Date: 11/03/15

07/20/2011 1-D Surface Tracking and Motion Compensation Hand-held Microsurgical Tool System Based on Dynamic Common-Path Optical Coherence Tomography Sensor, Protection Filings – File Number,

P11161-04, Patent Issued Number, 201180035450.9, China

Issue Date: 01/20/16; Publication: 04/17/13; Status Date: 04/04/16, Granted

07/20/2011 1-D Surface Tracking and Motion Compensation Hand-held Microsurgical Tool System Based on Dynamic Common-Path Optical Coherence Tomography Sensor, Protection Filings – File Number,

P11161-05, Patent Issued Number, 11810348.0, European Patent Office

Issue Date: None; Publication: 05/29/13; Status Date: 03/14/13, Pending

07/20/2011 1-D Surface Tracking and Motion Compensation Hand-held Microsurgical Tool System Based on Dynamic Common-Path Optical Coherence Tomography Sensor, Protection Filings – File Number,

P11161-06, 2013-520839, Japan

Issue Date: None; Publication: None; Status Date: 02/17/13, Pending

07/20/2011 1-D Surface Tracking and Motion Compensation Hand-held Microsurgical Tool System Based on Dynamic Common-Path Optical Coherence Tomography Sensor, Protection Filings – File Number,

P11161-07, Patent Issued Number 10-2013-7003643, Korea Rep Of

Issue Date: None; Publication: None; Status Date: 03/29/13. Pending

08/02/2011 Method for Presenting Force Sensor Information Using Cooperative Robot Control and Audio Feedback, Protection Filings – File Number, P11167-04, Patent Issued Number 201180038449.1 China

Issue Date: None; Publication: 04/24/13; Status Date: 09/24/15, Granted

08/02/2011 Method for Presenting Force Sensor Information Using Cooperative Robot Control and Audio Feedback. Protection Filings – File Number,

P11167-05, Patent Issued Number 11815199.2, European Patent Office

Issue Date: None; Publication: 06/12/13; Status Date: 03/12/13, Pending

08/02/2011 Method for Presenting Force Sensor Information Using Cooperative

Robot Control and Audio Feedback, Protection Filings – File Number, P11167-06, Patent Issued Number 2013-5232752013523275, Japan

Issue Date: 07/24/15; Publication: 08/22/13; Status Date: 10/12/15, Granted

08/02/2011 Method for Presenting Force Sensor Information Using Cooperative Robot Control and Audio Feedback, Protection Filings – File Number,

P11167-07, Patent Issued Number 10-2013-7003049, Korea Rep Of

	Issue Date: None; Publication: 12/12/13; Status Date: 04/15/13, Pending
08/02/2011	Micro-force Guided Cooperative Control for Surgical Manipulation of Delicate Tissue, Protection Filings – File Number, P11172-04, Patent
	Issued Number 201180037143.4 , China 11815201.6
	Issue Date: None; Publication: 04/10/13; Status Date: 04/15/13, Pending
08/02/2011	Micro-force Guided Cooperative Control for Surgical Manipulation of Delicate Tissue, Protection Filings – File Number, P11172-05, Patent Issued Number 11815201.6, European Patent Office Issue Date: 11/18/15; Publication: 06/12/13; Status Date: 12/09/15, Granted
08/02/2011	Micro-force Guided Cooperative Control for Surgical Manipulation of Delicate Tissue, Protection Filings – File Number, P11172-06, Patent Issued Number, 2013-523276, Japan
	Issue Date: 11/20/15; Publication: None; Status Date: 02/29/16, Granted
08/02/2011	Micro-force Guided Cooperative Control for Surgical Manipulation of Delicate Tissue, Protection Filings – File Number, P11172-07, Patent Issued Number, 10-2013-700314210-2013-7003142, Korea Rep Of Issue Date: None; Publication: 09/24/15; Status Date: 04/15/13, Pending

Provisional Inventions

02/15/2002	Selective Induction of Apoptosis to Treat Ocular Disease by Expression of PEDF, P039994-02, Abandoned.
05/09/2006	Multifunctional Neck Brace, P04933-01, Expired.
08/05/2009	Programmable Multispectral Illumination System for Surgery and Visualization of Light-Sensitive Tissues, P10789-01, Expired.
10/30/2009	Visual Tracking and Annotation of Clinically Important Anatomical Landmarks for Surgical Interventions, P10899-01, Expired.
10/08/2009	Surgical Instrument with Integrated Forward Looking Optical Coherence Tomography, P10900-01, Expired.
12/01/2009	Compact High Efficient Multispectral LED Based Endoscopic Illumination System, P10970-01, Expired.
07/06/2010	Method for Presenting Force Sensor Information Using Cooperative Robot Control and Audio Feedback, P11167-01. Expired.
07/12/2010	Micro-force Guided Cooperative Control for Surgical Manipulation of Delicate Tissue, P11172-01, Expired.
07/20/2010	1-D Surface Tracking and Motion Compensation Hand-held Microsurgical Tool System Based on Dynamic Common-Path Optical Coherence Tomography Sensor Value Proposition, P11161-01, Expired.
09/14/2010	Eye Model for Vitreoretinal Surgical Training, P11233-01. Abandoned.
04/19/2010	Programmable Multispectral Illumination System for Surgery and Visualization of Light-Sensitive Tissues, P10789-02, Expired.
04/13/2015	Retina and Anterior Segment Imaging System for Use in Contaminated and Resource-poor Settings ("The Ebola-scope"), P13530-01, Pending.

05/16/2017 Implantable Lens Capsule for Intraocular Lens Insertion, P14721-01.

Divisional Inventions

11/12/2007 Selective Induction of Apoptosis to Treat Ocular Disease by Expression of PEDF, P03994-04, Granted.

06/29/2010 1-D Surface Tracking and Motion Compensation Hand-held Microsurgical Tool

System Based on Dynamic Common-Path Optical Coherence Tomography

Sensor, P11161-08, Pending.

3/20/2015 Miniature Dexterous Manipulator for Therapeutic and Diagnostic Procedures In the Clinical Setting Where Tool Access Is Limited. P13480-01, Pending.

Ordinary Utility

12/27/2001 Periocular Gene Transfer For Retinal and Choroidal Diseases, P03994-01, Abandoned.

05/09/2007 Multifunctional Neck Brace, P04933-02, Abandoned.

11/01/2010 Surgical Instrument with Integrated Forward Looking Optical Coherence Tomography, P10900-02, Pending.

07/12/2013 Fiber Optic Sensor Integrated Micro-forceps, P12631-01, Pending.

07/12/2013 Fiber Optic Distal Sensor Controlled Drug Injector, P12746-01, Pending.

12/16/2013 Fiber Optic Distal Sensor Controlled Surgical Blade, P12835-01, Pending.

07/27/2015 Force-sensing Motorized Micro-forceps and Method of Use in Microsurgery,

P13009-02, Pending.

Trademark

3/15/2015 The Talking Eye. P13834-01, Trademark.

Disclosure of Inventions (In active patent prosecution)

03/25/2019 Control methods to enable safe robot-assisted eye surgery.

Apparatus for prevention of inadvertently retained items in a patient during surgery. Marcin Balicki, Han, Iulian Iordachita, Peter Gehlbach, James Handa, Jin Kang, Russell Taylor. Pending

08/15/2016 Surgical System Providing Hands-free Control of a Surgical Tool. Xingchi He, Iulian Iordichita, Yuki Horise, Russell H. Taylor, Peter L. Gehlbach

Educational Program Building/Leadership

2008-2013 Director, Retina Fellowship Program, the Wilmer Eye Institute, Johns Hopkins University School of Medicine, Baltimore, MD. (Major educational accomplishments: Brought program into full AUPO compliance for the first time; reduced the number of trainees to provide competitive volume of

surgery; implemented objective online fellow evaluations and also program evaluations by fellows; introduced flexible fellow assignments such that movement from clinic to surgical assignments was enabled.

2012 - Present Director, Department of Ophthalmology, Echography Center, the Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD (Major educational accomplishments: Initiated and competed effort to include eye ultrasound in the broader ultrasound curriculum of the Johns Hopkins University echography training program.)

2010 - Present Ophthalmology Preceptor of optometrist program. Piloted a program to provide nonsurgical subspecialty experience to optometrists interested in subspecialty areas of training. (Major educational accomplishments: first participant Dr. Salehi is better able to provide excellent nonsurgical primary retina care. She will be seeking academic advancement commensurate with her expertise.)

Editorial Board Appointments

2012-present International Journal of Ophthalmology Editorial Board Nominations: PLOSone, Journal of Ocular Biology, SOJ Clinical Trials

Editor in Chief Nomination: New Frontiers in Ophthalmology

CLINICAL ACTIVITIES

Certification

Medical, other state/government licensure

2000 to present Medical License State of Maryland, D0056021

2000 to present Maryland Controlled Substance, M51394

2000 to present Maryland D.E.A. number, BG5934395

2000 to present Medicaid Number, KR85

Present UPIN E77371

Present NPI 1770537102

Medical Licenses expired (all in good standing): Illinois, Minnesota, Missouri and Oregon

Board Certification

1987 National Board of Medical Examiners

2000 American Board of Ophthalmology, Certification

2010 American Board of Ophthalmology, Recertification

Clinical (Service) Responsibilities

2000 to present Specialty: Diseases of the Vitreous and Retina.

Role: Medical and surgical care of vitreoretinal diseases and complications of eye surgery.

A lead surgical attending on a high volume, tertiary referral and teaching service. The patient population derived from a broad national and international referral base; regionally referred patients with complications of prior surgery elsewhere and high levels of difficulty. The service is further composed of a significant high net worth grateful patient base; a substantial number of JHU faculty and their families, and a concentration of the regional legal and business community. Most clinics involve interactions with JHU International Services and the Wilmer Development Office.

Gehlbach was one of 2 out of 135 Wilmer physicians (the only Associate Professor) recognized in 2015 by the Johns Hopkins Medicine Clinical Awards: Nomination for Excellence in Service and Professionalism Award. (overall 30 nominations, out of approximately 3700 JHU clinical faculty)

Present time commitment: 2 days of clinic and 1 day of surgery per week.

Retina Service clinical call coverage (average ~6 weeks per year).

Vitreoretinal surgery for the Assistant Chief of Service: General Eye Service and indigent care (1 day every other month only in years in which the Assistant Chief of Service is not retina trained).

Clinical Program Building/Leadership

2008-2013	Satellite clinic start up. Established a thriving retina clinic at Green Spring Station during this period and then turned a mature practice over to the newest junior faculty members at that time.

System Innovation and Quality Improvement efforts within JHM

2012 - Present	Member the Perioperative Care Committee
2013 - Present	Member the Wilmer Operating Room Review Committee (Important quality improvements include but are not limited to: Enhanced utilization, consistent quality assurance and sustained access amenable to growth. Creation of service block times and automatic release for surgeon away.)
2008 - Present	Initiation: the Physician Extender training program (also mentioned under education): Optometrists in the Retina Clinic in preparation for primary retina care. This new resource may provide additional primary care capability in subspecialty services in a cost efficient way.
2015	Member the Wilmer Surgical Enterprise Executive Council
2016	Completion of Lean Management Training Program. Johns Hopkins University
2017	Completion of Perioperative Management Program

Production of Guidelines and/or Protocols

1. Rasmussen H, Chu KW, Campochiaro P, **Gehlbach PL**, Haller JA, Handa JT, Nguyen QD, Sung JU. Clinical Protocol: an open-label, phase I, single administration, dose-escalation study of ADGVPEDF.11D (ADPEDF) in neovascular age-related macular degeneration (AMD). Hum Gene Ther 2001; 12(16): 2029-2032.

2. Salehi M, Wenick AS, Law HA, Evans JR, **Gehlbach P**. Interventions for Central Serous Retinopathy a network meta-analysis. Cochrane Database Syst Rev. Protocol accepted (2015), Protocol published August, 2015.

Clinical Trials:

Design and Clinical Trial of Posterior Chamber, Intraocular Lenses Time Commitment for Patients with Marfan syndrome; Structural and Functional Outcomes. Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

Aerpio Akebia Phase II DME trial in Protocol Review
Role: Enrolling clinician. Time commitment: Less than 1%

Correlation of Retinal Blood Flow and Oxygen Saturation to Retinal Thickness using Novel Flow Oximetry System (JH FOS) and Optical Coherence Tomography in Normal Subjects and Diabetic Patients. Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

Double-Masked, Randomized, Controlled Study of the Safety, Tolerability and Biological Effect of Repeated Intravitreal Administration of VEGF Trap-Eye in Patients with Diabetic Macular Edema (DME). Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

A Double-Masked, Placebo-Controlled, Parallel-Group, Multicenter, Dose-Ranging Study to Assess the Efficacy and Safety of LX 211 as Therapy in Subjects with Active Sight Threatening, Non-Infectious Intermediate-, Anterior and Intermediate-, Posterior-, or Pan-Uveitis. Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

A Double-Masked, Placebo-Controlled, Multi-Center, Parallel-Group, Dose-Ranging Study to Assess the Efficacy and Safety of LX211 as Therapy in Subjects with Clinically Quiescent, Sight-Threatening, Non-Infectious, Intermediate-, Anterior- and Intermediate, Posterior-, or Pan-Uveitis. Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

A Double-Masked, Placebo-Controlled, Parallel-Group, Multi-Center, Dose-Ranging Study to Assess the Efficacy and Safety of LX211 as Therapy in Subjects with Active Sight-Threatening, Non-Infectious Anterior-Uveitis. Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

FVF4166g: A phase III, multicenter, randomized, sham injection-controlled study of the efficacy and safety of ranibizumab injection compared with sham in subjects with macular edema secondary to central retinal vein occlusion (Cruise). Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

CBPD952A2308 A 24-month randomized, double-masked, controlled, multicenter, phase IIIB study assessing safety and efficacy of verteporfin (Visudyne®) photodynamic therapy administered in conjunction with ranibizumab (Lucentis™)versus ranibizumab (Lucentis™)

monotherapy in patients with subfoveal choroidal neovascularization secondary to age-related macular degeneration. Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

VEGF Trap will be compared to ranibizumab (which is currently one of the standard treatments for neovascular AMD) in a non-inferiority paradigm in preventing moderate vision loss in subjects with all subtypes of neovascular AMD. The safety and tolerability of repeated intravitreal injections of VEGF in subjects with all types of neovascular AMD for periods up to 2 years will be evaluated. The effect of repeated intravitreal injections of VEGF trap on the quality of life will be assessed by using the NEI VFQ-25 questionnaire. Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

To assess the long-term safety and tolerability of repeated ITV administration of VEGF Trap-Eye in subjects with all sub-types of neovascular AMD for a period of up to 3 years. Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

Combined Approach to Treatment Using Ranibizumab and Efalizumab for Diabetic Macular Edema Study: The CAPTURE DME Study. Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

FVF3426g: An open-label, multicenter extension study to evaluate the safety and tolerability of ranibizumab in subjects with choroidal neovascularization (CNV) secondary to age related macular degeneration (AMD) or macular edema secondary to retinal vein occlusion (RVO) who have completed the treatment phase of a Genentech sponsored ranibizumab study. Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

A Phase 1 Open-Label, Dose Escalation Trial of REDD14NP Delivered by a Single Intravitreal Injection to Patients with Choroidal Neovascularization (CNV) Secondary to Exudative Age-Related Macular Degeneration (WET AMD). Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

A phase II prospective, randomized, multi-center, diabetic macular edema dose ranging, comparator study evaluating the efficacy and safety of PF-04523655 versus laser therapy (DEGAS). Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

Lucentis for DME: A Pilot, Open-Label, Dose-Escalation Study of the Safety, Tolerability and Bioactivity of Multiple Injections of Ranibizumab in Subjects with Macular Edema Secondary to Diabetes Mellitus. Wilmer Eye Institute (Multi-center), Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

Ranibizumab For Edema Of The Macula In Diabetes: A Phase 2 Study (The Read-2 Study): Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Co-Investigator. Time Commitment: Less than 1%

Score-Two Randomized Trials to Compare the Safety and with Standard Care to Treat patients with Macular Edema due to Central or Branch Retinal Vein Occlusions. Wilmer Eye

Institute (Multi-center), Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

Efficiency of Intravitreal Injections of Triamcinolone Acetonide Oxygen-Application No: 00-06-09-01, entitled, Supplemental Inspired Oxygen for Hypoxia-Mediated Retinal Diseases. Wilmer Eye Institute (Multi-center), Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

Sirna-A Phase 1, Open-Label, Dose Escalation Trial of a Single Intravitreal Injection of Sirna-027 in Patients with Subfoveal Choroidal Neovascularization (CNV) Secondary to Age-Related Macular Degeneration (AMD). Wilmer Eye Institute (Multi-center), Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

Regeneron 0502- An Exploratory Study of the Safety, Tolerability and Biological Effect of Intravitreal Administration of VEGF Trap in Patients with Neovascular Age-Related Macular Degeneration. Wilmer Eye Institute (Multi-center), Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

Posurdex for BRVO/CRVO- A Six-Month, Phase 3, Multi-Center, Masked, Randomized, Sham-Controlled Trial (with Six-Month Open-Label Extension) to Assess the Safety and Efficacy of 700 μg and 350 μg Dexamethasone Posterior Segment Drug Delivery System (DEX PS DDS) Applicator System in the Treatment of Patients with Macular Edema Following Central Retinal Vein Occlusion or Branch Retinal Vein Occlusion. Wilmer Eye Institute (Multi-center), Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

Posurdex for DME- A 3-Year, Phase 3, Multicenter, Masked, Randomized, Sham Controlled Trial to Assess the Safety and Efficacy of 700 μg and 350 μg Dexamethasone Posterior Segment Drug Delivery System (DEX PS DDS) Applicator System in the Treatment of Patients with Diabetic Macular Edema. Wilmer Eye Institute (Multi-center), Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

Lucentis for Vein Occlusions: An Open-Label Study of the Safety, Tolerability, and Bioactivity of Multiple Intravitreal Injections of Ranibizumab in Subjects with Macular Edema Secondary to Vein Occlusions. Wilmer Eye Institute (Multi-center), Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

Horizon: An Open Label, Multicenter Extension Study To Evaluate The Safety And Tolerability Of Ranibizumab In Subjects With Choroidal Neovascularization (CNV) Secondary To Age Related Macular Degeneration (AMD) Who Have Completed The Treatment Phase Of A Genentech Sponsored Ranibizumab Study. Wilmer Eye Institute (Multi-center), Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

Sailor: A Phase IIIb, Single-Masked, Multicenter, Randomized Study to Evaluate the Safety and Tolerability of Ranibizumab in Naive and Previously Treated Subjects with Choroidal Neovascularization (CNV) Secondary to Age-Related Macular Degeneration (AMD). Wilmer Eye Institute (Multi-center), Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

FVF3689g. "A phase IIIB, Single-Masked, Multicenter, Randomized Study to Evaluate the Safety and Tolerability of Ranibizumab in Naive and Previously Treated Subjects with Choroidal Neovascularization (CNV) Secondary to Age-Related Macular Degeneration (AMD)". Genentech Inc. and Novartis AG. Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

Review of Outcomes of Secondary Intraocular Lenses Repositioning or Exchange of Patient of the Wilmer Cornea Service. . Wilmer Eye Institute (Single Center), Johns Hopkins University School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

(Evaluating Physician). Genentech FVF2598g, "A Phase III, Multicenter, Randomized, Double-Masked, Sham Injection-controlled Study of the Efficacy and Safety of rhuFAB V2 in Subjects with Minimally Classic or Occult Neovascular Age-Related Macular Degeneration." Marina FVF2598g study. Wilmer Eye Institute (Multi-center), Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

Regeneron VGFT-OD-0502 an Exploratory Study of the Safety, Tolerability and Biological Effect of Intravitreal Administration of VEGF Trap in Patients with Neovascular Age-related Macular Degeneration. Wilmer Eye Institute (Multi-center), Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

Uveitis associated macular edema, a randomized, Double-Masked, Parallel Group, Multi-Center, Dose Ranging Pilot Study of Denufosol Tetrasodium (INS37217) Intravitreal Injection in subjects with Uveitis associated Macular Edema. Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

CDME 1 Celebrex "Preliminary multi-center assessment of laser and medical treatment of diabetic macular edema." NEI and Pharmacia. Start April 2003. Wilmer Eye Institute (Multi-center), Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

An Open Label, Pilot (Phase I/II), Dose-Escalation Safety and Tolerability Study of Combretastatin A4 Phosphate in Patients with Neovascular Age-Related Macular Degeneration " Sponsor: Foundation Fighting Blindness. Wilmer Eye Institute (Multi-center), Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

GV-003.001 An open-label, Phase 1, Single administration, Dose-Escalation Study of AdGVPEDF.11D in Neovascular Age-Related Macular Degeneration (AMD) Wilmer Eye Institute (Multi-center), Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

Lucentis (ranibzumab) intravitreous for BRVO and CRVO. Wilmer Eye Institute (Single Center), Johns Hopkins University School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

NO-03-11-05-03, Evaluation of the Retina of Subjects without Diabetes Mellitus and Subjects with Diabetes Mellitus without Diabetic Retinopathy using Optical Coherence Tomography.

Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

VGFT-OD-0305 an exploratory Study of the Safety, Tolerability and Biological Activity of Intravenously Administered VEGF Trap in Patients with Neovascular Age-Related Macular Degeneration. Regeneron Pharmaceuticals/Aventis Pharmaceuticals. Wilmer Eye Institute (Multi-center), Johns Hopkins University, School of Medicine, Baltimore, MD. Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

VGFT-OD-0306 Regeneron Pharmaceuticals/Aventis Pharmaceuticals. Wilmer Eye Institute (Multi-center), Johns Hopkins University, School of Medicine, Baltimore, MD. Wilmer Eye Institute, Johns Hopkins University, School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

VGFT-OD-0307 an Exploratory Study of the Safety, Tolerability and Biological Activity of Intravenously Administered VEGF Trap in Patients with Diabetic Macular Edema. Regeneron Pharmaceuticals, Inc. Co-Investigator. Time Commitment: Less than 1%

Genetic Epidemiology of Retinopathy in Patients with Type 1 Diabetes. JDF Core Grant. Wilmer Eye Institute, Johns Hopkins University School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

Supplemental Inspired Oxygen for Hypoxia-Mediated Retinal Diseases. Wilmer Eye Institute, Johns Hopkins University School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

A Phase II Non-Randomized, Multicenter, Open Label Safety and Performance Evaluation of the DDS Applicator Used for the Delivery of the Dexamethasone Posterior Segment Drug Delivery System (DEX PS DDS) into the Eyes of Patients with Macular Edema. Wilmer Eye Institute, Johns Hopkins University School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

A Multi-Center, Randomized, Double-Masked, Placebo-Controlled Parallel-Group Dose Finding Phase II Study of PKC4 12 (50, 100, 150 mg/day) in Patients with Diabetic Macular Edema. Wilmer Eye Institute, Johns Hopkins University School of Medicine, Baltimore, MD. Co-Investigator. Time Commitment: Less than 1%

A Phase II/III Randomized, Single-Masked, Controlled, Dose-Ranging, Multi-Center Comparative Trial, in Parallel Groups. To Establish the Safety and Efficacy of Intravitreal Injections of EYE001 (Anti-VEGF Pegylated Aptamer) Given at 6 Weekly Intervals for 54 Weeks, in Patients with Exudative Age-Related Macular Degeneration (AMD). Co-Investigator. Time Commitment: Less than 1%

A Double-Masked, Randomized, Active-Controlled Study of the Efficacy, Safety, and Tolerability of Intravitreal Administration of VEGF Trap-Eye (Intravitreal Aflibercept Injection [IAI] in Patients with Macular Edema Secondary to Branch Retinal Vein Occlusion, Termination Report: TR00000342 For: NA_00071981. Co-Investigator. Time Commitment: Less than 1%

Change in Research: CIR00003616 For: NA_00008812. Parent Study Name: Review of Outcomes of Secondary Intraocular Lenses Repositioning or Exchange of Patient of the Wilmer Cornea Service. PI: Walter Stark. Time Commitment: Less than 1%

(Co-investigators: Earl Palmer, M.D. and Joseph Robertson, M.D.). Enhanced Screening of Retinopathy of Prematurity: A Feasibility Trial of Combined Ultrasound and RetCam Photography. IRB approved 3/5/99. Principal Investigator, Time Commitment: Less than 20%.

Vitrase: Intravitreal hyaluronidase for non-clearing vitreous hemorrhage. Casey Eye Institute, Oregon health Sciences University, Portland OR. Co-Investigator. Time Commitment: Less than 1%

ORGANIZATIONAL ACTIVITIES

Institutional Administrative Appointments:

2002-2008	Oversight/Production of Wilmer, Research Associate, Web-based Orientation and Updates.
2003 - Present	Member, the Wilmer Research Committee
2003-2004	Member, CRBII Space Planning Committee
2005	Business planning committee the Wilmer Gene Therapy Vector Center, Johns Hopkins University School of Medicine.
2005- Present	Wilmer Retina Division, Retina Research Subcommittee
2005-2006	The Wilmer Gene Therapy Vector Core, Business Planning Group
2006	Neuroscience Blueprint Interdisciplinary Center Core Grants organizational committee, JHU
2006	Member the new Wilmer Building Committee
2007-2010	Board Member the Biomedical Engineering Bio-design Center Programs Development
2006-2007	Clinician Member the NSF Engineering Research Center for Computer-Integrated Surgical Systems and Technology ERC/CISST
2007	Co-organizer the Inaugural Wilmer-Merck Meet, the Wilmer Eye Institute, Johns Hopkins University, School of Medicine, June 5th, 2007.
2007	The Biomedical Design Team Project, Judges Panel, Whitaker Biomedical Engineering Institute at Johns Hopkins University (Master's Program)
2007-2014	Mitchell Prize Committee Member
2007- Present	Member the Advisory Board of the Center for Bioengineering Innovation and Design (CBID), Johns Hopkins University School of Engineering
2008	Member the Wilmer Education Committee
2008	Admissions selection committee. Committee organizer Alison Dunton, Whitaker Biomedical Engineering Institute, Johns Hopkins University.
2008-2013	Wilmer Retina Division, Retina Education Subcommittee
2008-Present	Initiation: the Physician Extender training program: Optometrists in the Retina Clinic in preparation for primary retina care.
2012	Retina section member of the Echography search committee
2013	Retina section member of the Ocular Tumor search committee
2014-Present	Retina section member of the Uveitis search committee
2008-2013	Moderator: Monthly Fellows Meeting
2008-2013	Moderator: Monthly Retina Division Surgery and Education Meeting
2013-Present	Moderator: Monthly Surgery portion of the Surgery and Education Meeting
2012-Present	Member the Perioperative Care Committee

2013-Present	Member the Wilmer Operating Room Review Committee
2014-Present	Member the Wilmer Operating Room Video System Committee
2015-Present	Member the Wilmer Surgical Enterprise Executive Council
2016	Wilmer Nominee to JHU Pharmacy and Therapeutics Committee
2016	Wilmer Nominee to the first cohort of the JHU Perioperative Management Program

Editorial Activities: Journal Peer Review

1993-present Ad hoc journal reviewer, *Investigative Ophthalmology and Visual Science*
1993-present Ad hoc journal reviewer, *Visual Neuroscience*
1993-present Ad hoc journal reviewer, *Current Eye Research*
1994-present Ad hoc journal reviewer, *Experimental Eye Research*
1996-present Ad hoc journal reviewer, *Survey of Ophthalmology*
2002-present Ad hoc journal reviewer, *Retina*
2002-present Ad hoc journal reviewer, *Archives of Ophthalmology (now JAMA Ophthalmology)*
2003-present Ad hoc journal reviewer, *Ophthalmology*
2004-present Ad hoc journal reviewer, *Expert Opinion in Ophthalmology*
2005-present Ad hoc journal reviewer, *Science*
2006-present Ad hoc journal reviewer, *Molecular Vision*
2006-present Ad hoc reviewer, *Cochrane Reviews*
2007-present Ad hoc reviewer, *American Journal of Ophthalmology*
2007-present Ad hoc reviewer, *Peroxisome Proliferator-Activated Receptor (PPAR) Research*
2007-present Ad hoc reviewer, *Current Molecular Medicine*
2012-present Ad hoc reviewer, *Journal of International Ophthalmology*
2013-present Ad hoc reviewer, *Journal of Investigative Medicine High Impact Case Reports*
2013-present Ad hoc reviewer, IEEE *International Conference on Robotics and Automation*

Advisory Committees, Review Groups/Study Sections

2004-2005	American Academy of Ophthalmology, (2004-2005) Committee Member, Continuing Education and Recertification.
2005-2007	Fight for Sight, Scientific Review Committee
2005-Present	Advisory Committee, MRI Molecular Imaging Program, CRBII
2007-Present	Member the Advisory Board of CBID Center for Bioengineering Innovation and Design, Johns Hopkins University School of Engineering
	2007-Present National C.M.E. Speakers Bureau, Appointed by the Cleveland Clinic, Cole Eye Institute. "Combination Therapy for Age-related Macular Degeneration."
2007-2009	Grants Review Committee, Fight for Sight, Inc, 381 Park Avenue South, Suite 809, New York, NY 10016. Grants Review Committee, Research into Ageing, 207-221 Pentoville Road, London, U.K. N1 9UZ.
2009-Present	National expert witness: Role, review and testimony on patients with disease of the vitreous and retina
2013	Grants Review Committee Collaborative Team External Grants Review. Alberta Innovates Health Solutions. Alberta Canada, Alberta Gene Therapy Team.

2013	American Academy of Ophthalmology, (2013-2014) Committee Member, Industry Training Task Force
2014	Alcon Vitreoretinal Surgical Advisory Board Invitation (Withdrew same year due to potential conflicts of interest relating to upcoming on site review of our own technology)
2014-Present	Wilmer Eye Institute, Grants Review Committee, KKESH

Professional Societies

-The American Academy of Ophthalmology (Current Member)
-The Association for Research in Vision and Ophthalmology (Current Member)
-The Macula Society (Current Member)
-Research to Prevent Blindness (RPB) (Current Member)
-The American Society of Retinal Specialists (Current Member)
-European Vitreoretinal Society (Current Member)
-The Johns Hopkins University Faculty Association (Current)
-The Institute of Electrical and Electronics Engineers (IEEE) (Current Member)
-The Juvenile Diabetes Research Foundation International (Current Member)
-The Wilmer Residents Association (Current Member)
-The National Marfan Foundation (Current Member)
-Maryland Eye Physicians Society (Current Member)
-The American Medical Association (Current Member)
-The American Society of Gene Therapy (Past Member)
-The American College of Eye Surgeons (Past Member)
-The National Institutes of Health, Special Interest Group, Gene Therapy (Past Member)
-The Oregon Academy of Ophthalmology (Past Member)
-The Missouri Ophthalmologic Society, Inc. (Past Member)
-The Oregon Medical Association (Past Member)
-The American College of Surgeons, candidate (Past Member)
-The Minnesota Chapter of the American College of Surgeons (Past Member)
-The Medical Society of Metropolitan Portland (Past Member)
-The Washington University Eye Alumni Association (Past Member)
-The Voyageurs' Chapter, Society for Neuroscience (Past Member)
-The Ramsey County Medical Society (Past Member)
-The Contact Lens Association of Ophthalmologists (Past Member)
-The American Society of Cataract and Refractive Surgery (Past Member)

Conference Organizer/Session Chair

2001	Atlantic Coast Retina Conference, Baltimore, MD Session Chair
2003	Gene Therapy Section, Western Eye Research Conference,Session Chair
2003	Western Eye Research Council, Association for Research Planning Committee, In Vision and Ophthalmology
2003	Western Eye Research Council, Association for Research Fund Raising Committee, In Vision and Ophthalmology
2005	Western Eye Research Council, Association for Research Planning Committee, In Vision and Ophthalmology
2005	Western Eye Research Council, Association for Research Fund Raising Committee, In Vision and Ophthalmology
2005	Gene Therapy Section, Western Eye Research Council, Session Chair

	Association for Research, in Vision and Ophthalmology.
2006	JHU Interdisciplinary effort to integrate imaging, Hopkins I4M Symposium engineering and the medical sciences, Session leader
2005-08	Bimonthly, Friday Afternoon Research Meeting, F.A.R.M. Co-Organizer: Wilmer Eye Institute, Johns Hopkins University School of Medicine, Conference
2007	Pacific Ocular Regenerative Biology Conference XII Planning Committee
2007	Pacific Ocular Regenerative Biology Conference XII Fund Raising Committee
2007	Wilmer Research Meeting. Section, Molecular Biology Session Co-Chair & Development, Patz Lecture Hall, Wilmer Eye Johns Hopkins University School of Medicine
2007	Stem Cells and Growth Factors in Age-Related Macular Session Co-Chair Degeneration Section, Pacific Ocular Regenerative Biology Conference XII
2008	The Wilmer Resident Association Meetings Chair Retina Section
2013-16	Current Concepts in Ophthalmology Chair Retina Section

Consultant

1991-1994	Consultant (Unpaid) Biomedical Frontiers, Inc., Minneapolis, MN, - Consultant (Paid) E.M.P.I, Inc., Minneapolis, MN, 1992
2001-2005	Consultant (Unpaid), Ocular Toxicology and Ophthalmology, Charles River Laboratories, Sierra Biomedical Division, Sparks, Nevada
2001-2005	Consultant (Unpaid), GenVec, Inc., Gaithersburg, MD
2004-2006	Consultant (Paid) Celgene, Okto Ophtho, Processed human amniotic membrane technology
2004-2012	Consultant (Unpaid), Gerson Lehrman Group's Council of Healthcare Advisors, - Consultant
2005-Present	(Unpaid) Sclera, Laguna Beach, California
2006-2008	Consultant (Paid) QLT, Inc. (early treatment of age related macular degeneration, lipid biology in AMD, novel antiangiogenic peptides, immune mechanisms in AMD and enhancement of phase 2 enzymes in AMD- Consultant (Paid) Acumen Medical Consultants
2006-2008	Consultant (Unpaid) Merck (therapeutic strategy development in AMD and glaucoma care)
2007-2009	Consultant (Unpaid) Alcon, Inc. (enhancement of phase 2 enzymes, advanced vitreoretinal surgery systems)
2007-2009	Consultant (Paid) Five Prime Therapeutics, San Francisco, CA
2007-2009	Consultant (Unpaid) Hamilton Beach (Retinal light toxicity of novel devices)
2013-present	Consultant (Unpaid) Lutronic, Seoul, South Korea

RECOGNITION

Awards, Honors

1986	Medical College, Annual Surgical Research Prize Winner, University of Vermont Judd Scholarship, Willet Ely Scholarship, Edith B. Kidder Scholarship
1989	University of Health Sciences the Chicago Medical School Surgical Research Scholarship

1990	Awarded Lake Itasca Neuroscience, Neurobiology Field Laborator Competitive Scholarship University of Minnesota, Minneapolis, MN
1992	Winner of the Minnesota Medical Foundation's J. Jacob Kaplan (Best Clinical Research Award), University of Minnesota, Minneapolis, MN
1992	Winner of the I.J. Fox (Best Basic Science Research Award) Department of Physiology, University of Minnesota, Minneapolis, MN
1992	Department Nominee for a competitive Thesis Dissertation Fellowship, University of Minnesota, Minneapolis, MN
1995	Hemingway Award Winner, University of Minnesota, Minneapolis, MN
1998-1999	Ophthalmology Fellowship, Heed Ophthalmic Foundation Fellowship
1999-2000	Vitreoretinal Fellowship (Clinical) American Ophthalmological Society – Knapp Fellowship
1999	Vitreoretinal Fellowship (Clinical) ARVO/National Eye Institute Travel Fellowship
2000-2001	Faculty, Inaugural Maumenee Clinician Scientist Scholar, the Wilmer Eye Institute, Johns Hopkins University, awarded following competitive national search
2002	Knights Templar Eye Foundation Award
2003-2005	Faculty, Research to Prevent Blindness Career Development Award
2004	Faculty (Clinical) Consumer Research Council of America, Listing Guide America's Top Ophthalmologists
2006	Faculty (Clinical) Consumer Research Council of America, Listing Guide America's Top Ophthalmologists
2007-2008	Fight for Sight Awardee
2008	Faculty (Clinical) Consumer Research Council of America, Listing Guide America's Top Ophthalmologists
2012	Faculty (Clinical) International Association of Ophthalmologists: A Top Ophthalmologist in Baltimore
2015	A top Ophthalmologist in Baltimore by the International Association of Ophthalmologists.
2015	Johns Hopkins Medicine Clinical Awards: Nomination for Excellence in Service and Professionalism Award. (One of thirty, out of approximately 3700 JHU clinical faculty; one of two in the Wilmer Eye Institute)

Membership in Honorary Societies:

Sigma Xi, the Scientific Research Society
AOS HEED Society
AOS Knapp Fellow
The Macula Society

Invited Talks, Panels:

1992	Schauer BA, Purple RL, **Gehlbach PL**. Retinal Toxicity of the Iron Chelator L1™ in an Albino Rat Model. University of Minnesota, Summer Research Forum, August 1992.
1992	**Gehlbach PL**. Conjugated Deferoxamine Reduces Deferoxamine Induced Retinal Toxicity In An Albino Rat Model. Association for Research in Vision and Ophthalmology, Annual Meeting, Sarasota, FL. May 1992; The Voyageur's Society of Neuroscience, University of Minnesota, May 1992.
1993	**Gehlbach PL**, Hoey M, Getachew J. Duodenal motor activity initiated by a "Gastrointestinal Chemical Pacemaker, is propagated in a rabbit model of

adynamic ileus. University of Minnesota, Summer Research Forum, August 19, 1993.

1993 **Gehlbach PL**. A Paired Comparison of Post Ischemic Recovery in Two Models of Experimental Retinal Ischemia. Association for Research in Vision and Ophthalmology, Annual Meeting, Sarasota, FL. May 7, 1993.

1993 **Gehlbach PL**. Conjugated Deferoxamine Enhances Recovery Following Ischemia and Reperfusion Injury in the Cat Retina. Association for Research in Vision and Ophthalmology, Annual Meeting, Sarasota, FL. May 7, 1993.

1994 **Gehlbach PL**. Ph.D. Thesis Defense: The Role of Iron in Ischemia/Reperfusion Injury in the Cat Retina. A University of Minnesota, Physiology Seminar, December 8, 1994.

1995 **Gehlbach PL**. A Role for Iron in Retinal Ischemia/Reperfusion Injury. Washington

University in St. Louis, Department of Ophthalmology and Visual Sciences Common Research Symposium. March 1995.

1996 **Gehlbach PL**. Developmental Expression of N M.D.A Receptor Subunits and N M.D.A-mediated Toxicity in Rat Retina. Association for Research in Vision and Ophthalmology, Annual Meeting, Ft. Lauderdale, FL. April 25, 1996.

1997 Thomas MA, **Gehlbach PL**. Subretinal Endolaser Photocoagulation of a Recurrent Juxtafoveal Neovascular Membrane in Presumed Ocular Histoplasmosis Syndrome. Association for Research in Vision and Ophthalmology, Annual Meeting, Ft. Lauderdale, FL May 1997.

1997 **Gehlbach PL**. Thomas MA. Surgical Treatment of Choroidal Neovascular Membranes Associated with Angioid Streaks. Association for Research in Vision and Ophthalmology, Annual Meeting, Ft. Lauderdale, FL. May 1997.

1999 **Gehlbach PL**. Diabetic Retinopathy: Clinical Overview and Topics in Research. The Oregon Health Sciences University, Immunology/Molecular Biology Lecture Series. January 1999.

1999 Gurdian SJ, **Gehlbach PL**, Hunyor PA, Robertson JE. Retinal Detachment Associated with Subthreshold Retinopathy of Prematurity. Investigative Ophthalmology & Visual Science Annual Meeting. May 1999.

1999 **Gehlbach PL**, Hiner CJ, Klein ML. Comparison of Binocular vs. Monocular Interpretation of Fluorescein Angiograms in Neovascular Age Related Macular Degeneration. Investigative Ophthalmology & Visual Science Annual Meeting May 1999.

1999 **Gehlbach PL**. (Invited Speaker) Enhanced Screening Techniques in Retinopathy of Prematurity University of Wisconsin, Invited Retina Conference Speaker. May 1999.

2001 **Gehlbach PL**. (Invited Speaker) Gene Therapy in Ocular Neovascularization. The Wilmer Resident Association. The Sixtieth Clinical Meeting, Johns Hopkins University Medical School, April 27, 2001.

2001 **Gehlbach PL**, Mori K, Ando A, Gunther V, Brough D, Wei L, Campochiaro PA. Adenovirus Mediated Reporter Gene Transfer In Normal

and PDGF Transgenic Mice. Association for Research in Vision and Ophthalmology, Presentation, April 30, 2001.

2001 **Gehlbach PL**. (Invited Speaker) Adenoviral Vectored PEDF, Methods and Analysis: Annual Report, Multi-gene Therapy Strategies, Gene Therapy to Affect Blood Retinal Barrier Permeability Changes, Gene Therapy with Pigmented Epithelium Derived Factor and the Soluble Receptor of Vascular Endothelial Growth Factor. GenVec, Inc. Gaithersburg, MD. October 29, 2001.

2001 **Gehlbach PL**. (Invited Speaker) Ocular Gene Therapy, Diabetes. Maryland Chapter of Juvenile Diabetes Foundation International, Baltimore, MD. November 8, 2001.

2001 **Gehlbach PL**. (Invited Speaker) Gene Therapy Update: Retinal and Choroidal Neovascularization. Current Concepts in Ophthalmology. Baltimore, MD. December 6, 2001.

2002 **Gehlbach PL**. (Invited Speaker) Adenovirus in Clinical Trials, Age-Related Macular Degeneration, Ocular Reading Centers and Clinical Trials, Periocular Injection of the Endogenous Inhibitors of Pathologic, Ocular Neovascularization. GenVec, Inc. February 2002.

2002 **Gehlbach PL**. (Invited Speaker) Age Related Macular Degeneration: Is there a Role for Gene Therapy? The Wilmer Macular Degeneration Center, Johns Hopkins at Green Spring Station. June 18, 2002.

2003 **Gehlbach PL**. (Invited Speaker) Ocular Gene Therapy: Retinal and Choroidal Neovascularization. F.A.R.M., Wilmer Eye Institute. Baltimore, MD. February 21, 2003.

2004 **Gehlbach PL**. Invited panelist representing Current/Prospective K Awardees. The National Eye Institute, David G. Cogan Clinician Scientist Symposium, Natcher Conference Center. December 13-14, 2004.

2005 **Gehlbach PL**, Cano M, Hose S, Zigler S, Jr, Goldberg MF, Sinha D. Nuc1: A Novel Spontaneous Mutation Affecting Vascular and Neuronal Architecture in the Retina. The 64th Wilmer Residents Clinical Meeting. Turner Auditorium, Johns Hopkins University School of Medicine, April 23, 2005.

2005 **Gehlbach PL**, M Cano, SL Hose, R Grebe, MF Goldberg, JS Zigler Jr, D Sinha. The Nuc1 Mutation Affects the Rat Retina and Retinal Vasculature. Association for Research in Vision and Ophthalmology, Presentation, May 1, 2005.

2005 **Gehlbach PL**. (Invited Speaker). Vanderbilt Eye Institute Academic Seminar Series, opening speaker. Ocular Gene Therapy, Basic and Preclinical Studies. Sept 12, 2005.

2005 **Gehlbach PL**. (Invited Speaker) Wilmer Advisory Council, Patz Auditorium, Wilmer Eye Institute, Johns Hopkins University School of Medicine. A Potential Role for Statins in AMD. October 28, 2005.

2005 **Gehlbach PL**. (Invited Speaker) JHU Continuing Medical Education Course on Diabetic Retinopathy and Venous Occlusive Disease "What's New in Diabetic Retinopathy and Venous Occlusive Disease" Persistent

Diabetic Macular Edema: What is OCT Telling Us? Turner Auditorium, Johns Hopkins University School of Medicine, Friday, October 28, 2005.

2006 **Gehlbach PL**. (Invited Group Leader) Hopkins I4M Symposium "Integrating Imaging, Intervention and Informatics in Medicine, February 27, 2006.

2006 **Gehlbach P**. Invited Lecturer: Viral Vector Symposium, Johns Hopkins University School of Medicine, Baltimore, Maryland. "Business Planning for a Viral Vector Core". Course Director John Nicholas Ph.D., Department of Viral Oncology, May 10, 2006.

2006 **Gehlbach P**. Invited Lecturer: Viral Vector Symposium. Johns Hopkins University School of Medicine, Baltimore, Maryland. "Gene Therapy for Retinal and Choroidal Neovascularization". Course Director John Nicholas Ph.D., Department of Viral Oncology, May 10, 2006.

2006 **Gehlbach PL**. (Invited Moderator and Discussant) JHU Continuing Medical Education Course Update on Age-related Macular Degeneration "Neovascular AMD" Turner Auditorium, Johns Hopkins University School of Medicine. May 13, 2006.

2006 **Gehlbach PL**. (Invited Moderator and Panelist) Continuing Medical Education Course: What's New in Diabetic Retinopathy and Venous Occlusive Disease? Turner Auditorium. Johns Hopkins University School of Medicine. November 3, 2006.

2007 **Gehlbach PL**. (Invited Speaker) Geographic Atrophy-Treatments on the Horizon, JHU Continuing Medical Education Course: "Macula 2007", Turner Auditorium, Johns Hopkins University School of Medicine. January 13, 2007.

2007 **Gehlbach PL**. (Invited Moderator and Discussant) Molecular Biology and Development, Wilmer Research Meeting, Patz Auditorium, Johns Hopkins University School of Medicine. April 19, 2007.

2007 **Gehlbach PL**. (Invited Speaker) Biomedical Engineering Design Day, the Whitaker Biomedical Engineering Institute, Johns Hopkins University. May 2, 2007.

2007 **Gehlbach PL**. (Invited Speaker) The Inaugural Wilmer-Merck Meet, June 5, 2007. *β and γ* Crystallins in Vascular Remodeling. Maumenee 501, Wilmer Eye Institute, Johns Hopkins University School of Medicine.

2007 Popel AS and **Gehlbach PL**. (Invited Speakers) The Inaugural Wilmer-Merck Meet, June 5, 2007. Antiangiogenic Peptides for Prevalent Ocular Disease. Maumenee 501, Wilmer Eye Institute, Johns Hopkins University School of Medicine.

2007 Chang YN and **Gehlbach PL**. (Invited Speaker) The Inaugural Wilmer-Merck Meet, June 5, 2007. Basic and Preclinical Development of the High Through-put SV40 Viral Vector for Ocular Application. Maumenee 501, Wilmer Eye Institute, Johns Hopkins University School of Medicine.

2007 **Gehlbach P**. Invited Speaker, Judges Panel, Biomedical Engineering Undergraduate Project Proposals. (10 projects) Clark Hall, Johns Hopkins University School of Biomedical Engineering, Baltimore, Maryland. Oct 2, 2007.

2007 **Gehlbach PL**. (Invited Speaker) What's New in Diabetic Retinopathy and Venous Occlusive Disease? Vector Mediated Treatments: Could It Apply to Diabetic Retinopathy? Thomas B. Turner Auditorium, Johns Hopkins University School of Medicine, Baltimore, MD. October 12, 2007.

2008 **Gehlbach PL**. (Invited Speaker) Age-Related Macular Degeneration in 2008, New Answers and New Questions, Genetics in AMD: What Should We Tell Our Patients*?* Tilgham Auditorium, Johns Hopkins University School of Medicine, Baltimore, MD. May 17, 2008.

2009 **Gehlbach PL**. (Invited Speaker) Age-Related Macular Degeneration in 2009: The Paradigm Continues to Evolve. Thomas B. Turner Auditorium, Johns Hopkins University School of Medicine, Baltimore, MD. June 13, 2009.

2009 **Gehlbach P**. Invited Speaker, Judges Panel, Biomedical Engineering Masters Project Proposals. (10 projects) Turner Concourse West, Johns Hopkins University School of Biomedical Engineering, Baltimore, Maryland. Sept, 2009.

2009 **Gehlbach PL**. (Invited Guest Lecturer CSEB B17. Computer-Integrated Surgery Department of Engineering. Johns Hopkins University School of Medicine, Baltimore, MD. September 24, 2009.

2009 **Gehlbach PL**. (Invited Speaker) What's New in Diabetic Retinopathy and Venous Occlusive Disease? Vitrectomy for Diabetic Retinopathy Thomas B. Turner Auditorium, Johns Hopkins University School of Medicine, Baltimore, MD. November 20, 2009

2010 **Gehlbach PL**. (Invited Speaker) AntiVEGF Therapy in Stage 2 Coats Disease. Atlantic Coast Retina Club Annual Meeting. Thomas B. Turner Auditorium, Johns Hopkins University School of Medicine, Baltimore, MD. January, 22 2010.

2010 **Gehlbach PL**. (Invited Speaker) When is Scleral Buckle a Primary Treatment for Retinal Detachment. Macula 2010, Thomas B. Turner Auditorium, Johns Hopkins University School of Medicine, Baltimore, MD. January 23, 2010.

2010 **Gehlbach PL**. (Invited Speaker and Panel Leader) Maryland Optometric Association Meeting 2010: Retinal protection Statin and vitamin use. Tilgham Auditorium, Johns Hopkins University School of Medicine, Baltimore, Maryland. March 7, 2010. (Talk summary reported in Optometry Times).

2010 **Gehlbach PL**. (Invited Speaker and Panel Leader) Maryland Optometric Association Meeting 2010: BRAOs, BRVOs are serious occurrences but some clinical studies suggest interesting "silver linings" for some affected patients. Tilgham Auditorium, Johns Hopkins University School of Medicine, Baltimore, Maryland. March 7, 2010. (Talk summary reported in Optometry Times)

2010 **Gehlbach PL**. (Invited Speaker) Ocular Gene Therapy. Saitama Gala, Saitama University, Japan. On the occasion of the inauguration of the Saitama Laser and Retinal Surgery Center, March 27, 2010.

2010 **Gehlbach PL**. (Invited Speaker) Free-hand surface tracking and motion compensation based on common-path optical coherence tomography distance sensor for retina vitreoretinal surgery. 21th Annual Wilmer Eye

Institute Research Meeting. Owens Auditorium, CRB II building Friday, April 23, 2010.

2011 **Gehlbach PL**. (Visiting Professor) Surgery for Proliferative Diabetic Retinopathy. Department of Ophthalmology and Visual Sciences Albert Einstein College of Medicine and Montefiore Medical Center, New York, New York.11/13/2011.

2011 **Gehlbach PL**. (Invited Speaker) Retinal care in diabetes. Johns Hopkins Comprehensive Diabetes Center, 601 North Caroline, Johns Hopkins Hospital, April 19, 2011.

2011 **Gehlbach PL**. (Invited Speaker) Morbidity and Mortality Conference. The Wilmer Eye Institute, Johns Hopkins University School of Medicine. Patz Auditorium. September 19, 2011.

2011 **Gehlbach PL**. (Invited Speaker) 41st Anniversary/New Horizons in Retina Meeting. Potential New Imaging and Instrumentation in Retinal Surgery. Victor, Idaho June 30-July 2, 2011.

2011 **Gehlbach PL**. (Invited Speaker) 2011 Diabetic Retinopathy and Venous Occlusive Disease Course. Vitrectomy for Proliferative Diabetic Retinopathy; and (Moderator) Surgical Case Presentations. Johns Hopkins University School of Medicine, Turner Auditorium. November 11, 2011.

2011 **Gehlbach PL**. (Invited Speaker) The Role of Retinal Surgery in Proliferative Diabetic Retinopathy. Current Concepts in Ophthalmology. Johns Hopkins University School of Medicine, Turner Auditorium. December 2, 2011.

2012 **Gehlbach PL**. (Invited Discussant) 71st Wilmer Residents Association Clinical Meeting. Surgical Outcomes of Severe Diabetic Retinopathy with Traction Retinal Detachments at Wilmer. Turner Auditorium, Johns Hopkins Hospital, Baltimore, MD. June 8, 2012.

2012 Salehi M, **Gehlbach P**. A case of punctate inner choroidopathy. AAO 2012, Phoenix, October 24-27, 2012.

2012 **Gehlbach PL**. (Retina Program Chair/Invited Speaker) 25th Annual Current Concepts in Ophthalmology. Vitreomacular Adhesion: Observation vs. Ocriplasmin vs. Vitrectomy; and Introduction of Smiddy Lecture. Johns Hopkins University School of Medicine, Turner Auditorium. December 6, 2012.

2013 **Gehlbach PL**. (Invited Speaker) Atlantic Coast Retina Conference-2013. Subretinal Perfluorochemical. Turner Auditorium, Johns Hopkins University School of Medicine, Baltimore, Maryland. January 18, 2013.

2013 **Gehlbach PL**. (Invited Panelist) Macula 2013. Retinal Tears and Detachment: What's a Retina Specialist to Do? Thomas B. Turner Building, Johns Hopkins University School of Medicine, Baltimore, Maryland. January 19, 2013.

2013 **Gehlbach PL**. (Invited Speaker and Panel Leader) 6th Annual Evidence Based Care in Optometry Conference: Evidenced Based Care in Retina: 2013 Highlights. BWI Marriott, Linthicum Heights, Maryland. March 10, 2013.

2013 **Gehlbach PL**. (Invited Discussant) 72nd Wilmer Residents Association Clinical Meeting. Factors Affecting Visual Outcomes in Patients with

Diabetic Macular Edema; and Oxidative Stress and NRF2 Signaling in the Aging RPE and Retina. Tilghman Auditorium, Johns Hopkins Hospital, June 14, 2013.

2013 **Gehlbach PL**. (Visiting Professor) Grand Rounds, Resident Case Conference and the Monthly Research Conference. Vitrectomy for Proliferative Diabetic Retinopathy and Potential New Imaging and Instrumentation for Retinal Surgery. The University of Louisville, Louisville, KY June 20, 2013.

2013 **Gehlbach PL**. (Invited Speaker) The American Society of Retina Specialists. Handheld Vitreoretinal SMART Microforceps with Active Tremor Reduction. Toronto, Ontario, Canada. August 26, 2013.

2013 **Gehlbach PL**. (Invited Speaker and Panel Discussant) What's New in Diabetic Retinopathy and Venous Occlusive Disease? Vitrectomy for Proliferative Diabetic Retinopathy; and Surgical Case Presentations. Thomas B. Turner Building, Johns Hopkins University School of Medicine, Baltimore, Maryland. October 11, 2013.

2013 **Gehlbach PL**. (Retina Program Chair/Invited Speaker) 26th Annual Current Concepts in Ophthalmology. Cooperative Management of the Complicated Lens by the Anterior and Posterior Segment Surgeon. Johns Hopkins University School of Medicine, Turner Auditorium. December 6, 2013.

2013 **Gehlbach PL**. (Visiting Lecturer) Retina Case Conference and Panel Discussion. Hadassah Hebrew University Medical Center, Jerusalem, Israel. December 25, 2013.

2013 **Gehlbach PL**. (Visiting Lecturer) Weekly Ophthalmology Grand Rounds. Hadassah Hebrew University Medical Center, Jerusalem, Israel. December 25, 2013.

2013 **Gehlbach PL**. (Visiting Lecturer) Clinical Grand Rounds: Vitrectomy for Proliferative Diabetic Retinopathy. Hadassah Hebrew University Medical Center, Jerusalem, Israel. December 27, 2013.

2013 **Gehlbach PL**. (Visiting Lecturer) Research Grand Rounds: Potential New Imaging and Instrumentation for Retinal Surgery. Hadassah Hebrew University Medical Center, Jerusalem, Israel. December 27, 2013.

2013 **Gehlbach PL**. (Visiting Lecturer) Clinical Lecture: Cooperative Management of the Difficult Lens by the Anterior and Posterior Segment Surgeon. Hadassah Hebrew University Medical Center, Jerusalem, Israel. December 27, 2013.

2013 **Gehlbach PL**. (Visiting Lecturer) Clinical Lecture: Management of Vitreomacular Adhesion: Observation vs. Ocriplasmin vs. Vitrectomy. Hadassah Hebrew University Medical Center, Jerusalem, Israel. December 27, 2013.

2013 **Gehlbach PL**. (Visiting Lecturer) Clinical Lecture: Fundamentals of Scleral Buckling Surgery. Hadassah Hebrew University Medical Center, Jerusalem, Israel. December 27, 2013.

2013 **Gehlbach PL**. (Visiting Lecturer) Panel Discussion and Case Presentations with the Jerusalem Ophthalmology Community. Hadassah Hebrew University Medical Center, Jerusalem, Israel. December 27, 2013.

2014 **Gehlbach PL**. (Invited Lecturer) Could Robots Ever Do Retina Surgery? Seventh Annual Evidenced Based Care in Optometry Conference. Maritime Institute, Linthicum Heights, Maryland. March 9, 2014.

2014 **Gehlbach PL**. (Invited Discussant) Medical Revolution by Applied Laser Technology, World Ophthalmology Conference 2014. Advanced laser technology and imaging with a femtosecond, mode-locked laser OCT. Tokyo Kaikan, 3-2-1 Marunouchi, Chiyoda-ku, Tokyo, Japan, April 3, 2014.

2014 **Gehlbach PL**. (Invited Discussant) SRT Laser Special Interest Group, World Ophthalmology Conference (sponsored by Lutronics, Inc.), Tokyo, Japan, April 5, 2014.

2014 **Gehlbach PL**. Optical-Sensor Guided Intelligent Micro-injector for Retinal Therapy. Association for Research in Vision and Ophthalmology, Annual Meeting, Orlando, FL. May 5, 2014.

2014 **Gehlbach PL**. (Invited Discussant) 73nd Wilmer Residents Association Clinical Meeting. Atrophy in Patients with Neovascular Age Related Macular Degeneration Treated with Anti-Vascular Endothelial Growth Factor. Tilghman Auditorium, Johns Hopkins Hospital. June 13, 2014.

2014 **Gehlbach PL**. (Invited Discussant) 73nd Wilmer Residents Association Clinical Meeting. Atrophy in Patients with Neovascular Age Related Macular Degeneration Treated with Anti-Vascular Endothelial Growth Factors (Roomasa Channa). Tilghman Auditorium, Johns Hopkins Hospital. June 13, 2014.

2014 **Gehlbach PL**. (Session Chair and Invited Discussant) 73nd Wilmer Residents Association Clinical Meeting. Head Mounted Digital Camera for Indirect Ophthalmoscopy (Aaron Wang). Tilghman Auditorium, Johns Hopkins Hospital. June 13, 2014.

2014 **Gehlbach PL**. (Invited Speaker) What's New in Diabetic Retinopathy and Venous Occlusive Disease? Vitrectomy for Proliferative Diabetic Retinopathy. Thomas B. Turner Building, Johns Hopkins University School of Medicine, Baltimore, Maryland. November 21, 2014.

2014 **Gehlbach PL**. (Invited Seminar) Electrical Engineering and Computer Science, Whiting School of Engineering. Advances in Retinal Microsurgey: a SMART tool approach, Hackerman 320, Whiting School of Engineering, Johns Hopkins University, November 11, 2014.

2014 **Gehlbach PL**. (Invited Panelist) Retina Surgery Case Conference. Thomas B. Turner Building, Johns Hopkins University School of Medicine, Baltimore, Maryland. November 21, 2014.

2014 **Gehlbach PL**. (Retina Program Chair/Invited Speaker) 27th Annual Current Concepts in Ophthalmology. Cooperative Management of the Complicated Lens by the Anterior and Posterior Segment Surgeon. Johns Hopkins University School of Medicine, Turner Auditorium. December 5, 2014.

2015 Zimmer-Galler I (presenter), Rege A, Dakos A, Wang C, Raje K, Thakor NV, Brooke MJ, **Gehlbach PL**. Preclinical Assessment of Retinal Vasculature Using a Novel, Non-Invasive, Low-Cost, Mobile Imager ATA, Baltimore Maryland. May 18-20, 2015

2015 **Gehlbach PL**. (Division Seminar) SMART Surgical Tools for Retina Surgery. Annual Retina Faculty Research Program Presentation. Maumenee 5th floor conference room, Wilmer Eye Institute, Johns Hopkins University School of Medicine. January 26, 2015.

2015 **Gehlbach PL**. (Session Chair and Invited Discussant) 74nd Wilmer Residents Association Clinical Meeting. Retinal Detachment/Proliferative VitreoretinopathyAfter Open Globe (Dean Eliott); Lucenticell: Sustained Intravitreal Cell Based Production of Ranibizumab (Brad Barnett); Axial Myopia in Marfan Syndrome and Elucidation of Therapeutic and Genetic Modifiers of Disease Progression (Jefferson Doyle). Tilghman Auditorium, Johns Hopkins Hospital. June 19, 2015.

2015 **Gehlbach PL**. (Invited Speaker) What's New in Diabetic Retinopathy and Venous Occlusive Disease? Vitrectomy for Proliferative Diabetic Retinopathy. William H. Welch Medical Library Building, Johns Hopkins University School of Medicine, Baltimore, Maryland. October 30, 2015.

2015 **Gehlbach PL**. (Retina Program Chair/Invited Speaker) 28th Annual Current Concepts in Ophthalmology. Cooperative Management of the Complicated Lens by the Anterior and Posterior Segment Surgeon. Johns Hopkins University School of Medicine, Turner Auditorium. December 4, 2015.

2016 **Gehlbach PL**. (Moderator-Discussant) 157 Retinal Detachment Clinical. Association for Research in Vision and Ophthalmology, Annual Meeting, Seattle, WA. May 1, 2016.

2016 **Gehlbach PL**. (Session Chair and Invited Discussant) 75th Wilmer Residents Association Clinical Meeting. When and How Should Extrafovel Choroidal Neovascular Lesions (EF-CNV) Be Treated? An Analysis of Data from the Macular Photocoagulation Study (MPS) (Jithin Yohannan) Albert H. Owens, Jr. Auditorium, Johns Hopkins Hospital, June 10, 2016.

2016 **Gehlbach PL** and Kang J. (Invited Presentation) Johns Hopkins – Coulter Translational Partnership. Optical Coherence Tomography Image and Sensor Guided Microsurgical Tools With Enhanced Surgical Functions. John G. Rangos Building, 855 Wolfe Street, Baltimore, MD. June 14, 2016.

2016 **Gehlbach PL**. (Invited Speaker) What's New in Diabetic Retinopathy and Venous Occlusive Disease? Vitrectomy for Proliferative Diabetic Retinopathy. Chevy Chase Bank Conference Center, Zayed Building, Johns Hopkins University School of Medicine, Baltimore, Maryland. November 3, 2016.

2016 **Gehlbach PL.** (Invited Speaker) Diabetic Eye Disease. American Academy of Ophthalmology/American Society of Ophthalmic Registered Nurses. McCormick Convention Center Chicago, Il. October 14th, 2016.

2016 **Gehlbach PL**. (Retina Program Chair/Invited Speaker) 29th Annual Current Concepts in Ophthalmology. Current Management of the Complicated Lens. Johns Hopkins University School of Medicine, Turner Auditorium, Baltimore, Maryland. December 2, 2016.

2016 **Gehlbach PL**. (Visiting Professor) Retina Teaching Case Conference and Panel Discussion. The University of Washington, Seattle, WA, USA. December 14-15, 2016.

2016 **Gehlbach PL**. (Visiting Professor) Clinical Grand Rounds: Vitrectomy for Proliferative Diabetic Retinopathy. The University of Washington, Seattle, WA, USA. December 14-15, 2016.

2016 **Gehlbach PL**. (Visiting Professor) Research Grand Rounds: Potential Advances in Retinal Microsurgery. The University of Washington, Seattle, WA, USA. December 14-15, 2016.

2016 **Gehlbach PL**. (Visiting Professor) Clinical Lecture: Cooperative Management of the Complicated Lens. The University of Washington, Seattle, WA, USA. December 14-15, 2016.

2017 **Gehlbach PL**. (Visiting Scientist) Annual Scientific Meeting of the Victorian Branch of The Royal Australian and New Zealand College of Ophthalmologists: Advances in Retinal Microsurgery. The University of Melbourne, Melbourne, Australia. March 4th, 2016.

2017 **Gehlbach PL**. (Visiting Lecturer) Annual Scientific Meeting of the Victorian Branch of The Royal Australian and New Zealand College of Ophthalmologists. Panel Discussant, Diabetic Retinopathy. The University of Melbourne, Melbourne, Australia. March 4th, 2016.

2017 **Gehlbach PL.** (Retina Program Moderator) 3D Video Surgery Presentations. The Retina Festival 2017. Turner Auditorium, Johns Hopkins University School of Medicine, Baltimore, Maryland. May 5, 2017.

2017 **Gehlbach PL.** (Invited Discussant) Expression of the Angiogenic Mediator, Aniopoietin-like 4, in Proliferative Sickle Retinopathy. The 76th Annual Clinical Meeting. The Wilmer Residents Association Meeting. Johns Hopkins University School of Medicine, Baltimore, Maryland. May 19, 2017.

2017 Kang J., Chae J., Lee S., Cheon G, Gonenc B, Lee C, **Gehlbach P**. Intraretinal Injection: Fiber Optics OCT Sensor Guided SMART Micro-injector Enables Precise Intraretinal Injections in Bovine Eyes. ARVO 2017, The Convention Center, Baltimore, Maryland, May 8, 2017.

2017 **Gehlbach PL**. (Visiting Scientist) Annual Scientific Meeting of the Victorian Branch of The Royal Australian and New Zealand College of Ophthalmologists: Advances in Retinal Microsurgery. The University of Melbourne, Melbourne, Australia. March 4th, 2017.

2017 **Gehlbach PL.** (Visiting Lecturer) Annual Scientific Meeting of the Victorian Branch of The Royal Australian and New Zealand College of Ophthalmologists. Panel Discussant, Diabetic Retinopathy. The University of Melbourne, Melbourne, Australia. March 4th, 2017.

2017 **Gehlbach PL**. (Retina Program Moderator) 3D Video Surgery Presentations. The Retina Festival 2017. Turner Auditorium, Johns Hopkins University School of Medicine, Baltimore, Maryland. May 5, 2017.

2017 **Gehlbach PL**. (Invited Discussant) Expression of the Angiogenic Mediator, Aniopoietin-like 4, in Proliferative Sickle Retinopathy. The 76th Annual Clinical Meeting. The Wilmer Residents Association Meeting. Johns Hopkins University School of Medicine, Baltimore, Maryland. May 19, 2017.

2018 **Gehlbach PL.** (Invited Speaker/Session Discussant) Symposium on Diabetic Retinopathy. Smart Surgical Tools for the Vitreoretinal Surgeon. Aravind Eye Hospital, Madurai, India. January 6-7, 2018.

2018 **Gehlbach PL.** (Invited Speaker/Session Discussant) Symposium on Diabetic Retinopathy. Robotics in Diabetic Vitrectomy. Aravind Eye Hospital, Madurai, India. January 6-7, 2018.

2018 **Gehlbach PL.** (Invited Speaker/Session Discussant) XXV Curso Regional Panamericano Oftalmologia. From Robots to Microsurgical Instruments. Cartagena, Columbia. February 8-10, 2018.

2018 **Gehlbach PL** (Moderator) Vitreoretinal Surgery and Endophthalmitis Paper Session. ARVO 2018 Annual Meeting, Honolulu. May 2, 2018.

2018 **Gehlbach PL** (Moderator) Vitreoretinal Surgery: Novel Approaches Poster Session. ARVO 2018 Annual Meeting, Honolulu. May 3, 2018.

2018 **Gehlbach PL** (Panelist) Longitudinal Changes by Multimodal Imaging in Sickle Cell Retinopathy, 77th Annual Wilmer Residents Association Meeting. Baltimore, MD. May 18, 2018.

2018 **Gehlbach PL** (Invited Speaker) SMART Tolls in Retinal Microsurgery, Innovations in Retina Advances in Vitreoretinal Surgery: Trends and Future Directions. Sciences of the Paulista School of Medicine, Sao Paulo, Brazil. Aug 2, 2018.

2018 **Gehlbach PL** (Invited Speaker) Updates in Robotics, Innovations in Retina Advances in Vitreoretinal Surgery: Trends and Future Directions. Sciences of the Paulista School of Medicine, Sao Paulo, Brazil. Aug 2, 2018.

2018 **Gehlbach PL** (US Representative Panelist) Retinal Detachment Session. 18th EVRS Meeting Prague Czech Republic. August 31 2018.

2018 **Gehlbach PL** (Panelist) Age-Related Macular Degeneration. XIV International Retina Congress "Retina y Mar," Mar del Plata, Argentina. September 28, 2018.

2018 **Gehlbach PL** (Panelist) Mysterious Cases. XIV International Retina Congress "Retina y Mar," Mar del Plata, Argentina. September 28, 2018.

2018 **Gehlbach PL** (Panelist) Macular Surgery. XIV International Retina Congress "Retina y Mar," Mar del Plata, Argentina. September 28, 2018.

2018 **Gehlbach PL** (Invited Speaker) Tremor, the Microsurgeon, and Robotics. XIV International Retina Congress "Retina y Mar," Mar del Plata, Argentina. September 28, 2018.

2018 **Gehlbach PL** (Panelist) Lunch with Experts: Robotic Surgery. XIV International Retina Congress "Retina y Mar," Mar del Plata, Argentina. September 28, 2018.

2018 **Gehlbach PL** (Panelist) Lunch with Experts: Cases Unknown. XIV International Retina Congress "Retina y Mar," Mar del Plata, Argentina. September 29, 2018.

OTHER PROFESSIONAL ACCOMPLISHMENTS

Citizenship and Society

2010- 2013 Governor's Appointment; the State of Maryland: Member, the Board of Trustees: Blind Industries and Services of Maryland. (Governor Robert L. Ehrlich, Jr.)

2013- 2015	Reappointed to Three-year term, Governor's Appointment; the State of Maryland: Member, the Board of Trustees: Blind Industries and Services of Maryland. (Governor Martin J. O'Malley)
2015- 2018	Reappointed to Three-year term, Governor's Appointment; the State of Maryland: Member, the Board of Trustees: Blind Industries and Services of Maryland. (Governor Lawrence J. Hogan, Jr.)
2012	Blind Industries and Services of Maryland: Co-chair, Development Committee
2013-Present	Blind Industries and Services of Maryland: Member Development Committee
2012-Present	Blind Industries and Services of Maryland: Finance Committee Member.
2015	Community outreach, Baltimore's Montebello Elementary and Middle School, Career Day, Science, Technology, Engineering and Math (STEM), May 26, 2015
2015	Member of the Wilmer advisory group, meeting with Senator James Brochin, to initiate repeal of language in Children and Youth in Medical Assistance/Medicaid and MCHP Help for Special Health Care law; that would allow children on Medicaid to receive a second pair of glasses when lost or broken, with having to seek approval from DHMH.
2015-Present	Participating host (summer 2015, 2016 planned) the Diversity and Academic Advancement Summer Institute (DAASI). DAASI is a partnership between the Office for Student Diversity at Johns Hopkins University School of Medicine and a non-profit organization, with student stipends being provided in partnership with the Mayor's office.