

CURRICULUM VITAE  
The Johns Hopkins University School of Medicine

(Signature) \_\_\_\_\_  
(Typed Name) Albert S. Jun, MD, PhD

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**DEMOGRAPHIC AND PERSONAL INFORMATION**

**Current Appointments**

Year-present University

2015-present Chief, Division of Cornea, Cataract, and External Diseases, Wilmer Eye Institute  
2018-present Walter J. Stark, MD, Professor of Ophthalmology, The Johns Hopkins University School of Medicine

Year-present Hospital

2002-present Courtesy Staff, The Johns Hopkins Bayview Medical Center  
2003-present Active Staff, Full-time, The Johns Hopkins Hospital

Year-present Other

**Personal Data**

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**Education and Training**

1986-1990 AB Harvard University, Cambridge, MA  
Concentration: Biochemistry

1990-1997 MD Emory University School of Medicine, Atlanta, GA  
PhD Emory University Graduate School of Arts and Sciences, Atlanta, GA  
Concentration: Genetics and Molecular Biology (Thesis advisor: Douglas Wallace, PhD)

1997-1998 Internal Medicine Internship, The Johns Hopkins University/Sinai Hospital of Baltimore  
1998-2001 Ophthalmology Residency, The Johns Hopkins Medical Institutions  
2001-2002 Cornea and External Disease Fellowship, Moorfields Eye Hospital, London, United Kingdom  
2002 Corneal Gene Therapy Research Fellowship, Imperial College School of Medicine, London, United Kingdom (Research advisor: Frank Larkin, MD)

2002-2003 Maumenee Clinician-Scientist Fellowship, The Johns Hopkins Medical Institutions  
2015 Ambulatory Management Program, Johns Hopkins Medicine (see Other Professional Accomplishments section)  
2020 Leadership Development Program, Johns Hopkins Medicine (see Other Professional Accomplishments section)  
2020 Lab to Market Bootcamp: What Johns Hopkins Inventors Need to Know About Commercialization, Johns Hopkins Technology Ventures (see Other Professional Accomplishments section)  
2021-2023 MBA candidate, Johns Hopkins Carey Business School, Baltimore, MD

**Professional Experience**

2001-2002 Assistant, Wilmer Eye Institute  
2002-2004 Instructor, Wilmer Eye Institute

2003-2004	Assistant Chief of Service (Chief Resident) and Associate Director of Ocular Trauma, Wilmer Eye Institute
2004-2010	Director of Medical Student Education, Wilmer Eye Institute
2004-2009	Assistant Professor of Ophthalmology, Wilmer Eye Institute
2009-2015	Associate Professor of Ophthalmology, Wilmer Eye Institute
2011-2016	Vice Chair for Education, Wilmer Eye Institute
2015-2018	Maurice E. Langham, PhD, Professor of Ophthalmology, Wilmer Eye Institute
2015-present	Professor of Ophthalmology, Wilmer Eye Institute
2015-present	Chief, Division of Cornea, Cataract, and External Diseases, Wilmer Eye Institute
2018-present	Walter J. Stark, MD, Professor of Ophthalmology, Wilmer Eye Institute

## PUBLICATIONS:

Original Research [OR] (\* corresponding author, underline indicates primary mentee)

1. **Jun AS**, Brown MD, Wallace DC. A mitochondrial DNA mutation at np 14459 of the ND6 gene associated with maternally inherited Leber hereditary optic neuropathy and dystonia. *Proc natl Acad Sci* 1994;91:6206-6210.
2. Shoffner JM, Brown MD, Stugard CE, **Jun AS**, Pollok S, Haas RH, Kaufman AE, Koontz DA, Kim Y, Graham JR, Smith E, Dixon D, Wallace DC. Leber's hereditary optic neuropathy plus dystonia is caused by a mitochondrial DNA point mutation. *Ann Neurol* 1995;38:163-169.
3. Brown MD, Shoffner JM, Kim YL, **Jun AS**, Graham BH, Cabell MF, Gurley DS, Wallace DC. Mitochondrial DNA sequence analysis of four Alzheimer's and Parkinson's disease patients. *Am J Med Genet* 1995;61:283-289.
4. **Jun AS**, Trounce IA, Brown MD, Shoffner JM, Wallace DC. Use of transmitochondrial cybrids to assign a complex I defect to the mitochondrial DNA-encoded NADH dehydrogenase subunit 6 gene mutation at nucleotide pair 14459 that causes Leber hereditary optic neuropathy and dystonia. *Mol Cell Biol* 1996;16:771-777.
5. Melov S, Coskun P, Patel M, Tuinstra R, Cottrell B, **Jun AS**, Zastawny TH, Dizdaroglu M, Goodman SI, Huang T-T, Mizioro H, Epstein CJ, Wallace DC. Mitochondrial disease in superoxide dismutase 2 mutant mice. *Proc natl Acad Sci* 1999;96:846-851.
6. Brown MD, Trounce IA, **Jun AS**, Allen JC, Wallace DC. Functional analysis of lymphoblast and cybrid mitochondria containing the 3460, 11778, or 14484 Leber's hereditary optic neuropathy mitochondrial DNA mutation. *J Biol Chem* 2000;275:39831-39836.
7. **Jun AS**, Liu S, Koo E, Van Do D, Stark WJ, Gottsch JD. Microarray analysis of gene expression in human donor corneas. *Arch Ophthalmol* 2001;119:1629-1634.
8. Akpek EK, **Jun AS**, Goodman D, Green WR, Gottsch JD. Clinical and ultrastructural features of a novel, autosomal dominant, anterior segment dysgenesis. *Ophthalmology* 2002;109:513-519.
9. **Jun AS**, Broman KW, Do DV, Akpek EK, Stark WJ, Gottsch JD. Endothelial Dystrophy, Iris Hypoplasia, Congenital Cataract, and Stromal Thinning (EDICT) Syndrome Maps to Chromosome 15q22.1-q25.3. *Am J Ophthalmol* 2002;134:172-176.
10. Gottsch JD, Bowers AL, Margulies EH, Seitzman GD, Kim SW, Saha S, **Jun AS**, Stark WJ, Liu SH. Serial analysis of gene expression in the corneal endothelium of Fuchs' dystrophy. *Invest Ophthalmol Vis Sci* 2003;44:594-599.
11. Gottsch JD, Seitzman GD, Margulies EH, Bowers AL, Michels AJ, Saha S, **Jun AS**, Stark WJ, Liu SH. Gene Expression in donor corneal endothelium. *Arch Ophthalmol* 2003;121:252-258.
12. Garibaldi DC, Schein OD, **Jun AS\***. Features of the iridocorneal endothelial syndrome on confocal microscopy. *Cornea* 2005;24:349-351.

13. Reyes JM, Herretes S, Pirouzmanesh A, Wang D-A, Elisseeff JH, **Jun A**, McDonnell PJ, RS Chuck, A Behrens. A modified chondroitin sulfate aldehyde adhesive for sealing corneal incisions. *Invest Ophthalmol Vis Sci* 2005;46:1247-1250.
14. Gottsch JD, Sundin OH, Liu SH, **Jun AS**, Broman KW, Stark WJ, Vito ECL, Narang A, Thompson JM, Magovern M. Inheritance of a novel COL8A2 mutation defines a distinct subtype of Fuchs corneal dystrophy. *Invest Ophthalmol Vis Sci* 2005;46:1934-1939.
15. Sundin OH, **Jun AS**, Broman KW, Liu SH, Sheehan SE, Vito ECL, Stark WJ, Gottsch JD. Linkage of late-onset Fuchs corneal dystrophy to a novel locus at 13ptel-13q12.13. *Invest Ophthalmol Vis Sci* 2006;47:140-5
16. **Jun AS\***, Chakravarti S, Edelhauser HF, Kimos M. Aging changes of mouse corneal endothelium and Descemet membrane. *Exp Eye Res* 2006;83:890-6.
17. Henry C, Navarro V, **Jun A**, Annaberdyev S. Measuring the “fifth vital sign” in cataract surgery patients—is it necessary? *Insight* 2006;31:7-9. [QI]
18. Wang Z, Handa JT, Green WR, Stark WJ, Weinberg RS, **Jun AS\***. Advanced glycation end products and receptors in Fuchs’ dystrophy corneas undergoing Descemet’s stripping with endothelial keratoplasty. *Ophthalmology* 2007;114:1453-60.
19. Hindman HB, McCally RL, Myrowitz E, Terry MA, Stark WJ, Weinberg RS, **Jun AS\***. Evaluation of deep lamellar endothelial keratoplasty surgery using scatterometry and wavefront analyses. *Ophthalmology* 2007;114:2006-12.
20. Suh LH, Zhang C, Chuck RS, Stark WJ, Naylor S, Binley K, Chakravarti S, **Jun AS\***. Cryopreservation and lentiviral mediated genetic modification of human primary cultured corneal endothelial cells. *Invest Ophthalmol Vis Sci* 2007;48:3056-61.
21. Rose L, Briceño CA, Stark WJ, Gloria DG, **Jun AS\***. Assessment of eye bank prepared posterior lamellar corneal tissue for endothelial keratoplasty. *Ophthalmology* 2008;115:279-86.
22. Wu F, Lee S, Schumacher M, **Jun A**, Chakravarti S. Differential gene expression patterns of the developing and adult cornea compared to the lens and tendon. *Exp Eye Res* 2008;87:214-25.
23. Oster SE, Ebrahimi KB, Eberhart CG, Schein OD, Stark WJ, **Jun AS\***. A clinicopathologic series of primary graft failure after Descemet’s stripping and endothelial keratoplasty (DSAEK). *Ophthalmol* 2009;116:609-14.
24. Kelliher C, Engler C, Speck C, Ward D, Farazdaghi S, **Jun AS\***. A comprehensive analysis of eye bank-prepared posterior lamellar corneal tissue for use in endothelial keratoplasty. *Cornea* 2009;28:966-70.
25. Shin YJ, Nishi Y, Engler C, Kang J, Hashmi S, **Jun A**, Gehlbach P, Chuck R. The effect of phacoemulsification energy on the redox state of cultured human corneal endothelial cells. *Arch Ophthalmol* 2009;127:435-41.
26. Engler C, Kelliher C, Speck CL, **Jun AS\***. Assessment of attachment factors for primary cultured human corneal endothelial cells. *Cornea* 2009;28:1050-4.
27. Engler C, Kelliher C, Wahlin K, Speck C, **Jun AS\***. Comparison of non-viral methods to genetically modify and enrich populations of primary human corneal endothelial cells. *Mol Vis* 2009;15:629-37.
28. Lee JS, Desai NR, Schmidt GW, **Jun AS**, Schein OD, Stark WJ, Eghrari AO, Gottsch JD. Secondary angle closure caused by air migrating behind the pupil in Descemet stripping endothelial keratoplasty. *Cornea* 2009;28:652-6.

29. Engler C, Kelliher C, Spitze AR, Speck C, Eberhart CG, **Jun AS\***. Unfolded Protein Response in Fuchs Endothelial Corneal Dystrophy: a Unifying Pathogenic Pathway? *Am J Ophthalmol* 2010;149:194-202.
30. Sikder S, McCally RL, Engler C, Ward D, **Jun AS\***. Evaluation of irradiated corneas using scatterometry and light and electron microscopy. *Cornea* 2011;30:503-7.
31. Sikder S, Ward D, **Jun AS\***. A surgical technique for donor tissue harvesting for Descemet membrane endothelial keratoplasty. *Cornea* 2011;30:91-4.
32. Nishi Y, Engler C, Na DR, Kashiwabuchi RT, Shin YJ, Cano M, **Jun AS**, Chuck RS. Evaluation of phacoemulsification induced oxidative stress and damage of cultured human corneal endothelial cells in different solutions using redox fluorometry microscopy. *Acta Ophthalmol* 2011;88:e323-7.
33. Hindman HB, McCally RL, Kim A, D'Anna SE, Eberhart CG, **Jun AS\***. Evaluation of the effects of circular Descemet's membrane incision on the biomechanical, topographic, and optical properties of rabbit corneas. *Clin Experiment Ophthalmol* 2011;39:691-9.
34. **Jun AS**, Cope L, Feng X, Meng H, Hamad A, Chakravarti S. Cytokine changes in the tear fluid of keratoconus patients. *PLoS One* 2011;6:e16437.
35. Engler C, Chakravarti S, Doyle J, Eberhart CG, Kelliher C, Meng H, **Jun AS\***. Transforming growth factor-beta signaling pathway activation in keratoconus corneas. *Am J Ophthalmol* 2011;151:752-9.
36. Lee BS, Stark WJ, **Jun AS\***. Descemet-stripping Automated Endothelial Keratoplasty: A Successful Alternative to Repeat Penetrating Keratoplasty. *Clin Experiment Ophthalmol* 2011; 39:195-200.
37. Kelliher C, Chakravarti S, Vij N, Mazur S, Stahl PJ, Engler C, Matthaei M, Yu SM, **Jun AS\***. A cellular model for the investigation of Fuchs endothelial corneal dystrophy. *Exp Eye Res* 2011;93:880-8.
38. Engler C, Kelliher C, Chang SD, Meng H, **Jun AS\***. Cryopreservation and long-term culture of transformed murine corneal endothelial cells. *Graefes Arch Clin Exp Ophthalmol* 2012;250:103-10.
39. **Jun AS\***, Meng H, Ramanan N, Matthaei M, Chakravarti S, Bonshek R, Black GCM, Grebe R, Kimos M. An alpha 2 collagen VIII transgenic knock-in model of Fuchs endothelial corneal dystrophy shows early endothelial cell unfolded protein response and apoptosis. *Hum Mol Genet* 2012;21;384-93.
40. Scott S-G, **Jun AS**, Chakravarti S. Sphere formation from corneal keratocytes and phenotype specific markers. *Exp Eye Res* 2011;93:898-905.
41. Kim EC, Kang NY, Bonfadini G, **Jun AS\***. "Iris-assisted," open-sky, continuous curvilinear capsulorhexis technique for combined cataract extraction and corneal transplantation. *Ophthalmic Surg Lasers Imaging*. 2012;43:500-3.
42. Matthaei M, Meng H, Bhutto I, Xu Q, Hanes J, **Jun AS\***. Systematic assessment of microneedle injection into mouse cornea. *Eur J Med Res* 2012;17:19.
43. Matthaei M, Meng H, Meeker AK, Eberhart CG, **Jun AS\***. Endothelial *Cdkn1a* (*p21*) overexpression and accelerated senescence in a mouse model of Fuchs dystrophy. *Invest Ophthalmol Vis Sci* 2012;53:6718-27.
44. Bonfadini G, Ladas JG, Moreira H, Campos M, Matthaei M, Muñoz B, Pratzner K, **Jun AS\***. Improved accuracy of refractive outcomes using an optimized intraocular lens constant in combined endothelial keratoplasty and cataract surgery. *Ophthalmology* 2013;120:234-9.
45. Matthaei M, Lackner E-M, Meng H, Hicks JL, Meeker AK, Eberhart CG, **Jun AS\***. Tissue microarray analysis of cyclin-dependent kinase inhibitors p21 and p16 in Fuchs endothelial corneal dystrophy. *Cornea* 2013;32:473-8.

46. Bonfadini G, Moreira H, **Jun AS**, Campos M, Kim EC, Arana E, Zapparoli M, Ribas Filho JM, McDonnell, PJ. Modified femtosecond laser-assisted sutureless anterior lamellar keratoplasty. *Cornea* 2013;32:533-7.
47. Meng H, Matthaei M, Ramanan N, Grebe R, Chakravarti S, Kimos M, Vij N, Eberhart CG, **Jun AS\***. L450W and Q455K Col8a2 knock-in mouse models of Fuchs endothelial corneal dystrophy show distinct phenotypes and evidence for altered autophagy. *Invest Ophthalmol Vis Sci* 2013;54:1887-97.
48. Matthaei M, Hu J, Meng H, Lackner E-M, Grebe R, Eberhart CG, Qian J, Hao H, **Jun AS\***. Endothelial cell whole genome expression analysis in a mouse model of early-onset Fuchs endothelial corneal dystrophy. *Invest Ophthalmol Vis Sci* 2013;54:1931-40.
49. Kim EC, Meng H, **Jun AS\***. Lithium treatment increases endothelial cell survival and autophagy in a mouse model of Fuchs endothelial corneal dystrophy. *Br J Ophthalmol* 2013;97:1068-73.
50. Li Y, Ho D, Meng H, Chan TR, An B, Yu H, Brodsky B, **Jun AS**, Yu SM. Direct detection of collagenous proteins by fluorescently labeled collagen mimetic peptides. *Bioconj Chem* 2013;24:9-16.
51. Chaerkady R, Shao H, Scott, S-G, Cole R, Pandey A, **Jun AS**, Chakravarti S. The keratoconus proteome: loss of epithelial integrity and stromal degeneration. *J Proteomics* 2013;87:122-31.
52. Lackner E-M, Matthaei M, Meng H, Ardjomand N, Eberhart CG, **Jun AS\***. Design and analysis of keratoconus tissue microarrays. *Cornea* 2014;33:49-55.
53. Srikumaran D, Son, H-S, Doyle JJ, Muñoz B, Stark WJ, McCally RL, **Jun AS\***. Correlation of corneal parameters and visual acuity outcomes after Descemet stripping endothelial keratoplasty. *J Clin Exp Ophthalmol* 2013;4:308.
54. Matthaei M, Hu J, Kallay L, Eberhart CG, Cursiefen C, Qian J, Lackner E-M, **Jun AS\***. Endothelial cell microRNA expression in human late-onset Fuchs dystrophy. *Invest Ophthalmol Vis Sci* 2014;55:216-25.
55. Mitry D, Bhogal M, Patel AK, Lee BS, Chai SM, Price MO, Price FW, Jr., **Jun AS**, Aldave AJ, Mehta JS, Busin M, Allan BD. Descemet's stripping automated endothelial keratoplasty after failed penetrating keratoplasty – survival, risk, and visual outcome. *JAMA Ophthalmol* 2014;132:742-9.
56. Kim EC, Bonfadini G, Todd L, Zhu A, **Jun AS\***. Simple, inexpensive, and effective injector for Descemet membrane endothelial keratoplasty (DMEK). *Cornea* 2014;33:649-52.
57. Kim EC, Meng H, **Jun AS\***. N-acetylcysteine increases corneal endothelial cell survival in a mouse model of Fuchs endothelial corneal dystrophy. *Exp Eye Res* 2014;127:20-5.
58. Foster J, Wu W-H, Scott S-G, Bassi M, Mohan D, Stark WJ, **Jun AS**, Chakravarti S. Transforming growth factor beta and insulin signal changes in stromal fibroblasts of individual keratoconus patients. *PLoS One* 2014;9:e106556.
59. Matthaei M, Zhu AY, Kallay L, Eberhart CG, Cursiefen C, **Jun AS\***. Transcript profile of cellular senescence-related genes in Fuchs endothelial corneal dystrophy. *Exp Eye Res* 2014;129:13-7.
60. Vianna LM, Muñoz B, Hwang FS, Gupta A, **Jun AS\***. Variability in Oculus Pentacam tomographer measurements in keratoconus patients. *Cornea* 2015;34:285-9.
61. Vianna LM, Kallay L, Toyono T, Belfort, Jr., R, Holiman JD, **Jun AS\***. Use of human serum for human corneal endothelial cell culture. *Br J Ophthalmol* 2015;99:267-71.

62. Vianna LM, Stoeger CG, Galloway JD, Terry M, Cope L, Belfort, R Jr, **Jun AS\***. Risk factors for eye bank preparation failure of Descemet membrane endothelial keratoplasty (DMEK) tissue. *Am J Ophthalmol* 2015;159:829-34.
63. Muthappan V, Paskowitz D, Kazimierczak A, **Jun AS**, Ladas J, Kuo IC. Measurement and use of postoperative anterior chamber depth of fellow eye in refractive outcomes. *J Cataract Refract Surg* 2015;41:778-84.
64. Bonfadini G, Arora K, Vianna LM, Campos M, Friedman D, Muñoz B, **Jun AS\***. Quantitative analysis of iris parameters in keratoconus patients using optical coherence tomography. *Arq Bras Oftalmol* 2015;78:305-9.
65. Ladas JG, Siddiqui AA, Devgan U, **Jun AS**. A 3-D “super surface” combining modern intraocular lens formulas to generate a “super formula” and maximize accuracy. *JAMA Ophthalmol* 2015;133:1431-6.
66. Zhu AY, Vianna LMM, Borkenstein E-M, Elisseeff J, **Jun AS\***. Assessment of a novel corneal shaping device with simultaneous corneal collagen cross-linking (CXL) using a porcine eye model. *Cornea* 2015;35:114-21.
67. Vianna LM, Li, H-D, Holiman JD, Stoeger C, Belfort, Jr., R, **Jun AS\***. Characterization of cryopreserved primary human corneal endothelial cells cultured in human serum supplemented media. *Arq Bras Oftalmol* 2016;79:37-41.
68. Singman E, Srikumaran D, Hackett K, Kaplan B, **Jun A**, Preece D, Ramulu P. Benchmarking the Wilmer general eye services clinics: baseline metrics for surgical and outpatient clinic volume in an educational environment. *BMC Med Educ* 2016;16:29.
69. Losick VP, **Jun AS**, Spradling AC. Wound-induced polyploidization: regulation by Hippo and JNK signaling and conservation in mammals. *PLoS One* 2016;11:e0151251.
70. Toyono T, Usui T, Villarreal, Jr, G, Kallay L, Matthaei M, Vianna LMM, Zhu AY, Kuroda M, Amano S, **Jun AS\***. MicroRNA-29b over-expression decreased extracellular matrix mRNA and protein production in human corneal endothelial cells. *Cornea* 2016;35:1466-1470.
71. Botsford B, Vedana G, Cope L, Yiu SC, **Jun AS\***. Comparison of 20% sulfur hexafluoride vs air for intraocular tamponade in Descemet membrane endothelial keratoplasty. *Arq Bras Oftalmol* 2016;79:299-302.
72. Matthaei M, Sandhaeger H, Hermel M, Adler W, **Jun AS**, Cursiefen C, Heindl LM. Changing indications in penetrating keratoplasty: a systematic review of 34 years of global reporting. *Transplantation*. 2017;101:1387-1399.
73. Kim EC, Toyono T, Berlinicke CA, Zack DJ, Jurkunas U, Usui T, **Jun AS\***. Screening and characterization of drugs that protect corneal endothelial cells against unfolded protein response and oxidative stress. *Invest Ophthalmol Vis Sci*. 2017;58:892-900, (ECK and TT are co-first authors).
74. Vedana G, Cardoso FG, Marcon AS, Araujo LEK, Zanon M, Birriel DC, Watte G, **Jun AS**. Cumulative sum analysis score and phacoemulsification competency learning curve. *Int J Ophthalmol* 2017;10:1088-1093.
75. Linz MO, **Jun AS**, Clever SL, Lawson SM, Sanyal A, Scott AW. Evaluation of medical students’ perception of an ophthalmology career. *Ophthalmology* 2018;125:461-2.
76. Li Z, Breitwieser FP, Lu J, **Jun AS**, Asnaghi L, Salzberg SL, Eberhart CG. Identifying corneal infections in formalin-fixed specimens using next generation sequencing. *Invest Ophthalmol Vis Sci* 2018;59:280-88.
77. Foster JW, Shinde V, Soiberman US, Sathe G, Liu S, Wan J, Qian J, Daoud Y, Pandey A, **Jun AS**, Chakravarti S. Integrated stress response and decreased ECM in cultured stromal cells from keratoconus corneas. *Invest Ophthalmol Vis Sci* 2018;59:2977-86.

78. Leonard BC, Jalilian I, Raghunathan VK, Wang W, **Jun AS**, Murphy CJ, Thomasy SM. Biomechanical changes to Descemet's membrane precede endothelial cell loss in an early-onset murine model of Fuchs endothelial corneal dystrophy. *Exp Eye Res* 2018;180:18-22.
79. Yin H, Lu Q, Wang X, Majumdar S, **Jun AS**, Stark WJ, Grant MP, Elisseeff JH. Tissue-derived microparticles reduce inflammation and fibrosis in cornea wounds. *Acta Biomater* 2019;85:192-202.
80. Annadanam A, Stoeger CG, Galloway JD, Hikes MT, **Jun AS\***. Optical coherence tomography assessment of the cornea during corneal swelling: Should the term "Descemet membrane folds" be reconsidered? *Cornea* 2019;38:754-7.
81. Soiberman US, Shehata AEM, Lu MX, Young T, Daoud YJ, Chakravarti S, **Jun AS**, Foster JW. Small molecule modulation of the integrated stress response governs the keratoconic phenotype in vitro. *Invest Ophthalmol Vis Sci* 2019;60:3422-31.
82. DeParis SW, Zhu AY, Majumdar S, Tian J, Elisseeff J, **Jun AS**, Mahoney NR. Effects of collagen cross-linking on porcine and human tarsal plate. *BMC Ophthalmol* 2019;19:255.
83. Wang KM, **Jun AS**, Ladas JG, Siddiqui AA, Woreta F, Srikumaran D. Accuracy of intraocular lens formulas in eyes with keratoconus. *Am J Ophthalmol* 2020;212:26-33.
84. Shehata AE, Foster JW, Sanyal A, **Jun AS**, Soiberman US. The correlation between corneal findings and disease severity in keratoconus per Pentacam tomography. *J Ophthalmol* 2020;4130643.
85. Shinde V, Hu N, Mahale A, Maiti G, Daoud Y, Eberhart CG, Maktabi A, Jun AS, Al-Swailem SA, Chakravarti S. RNA sequencing of corneas from two keratoconus patient groups identifies potential biomarkers and decreased NRF2-antioxidant responses. *Sci Rep* 2020 18;10:9907.
86. Ansah D, Li X, Gehlbach P, **Jun AS**, Soiberman U. Prediction error in iris suture fixated intraocular lenses and long term stability. *Clin Exp Ophthalmol* 2020;48:1175-82.
87. Jabbour S, **Jun AS**, Shekhawat NS, Woreta F, Krick T, Srikumaran D. Descemet membrane endothelial keratoplasty (DMEK) using a pull-through technique with infusion forceps: surgical technique and early outcomes. *Cornea* 2020; Dec 4 online ahead of print.
88. Kim YC, Shin M, Hackett S, Hsueh HT, Lima e Silva R, Date A, Han H, Kim B-J, Xiao A, Kim Y, Ogunnaike L, Anders NM, Hemingway A, He P, **Jun AS**, McDonnell PJ, Eberhart C, Pitha I, Zack DJ, Campochiaro P, Hanes J, Ensign LM. Thin, controlled-release topical ocular gels formed by administration of low concentration thermoreversible polymer solutions in hypotonic aqueous vehicles. *Nat Biomed Eng* 2020;4:1053-62.
89. Angelbello AA, Benhamou RI, Rzuczek SG, Choudhary S, Tang Z-Z, Chen JL, Roy M, Wong KW, Yildirium I, **Jun AS**, Thornton CA, Disney MD. A small molecule binding an RNA repeat expansion stimulates its decay via the exosome complex. *Cell Chem Biol* 2020;S2451-9456(20)30423-2.
90. Uehara H, Zhang X, Pereira F, Narendran S, Choi S, Bhuvanagiri S, Liu J, Kumar SR, Bohner A, Carroll L, Archer B, Zhang Y, Liu W, Gao G, Ambati J, **Jun AS**, Ambati BK. Start codon disruption with CRISPR/Cas9 prevents murine Fuchs' endothelial corneal dystrophy. Submitted.
91. Ladas J, Ladas D, Lin SR, Devgan U, Siddiqui AA, **Jun AS**. Improvement of multiple generations of intraocular lens calculation formulae with a novel approach using artificial intelligence. In revision.
92. Marquezan MC, de Freitas D, Majumdar S, Wang X, Elisseeff J, Guyton DL, Bower KS, Skurski ZP, Chalita MR, Belfort, Jr, R, **Jun AS\***. Reverse SMILE with an excimer laser treated biomaterial: a novel approach to corneal reshaping using an intracorneal implant. Submitted.

Review Articles [RA] (\* corresponding author, underline indicates primary mentee)

1. Wallace DC, Shoffner JM, Trounce IA, Brown MD, Ballinger SW, Corral-Debrinski M, Horton TM, **Jun AS**, Lott MT. Mitochondrial DNA mutations in human degenerative diseases and aging. *Biochem Biophys Acta* 1995;1271:141-151.
2. **Jun AS**, Larkin DF. Prospects for Corneal Gene Therapy. *Eye* 2003;17:906-911.
3. Ansari H, Qureshi JA, Rafiei N, **Jun AS\***. Dystrophies of the corneal epithelium, Bowman layer, and stroma. *Contemporary Ophthalmology* 2005;4:1-12.
4. Rose L, Kelliher C, **Jun AS\***. Endothelial keratoplasty; historical perspectives, current techniques, future directions. *Can J Ophthalmol* 2009;44:401-5.
5. Vedana G, Villarreal G, **Jun AS\***. Fuchs endothelial corneal dystrophy: current perspectives. *Clin Ophthalmol* 2016;10:321-30.
6. Soiberman U, Foster JW, **Jun AS**, Chakravarti S. Pathophysiology of keratoconus: what do we know today. *Open Ophthalmol J* 2017;11:252-261.
7. Porter AJ, Lee GA, **Jun AS\***. Infectious crystalline keratopathy. *Surv Ophthalmol* 2018;63 :480-99.
8. Matthaei M, Hribek A, Clahsen T, Bachmann B, Cursiefen C, **Jun AS\***. Fuchs endothelial corneal dystrophy: clinical, genetic, pathophysiologic, and therapeutic aspects. *Annu Rev Vis Sci* 2019;5 :151-175.
9. Zhu AY, **Jun AS**, Soiberman US. Combined protocols for corneal collagen cross-linking with photorefractive surgery for refractive management of keratoconus: update on technique and review of literature. *Ophthalmol Ther* 2019 ;8 :15-31.
10. Chu HS, Peterson C, **Jun A**, Foster J. Targeting the integrated stress response in ophthalmology. Submitted.

Case Reports [CR] (\* corresponding author, underline indicates primary mentee)

1. **Jun AS**, Bridges WZ, Pieramici DJ. Clear cornea cataract wound dehiscence during pneumatic retinopexy: a report of two cases. *Arch Ophthalmol* 2000;118:847-848.
2. Chang MA, Rizen M, **Jun AS\***. Bilateral endogenous endophthalmitis in a patient with hemoglobin SC disease. *Can J Ophthalmol* 2005;40:768-771.
3. Suh LH, Sweeney DA, **Jun AS\***. 33 year old man with a white pupil. *Clin Infect Dis* 2006;43:1043-1044.
4. Ansari H, Garibaldi DC, **Jun AS\***. Anesthetic abuse keratopathy as a manifestation of ocular Munchausen's syndrome. *Clin Experiment Ophthalmol* 2006;34:81-83.
5. Kedhar SR, Belair M-L, **Jun A**, Sulkowski M, Thorne JE. Necrotizing scleritis and peripheral ulcerativekeratitis associated with hepatitis C virus-related cryoglobulinemia. *Arch Ophthalmol* 2007;125:852-3.
6. Walker BM, Hindman HB, Ebrahimi KB, Green WR, Eberhart CG, Garcia I, **Jun AS\***. Epithelial downgrowth following Descemet's stripping automated endothelial keratoplasty. *Arch Ophthalmol* 2008;126:278-80.
7. Ebrahimi KB, Oster SF, Green WR, Grebe R, Schein OD, **Jun AS\***. Calcareous degeneration of host-donor interface after Descemet's membrane stripping with automated endothelial keratoplasty (DSAEK). *Cornea* 2009;28:342-4.



8. Ebrahimi KB, Green WR, Grebe R, **Jun AS\***. Acanthamoeba sclerokeratitis. *Graefes Arch Clin Exp Ophthalmol* 2009;247:283-6.
9. Ebrahimi KB, Oster SF, Green WR, **Jun AS**. Donor corneal stroma and host-interface vascularization after Descemet's membrane stripping with automated endothelial keratoplasty (DSAEK). *Acta Ophthalmol* 2010; 88:e7-8.
10. Hongyok T, Kim A, **Jun AS**, Ladas JG, Chuck RS. Phototherapeutic keratectomy with mitomycin C after Descemet's stripping automated endothelial keratoplasty. *Br J Ophthalmol* 2010;94:377-8.
11. Lee BS, Viridi AS, Hammersmith KM, **Jun AS\***. Guttae in the donor after Descemet-stripping automated endothelial keratoplasty. *Graefes Arch Clin Exp Ophthalmol* 2010; 248:1523-5.
12. Kim EC, **Jun AS**, Kim MS, Jee D. Mooren's ulcer occurring at the donor site after contralateral conjunctivolimbal autograft for recurrent pterygium. *Cornea* 2012;31:1357-8.
13. Gattey D, Zhu AY, Stagner A, Terry MA, **Jun AS\***. Fuchs endothelial corneal dystrophy in patients with myotonic dystrophy: a case series. *Cornea* 2014;33:96-8.
14. Singman EL, Poon D, **Jun AS**. Putative corneal neuralgia responding to vitamin D supplementation. *Case Rep Ophthalmol* 2013;4:105-8.
15. Ahmad S, **Jun AS**, Alkharashi M. Utilizing hardware culture in a case of atypical keratitis. *Semin Ophthalmol* 2014;29:175-7.
16. Vianna LM, Woreta F, Kiely AE, **Jun AS\***. Retained host Descemet membrane (Auto-DMET) during conversion of deep anterior lamellar keratoplasty to penetrating keratoplasty: a case report. *Cornea* 2014;33:865-7.
17. Giovannini J, Lee R, Zhang SX, Davis G, **Jun AS**, Bower K. Rhodotorula keratitis. A rarely encountered ocular pathogen. *Case Rep Ophthalmol* 2014;5:302-10.
18. Son H-S, Villarreal G, Meng H, Eberhart CG, **Jun AS\***. On the origin of guttae. *Br J Ophthalmol* 2014;98:1308-10.
19. Bonfadini G, Kim EC, Campos M, **Jun AS\***. Novel spatula and dissector for safer deep anterior lamellar keratoplasty. *Rev Bras Oftalmol* 2014;73:279-81.
20. Vianna LM, Leatherman J, **Jun AS\***. Vision through a Fuchs endothelial dystrophy cornea. *JAMA Ophthalmol* 2015;133:e145353.
21. Manschreck DB, Rubinfeld RS, Soiberman US, **Jun AS**. Diffuse lamellar keratitis after epi-off corneal crosslinking: an under-recognized complication? *Am J Ophthalmol Case Rep* 2019;13:140-2.
22. Jenkins SG, **Jun AS**, Woreta FA, Srikumaran D. YAG laser treatment for epithelial ingrowth in Descemet's membrane endothelial keratoplasty interface. *Cornea* 2020: May 7 epub ahead of print..
23. Barnett B, Akpek EK, **Jun AS**. Rubbed the wrong way – the case of the pouting punctal plug. *BMJ Case Rep* 2020;13(5):e233808.

Book Chapters, Monographs [BC] (\* corresponding author, underline indicates primary mentee)

1. Trounce IA, Kim YL, **Jun AS**, Wallace DC. Assessment of mitochondrial oxidative phosphorylation in patient muscle biopsies, lymphoblasts, and transmitochondrial cybrid cell lines. *Methods in Enzymology* 1996;264:484-509.

2. **Jun AS**, Vito ECL, Haller JA, Stark WJ. Epithelial Downgrowth, Pearl Tumors, and Fibrous Ingrowth. In Corneal Surgery: Theory, Technique, and Tissue. Mosby-Yearbook. FS Brightbill, PJ McDonnell, CNJ McGhee, eds. 2008.
3. Suh LH, Emerson MV, **Jun AS\***. Fuchs' Endothelial Dystrophy. In Essentials in Ophthalmology – Cornea and External Eye Disease. Springer. T Reinhard, DF Larkin, eds. 2008.
4. Bykhovskaya I, **Jun AS\***. Pterygium Surgery. In Manual of Resident Surgery. American Academy of Ophthalmology. JP Dunn and P Langer, eds. 2009.
5. **Jun AS\***. Episcleritis. In Curbside Consultation in Cornea. Slack Inc. F Price, E Letko, eds. 2010.
6. Villarreal G, Jr, Kallay L, Vedana G, **Jun AS\***. Epidemiology and Genetic Basis of Fuchs Endothelial Corneal Dystrophy. In Current Treatment Options for Fuchs Endothelial Dystrophy. Springer. C Cursiefen, **AS Jun**, eds. 2016.
7. Barnett BP, **Jun AS\***. Animal models for endothelial cell transplantation. In Corneal Regeneration-Therapy and Surgery. Springer. J Alió, ed. 2019.
8. Wang KM, **Jun AS**, Ladas JG, Devgan U. Phacoemulsification: Principles and Techniques. In Albert and Jakobiec's Principles and Practices of Ophthalmology (6<sup>th</sup> edition). Springer. D Albert, J Miller, D Azar, LH Young, eds. 2020.

Books, Textbooks [BK]

1. Cursiefen C, **Jun AS**, eds. Current Treatment Options for Fuchs Endothelial Dystrophy. Springer. 2016.

**Other Publications: Suggested Additional Subcategory Titles:** *May adjust as necessary for your specialty*

Proceedings Reports [PR]

Guidelines/Protocols, Consensus Statement, Expert Opinion, Consortium Articles [GL] (\* corresponding author, underline indicates primary mentee)

1. Hindman HB, Patel SB, **Jun AS\***. Rationale for adjunctive topical corticosteroids in bacterial keratitis. Arch Ophthalmol 2009;127:97-102.
2. Zhu AY, Eberhart CG, **Jun AS\***. Fuchs endothelial corneal dystrophy: a neurodegenerative disorder? JAMA Ophthalmol 2014;132:377-8.
3. Zhu AY, Jaskula-Ranga V, **Jun AS\***. Gene editing as a potential therapeutic solution for Fuchs endothelial corneal dystrophy: the future is clearer. JAMA Ophthalmol 2018;136:969-70.

Editorials [ED] (\* corresponding author)

1. **Jun AS\***. Guest Editorial: 100 years of Fuchs dystrophy. Ophthalmology 2010;117:859-60. Contains on-line English translation of the original description of Fuchs dystrophy published in German (see Other Media below).

Methods and Techniques, "How I Do It" articles [MT]

Research Letters/White Papers/Brief Reports [RL]

Published Curricula [PC], Learner Assessment Tools, Educational Evaluations, Assessment/Evaluation Instruments [PC] Letters, Correspondence [LT] (\* corresponding author, underline indicates primary mentee)

1. Ladas JG, **Jun AS**, Devgan U. Origin of multiple formula use to calculate intraocular lens power-reply. JAMA Ophthalmol. 2016;134:848-9.

2. Zhu AY, Gattley D, Stagner A, Terry MA, **Jun AS\***. Reply. *Cornea* 2017;36:e25-e27.
3. Wang KM, **Jun AS**, Ladas JG, Siddiqui AA, Woreta F, Srikumaran D. Reply to Comment on: Accuracy of intraocular lens formulas in eyes with keratoconus. *Am J Ophthalmol* 2020;218:355-6.

Media Releases or Interviews [MR]

Other Media [OM] (Videos, Websites, Blogs, Social Media, etc.) (\* corresponding author, underline indicates primary mentee)

- 2000-2002 Founder and Curator, CorneaNet, The Cornea Information Network, [www.corneanet.net](http://www.corneanet.net). This website is a searchable database of global corneal gene expression.
- 2010 Engler C, **Jun AS\***. English translation from the German of the original description of Fuchs dystrophy (Fuchs E. Dystrophia epithelialis corneae. *Graefes Arch Clin Exp Ophthalmol* 1910;76:478 –508). Available on-line at [www.aaojournal.org](http://www.aaojournal.org) or <http://www.sciencedirect.com.ezproxy.welch.jhmi.edu/science/article/pii/S0161642010002460>
- 2013 Bonfadini G, Kim EC, **Jun AS**. What DMEK is Going On? Descemet membrane endothelial keratoplasty demonstration video. Available at <https://www.youtube.com/watch?v=UWKY4W0drnA>
- 2018 **Jun AS**. Interviewed in Washington Post article about sunglasses, “Why it’s important to wear sunglasses on both cloudy and sunny days,” 5/26/18. Available at [https://www.washingtonpost.com/national/health-science/why-its-important-to-wear-sunglasses-on-both-cloudy-and-sunny-days/2018/05/25/46c7240e-5e8b-11e8-9ee3-49d6d4814c4c\\_story.html?noredirect=on&utm\\_term=.3da16f2b390c](https://www.washingtonpost.com/national/health-science/why-its-important-to-wear-sunglasses-on-both-cloudy-and-sunny-days/2018/05/25/46c7240e-5e8b-11e8-9ee3-49d6d4814c4c_story.html?noredirect=on&utm_term=.3da16f2b390c)

## FUNDING

### EXTRAMURAL Funding

#### Research Extramural Funding

##### Current

- 10/14-12/20 Use of cultured human corneal endothelial cells for keratoplasty  
Lions VisionGift  
\$698,315  
Role: PI (1% effort)
- 11/17-10/22 New method to treat or prevent corneal graft rejection  
RO1EY027827  
National Eye Institute  
\$2,000,000  
Role: co-investigator (2% effort), PI: Qingguo Xu, PhD
- 09/18-08/22 Role of Wnt-regulated collagen dysfunction in keratoconus  
K08EY027474  
National Eye Institute  
Direct: \$695,208  
Role: co-mentor, PI: Uri Soiberman MD
- 2020-2024 Trachomatous trichiasis and predicting the end of blinding trachoma  
K23 EY030162  
National Eye Institute  
\$787,938  
Role: co-mentor, PI: Meraf A. Wolle, MD MPH

04/20-03/25	<p>Understanding endoplasmic reticulum-mitochondrial cross-talk in corneal endothelial cells  K99EY031339  National Eye Institute  \$ 955,444  Role: co-mentor, PI: Varun Kumar, PhD</p>
03/20-02/21	<p>Development of CRISPR/Cas9 based approaches for the treatment of Granular Corneal Dystrophy, Type I.  Max Kade Foundation  Role: mentor, PI: Hyeck-Soo Son, MD</p>
Pending	None
Previous	
7/00-6/01	<p>Identification of genes associated with corneal graft failure  Eye Bank Association of America  \$10,000  Role: PI (1% effort)</p>
7/04-6/09	<p>Role of alpha 2 collagen VIII in Fuchs corneal dystrophy  1KO8EY015523  National Eye Institute  \$875,242  Role: PI (80% effort)</p>
1/05-12/08	<p>Role of alpha 2 collagen VIII in Fuchs corneal dystrophy  Career Development Award, Research to Prevent Blindness  \$200,000  Role: PI (1% effort)</p>
7/08-12/10	<p>Genetic modification of human corneal endothelial cells  Eye Bank Association of America  \$10,000  Role: mentor, PI: Christoph Engler, MD</p>
7/09-6/10	<p>A cellular model for the investigation of Fuchs dystrophy  Eye Bank Association of America  \$10,000  Role: mentor, PI: Clare Kelliher, MD</p>
7/09-6/10	<p>Role of unfolded protein response and alpha 2 collagen VIII mutations in Fuchs endothelial corneal dystrophy  Dolly Green Special Scholar Award, Research to Prevent Blindness  \$25,000  Role: PI (1% effort)</p>
7/11-6/12	<p>Towards a nanoparticle based therapy of Fuchs dystrophy  Eye Bank Association of America  \$10,000  Role: mentor, PI: Mario Matthaei, MD</p>
9/11-2/13	<p>Role of the unfolded protein response in the pathogenesis of Fuchs endothelial corneal dystrophy  Deutsche Forschungsgemeinschaft (DFG, German Research Foundation)  € 80,600 (\$105,000)</p>

Role: mentor, PI: Mario Matthaei, MD

- 7/12-6/13 Cellular stress response pathways in the pathogenesis of Fuchs endothelial corneal dystrophy  
Eye Bank Association of America  
\$10,000  
Role: mentor, PI: Mario Matthaei, MD
- 9/14-8/15 AMPK activation for treatment of Fuchs corneal dystrophy  
Eye Bank Association of America  
\$8,605  
Role: mentor, PI: Guadalupe Villarreal, Jr., MD
- 9/14-8/15 Influence of endoreticulum stress caused by UV radiation to the corneal endothelial cells in a mouse model of early-onset Fuchs' endothelial corneal dystrophy  
Japan Eye Bank Association Overseas Grant  
¥2,000,000 (\$20,000)  
Role: mentor, PI: Tetsuya Toyono, MD, PhD
- 6/15-5/16 Towards drug therapy of Fuchs corneal dystrophy  
Eye Bank Association of America  
\$10,000  
Role: mentor, PI: Tetsuya Toyono, MD, PhD
- 9/10-8/16 Role of unfolded protein response and COL8A2 in Fuchs corneal dystrophy  
1R01EY019874  
National Eye Institute  
\$1,250,000  
Role: PI (40% effort)
- 12/15-11/17 Pathogenesis and CRISPR/Cas9 Correction of TCF4 Expansion in Fuchs Dystrophy  
1R21EY026238  
National Eye Institute  
\$275,000  
Role: PI (20% effort)
- 11/18-10/19 Viability and function of cultured human corneal endothelial cells for transplantation  
Eye Bank Association of America High Impact Grant  
\$50,000  
Role: scientific supervisor (1% effort), PI: Khoa Tran, PhD
- 6/16-5/20 TGF- $\beta$  and AKT signaling in keratoconus pathogenesis  
1R01EY024273  
National Eye Institute  
\$2,464,385  
Role: co-investigator (3% effort), PI: Shukti Chakravarti, PhD

#### Educational Extramural Funding

Current None  
Pending None

Previous  
2008-2009

Alcon Education Grant  
Alcon Laboratories  
\$2000. Funding provided to support medical student ophthalmology education initiatives including equipment purchases, educational publications, and student travel expenses.

## Other Extramural Funding

### Current

2019-2023      Gene therapy for granular corneal dystrophy  
Pedas Family and Foundation  
\$250,000  
Role: PI (1% effort)

Pending      None

### Previous

9/06-8/09      Phenotypic and genotypic analysis of keratoconus  
Openshaw Keratoconus Research Fund  
\$800,000  
Role: PI (10% effort)

6/12-5/15      Screening for potential drug therapies for Fuchs corneal dystrophy  
J. Willard and Alice S. Marriott Foundation,  
\$111,666  
Role: PI (1% effort)

2015-2019      Genetic and functional studies of keratoconus  
Sandra and Larry Small  
\$300,000  
Role: co-investigator (1% effort)

## INTRAMURAL Funding

### Research Intramural Funding

Current      None

Pending      None

### Previous

2003      Clinical confocal microscopy for the evaluation of corneal diseases  
Women's Board of the Johns Hopkins Hospital  
\$46,000  
Role: PI (Funds used for the purchase of an *in vivo* corneal confocal microscope)

2007      Role of alpha 2 collagen VIII in Fuchs corneal dystrophy  
Inaugural Wilmer Scholars Research Fund Award  
\$100,000  
Role: PI (Awarded to the most promising Wilmer assistant professor)

2009      Role of unfolded protein response and COL8A2 in Fuchs corneal dystrophy  
Wilmer Pooled Professors Fund  
\$50,000  
Role: PI

2012      Investigating cellular and molecular mechanisms regulating keratoconus  
Wilmer Pooled Professors Fund  
\$53,000  
Role: PI

2014-2015      Proteomic analysis of keratoconus patients from the Kingdom of Saudi Arabia  
King Khaled Eye Specialist Hospital/Wilmer Eye Institute Research Grant

\$250,280

Role: co-investigator (5% effort), PI: Shukti Chakravarti, PhD

2015

*In vitro* and *in vivo* treatment of protein processing defect using dendrimer-drug delivery for early-onset Fuchs endothelial corneal dystrophy

Wilmer Pooled Professors Fund

\$54,000

Role: co-PI (1% effort) with Liudmila Cebotaru, MD, JD, LLM

## CLINICAL ACTIVITIES

### Clinical Focus and Accomplishments

My clinical activities involve management of medical and surgical disorders of the anterior segment of the eye and ocular surface, including but not limited to anterior segment reconstruction, advanced corneal transplantation, premium and complex cataract surgery, and surgical correction of refractive error.

I was the first surgeon at Wilmer to perform the following major corneal and anterior segment surgeries and adjunctive techniques developed initially by colleagues around the world. My clinical publications show contributions to the field of corneal surgery through further innovation and outcomes reporting of these and related procedures and processes. I regularly assist my Wilmer divisional colleagues in learning how to perform some of the procedures listed below.

Corneal collagen cross-linking (CXL)

Deep lamellar endothelial keratoplasty (DLEK)

Descemet stripping (automated) endothelial keratoplasty (DS(A)EK)

Descemet membrane endothelial keratoplasty (DMEK)

Deep anterior lamellar keratoplasty (DALK, Melles manual dissection technique)

DALK (Anwar “big bubble” technique)

DALK (Jacobs, “groove and peel” technique)

Living related donor limbal stem cell transplantation

Morcher iris diaphragm scleral suture fixated posterior chamber intraocular lens implantation

Use of anterior segment optical coherence tomography microscope to guide corneal surgery

Use of high resolution 3-D surgical viewing system for anterior segment surgery.

I have numerous inventions and patents for surgical devices, (see below RESEARCH ACTIVITIES, Inventions, Patents, Copyrights and Technology Transfer Activities sections), one is FDA approved and in clinical use (2) and one is in prototype development with Gore Corporation (3).

### Certification

Medical, other state/government licensure

5/02-present Maryland medical license #D0058677

Boards, other specialty certification

10/03-present Diplomate, American Board of Ophthalmology

Clinical (Service) Responsibilities

2003-2004 Clinical Attending and Assistant Chief of Service, Wilmer Ophthalmology Residency, 100% effort

2004-present Cornea Service Attending (Clinic and Operating Room), 20-60% effort

Clinical Productivity (*such as the annual number of patients evaluated or treated, procedures performed, tertiary referrals, wRVUs, etc.*)

I perform the highest number of corneal transplant surgeries annually at Wilmer.

Clinical Draw from outside local/regional area (*reflecting national/international reputation*)

Approximately 36% of my clinic patients reside outside Maryland representing 34 states and DC.

Approximately 37% of my corneal transplant surgery patients reside outside Maryland representing 21 states and DC.

Membership in or examiner for specialty board

Clinical Demonstration Activities to external audience, on or off campus

I trained the lead corneal surgeon at Johns Hopkins Aramco Healthcare (JHAH) in Dhahran, Saudi Arabia in DMEK surgery and donor tissue preparation as part of a joint venture between Wilmer, JHAH, and Johns Hopkins International (see SYSTEM INNOVATION AND QUALITY IMPROVEMENT ACTIVITIES section below)

Development of nationally/internationally recognized clinical standard of care (*may not be published in peer-reviewed journals*):

## **EDUCATIONAL ACTIVITIES**

### **Educational Focus and Accomplishments**

I have been an active, dedicated, and innovative educator for a wide range of learners and settings since joining the Wilmer faculty. As director of medical student education in ophthalmology (2004-2010), I modernized the required ophthalmology clerkship to the standards set by other core clerkships, and I oversaw the transition of the ophthalmology pre-doctoral educational content into the Genes to Society, Longitudinal Clerkship, and Transition to the Wards courses as part of a major curriculum revision at JHUSOM in 2010. As Wilmer's vice chair for education (2011-2016), I established with the approval of the department director (chair) a system of Division Education Champions (DECs) who are accountable for organizing each division's educational activities, receive financial support, and are reviewed annually for performance. I also established a standing Wilmer post-doctoral fellow advocacy committee which includes research leaders and post-doctoral fellows who are tasked with overseeing and improving the research training experience in the department.

For additional educational activities and accomplishments see below under Educational Program Building/Leadership.

### **Teaching**

Classroom Instruction (All JHM/JHU)

2002-2004	Lecturer, medical students, Clinical Elective in Ophthalmology, "Penetrating keratoplasty," and Corneal Surgery Wet-lab Organizer
2003-present	Lecturer, residents, Wilmer Resident Orientation, "Introduction to cornea and external disease"
2003-2009	Lecturer, medical students, Basic Ophthalmology Clerkship, "Red eye, cataract, and refractive surgery"
2004	Lecturer, medical students, Year 2 Clinical Skills Course, "The eye"
2004-2005	Lecturer, residents, Wilmer Resident Lecture Series, "Hereditary corneal dystrophies," "Disorders of corneal size, shape, and thickness"
2005	Lecturer, residents, Wilmer Resident Lecture Series, "Phaco harangue"
2008-present	Lecturer, residents, Wilmer Resident Orientation Lecture Series, "Introduction to external disease, cornea, and corneal imaging"
2009-present	Lecturer, residents, Wilmer Resident Lecture Series, "Introduction to external disease, cornea, and corneal imaging"
2009-2010	Lecturer, residents, Wilmer Resident Lecture Series, "Anterior segment dysgeneses"
2009	Preceptor, residents, Wilmer Resident Cataract Surgery Course
2010	Lecturer, residents, Wilmer Resident Lecture Series, "Lamellar keratoplasty"
2010-2015	Lecturer, medical students, Year 1 Genes to Society Course, "Optics and anterior segment"
2012	Preceptor, residents, Wilmer Resident Cataract Surgery Course
2012	Lecturer, residents, Wilmer Resident Cataract Surgery Course, "Capsulorhexis and hydrodissection"
2012-2013	Preceptor, medical students, Year 1 Anatomy Course Team Based Learning exercise, "Angle closure glaucoma"
2017	Lecturer, resident, Wilmer Resident Lecture Series, "Fuchs dystrophy and lamellar keratoplasty"
2020-present	Clinical mentor, Course No. 580.750: Surgineering: Systems Engineering and Data Science in Interventional Medicine (course director: Jeff Siewerdsen, PhD)

Clinical Instruction (All JHM)



- 2003-2004 Assistant Chief of Service, Residency Service Attending Ophthalmologist (In-patient/Out-patient Clinic and Surgery, Wilmer Emergency Room, residents, conducted ward rounds 7 days per week for 1 year, surgical attending for over 500 resident cases.
- 2003-2010 Clinic preceptor, medical students, Basic Ophthalmology Clerkship
- 2004-2016 Course director and clinic preceptor, medical students, Elective Ophthalmology Clerkship
- 2004-present Clinic and surgery attending, fellows, Wilmer cornea fellowship. Supervised 3-5 fellows per year in cornea and anterior segment patient management.
- 2009-2010 Wilmer resident surgical attending, residents. Supervised 200+ anterior segment cases with residents as primary surgeon.
- 2013-present Clinic and surgery attending, residents, Wilmer resident cornea rotation. Supervised 5-6 residents per year in cornea and anterior segment patient management.

#### CME Instruction

##### JHM/Regional

- 2002 Lecturer, attending physicians, Ophthalmology for the Primary Care Physician, "Conjunctivitis," Baltimore, MD
- 2002 Lecturer, attending physicians, Current Concepts in Ophthalmology, "Posterior lamellar endothelial keratoplasty," Baltimore, MD
- 2003 Lecturer, residents and attending physicians, Wilmer Residents Association Annual Meeting, "Genetic manipulation of human corneal endothelium," Baltimore, MD
- 2004 Lecturer, attending physicians, Current Concepts in Ophthalmology, "Lamellar keratoplasty," Baltimore, MD
- 2004 Lecturer, attending physicians, Korean American Medical Association Scientific Meeting, "Update on cataract and refractive surgery," Easton, MD
- 2004 Lecturer, attending physicians and residents, Wilmer Residents Association Annual Meeting, "Deep lamellar endothelial keratoplasty," Baltimore, MD
- 2005 Lecturer, nurses, Wilmer Nursing Conference, "Toxic anterior segment syndrome," Baltimore, MD
- 2005 Lecturer, attending physicians and residents, Wilmer Residents Association Annual Meeting, "Non-invasive imaging of corneal infections," Baltimore, MD
- 2005 Lecturer, attending physicians, Current Concepts in Ophthalmology, "Prevention of posterior capsule opacification" and "New techniques in endothelial keratoplasty," Baltimore, MD
- 2006 Lecturer, attending physicians, Current Concepts in Ophthalmology, "My Epilift/PRK Experience: physician as patient" and "Advances in endothelial keratoplasty," Baltimore, MD
- 2007 Lecturer, attending physicians, Current Concepts in Ophthalmology, "Update on endothelial keratoplasty," Baltimore, MD
- 2008 Lecturer, attending physicians, Fuchs Corneal Dystrophy Symposium sponsored by Tissue Banks International and Wilmer Eye Institute, "What are the cellular causes of Fuchs dystrophy?," "How to avoid dislocations in DSEK," "Assessment of corneal clarity after endothelial keratoplasty," and "Future therapies for Fuchs dystrophy," Baltimore, MD
- 2009 Lecturer, optometrists, Maryland Optometric Society Annual Meeting, "Etiology of keratoconus: a review of the evidence," Baltimore, MD
- 2010 Lecturer, attending physicians, Fuchs Corneal Dystrophy Symposium, "Cellular pathophysiology of Fuchs dystrophy," "Optical assessment of DSAEK corneas," and "Future therapies for Fuchs dystrophy," Baltimore, MD
- 2010 Lecturer, attending physicians, Maryland Society of Eye Physicians and Surgeons Annual Meeting, "Update on endothelial keratoplasty," Baltimore, MD
- 2011 Lecturer, attending physicians, Current Concepts in Ophthalmology, "DMEK: the next frontier in endothelial keratoplasty" and "Optimization of IOL calculations after combined DSEK and cataract/IOL surgery," Baltimore, MD
- 2012 Lecturer, attending physicians, Current Concepts in Ophthalmology, "DMEK – advantages and disadvantages," Baltimore, MD
- 2014 Lecturer, attending physicians, fellows, residents, Johns Hopkins Cataract and Cornea Practicum, "Anterior lamellar keratoplasty: indications and surgical technique" and "Endothelial keratoplasty procedures (DSEK/DMEK): surgical technique and clinical outcomes," Baltimore, MD
- 2016 Lecturer, attending physicians, Current Concepts in Ophthalmology, "DMEK and beyond," Baltimore, MD

##### National

- 2008 Lecturer, residents, Continuing Physician Education Course, “Challenging cornea cases,” Alcon Laboratories, Fort Worth, TX
- 2008 Lecturer, attending physicians, Current Concepts in Ophthalmology, “Corneal ectasia screening using the Pentacam™” and “Expanded anterior segment applications of the Pentacam™,” Vail, CO
- 2009 Lecturer, attending physicians, Current Concepts in Ophthalmology, “Assessment of corneal clarity after endothelial keratoplasty,” “Descemet stripping endothelial keratoplasty,” and “Genetics and pathophysiology of Fuchs dystrophy,” Vail, CO
- 2011 Lecturer, attending physicians, Current Concepts in Ophthalmology, “Reproducibility of Pentacam™ corneal modeling in keratoconus” and “Fuchs dystrophy: past, present, and future,” Vail, CO
- 2012 Lecturer, attending physicians, Current Concepts in Ophthalmology, “Reproducibility of Pentacam™ corneal modeling in keratoconus” and “DMEK: making the transition,” Vail, CO

#### Workshops / seminars

##### JHM/Regional

- 2008 Co-organizer/Instructor, attending physicians, Descemet’s Stripping Endothelial Keratoplasty Training Course, sponsored by Tissue Banks International and Wilmer Eye Institute. Baltimore, MD
- 2009 Co-organizer/Instructor, attending physicians Descemet’s Stripping Endothelial Keratoplasty Training Course, sponsored by Tissue Banks International and Wilmer Eye Institute. Baltimore, MD
- 2014 Organizer, attending physicians, fellow, residents, Corneal Transplantation Practical Sessions, Johns Hopkins Cataract and Cornea Practicum, Baltimore, MD

##### National

- 2006 Panelist, residents, Inaugural Heed Ophthalmic Foundation Resident and Faculty Retreat, Airlie, VA. A two day retreat for 20 ophthalmology residents and faculty members from the U.S. and Canada intended to foster career mentorship and guidance for promising academic ophthalmologists.
- 2007 Panelist, residents, Second Annual Heed Ophthalmic Foundation Resident and Faculty Retreat, Chicago, IL
- 2008 Co-organizer/Instructor, Descemet’s Stripping Endothelial Keratoplasty Training Course, sponsored by Tissue Banks International and Wilmer Eye Institute. Baltimore, MD
- 2008 Panelist, residents, Third Annual Heed Ophthalmic Foundation Resident and Faculty Retreat, Denver, CO
- 2011 Organizer/Instructor, attending physicians, Pentacam™ Workshop as part of Current Concepts in Ophthalmology Meeting. Vail, CO
- 2012 Organizer/Instructor, attending physicians, Pentacam™ Workshop as part of Current Concepts in Ophthalmology Meeting. Vail, CO
- 2015 Organizer/course director, attending physicians, Descemet Membrane Endothelial Keratoplasty Training Course, sponsored by Tissue Banks International, Orlando, FL
- 2015 Organizer/course director, attending physicians, Descemet Membrane Endothelial Keratoplasty Training Course, sponsored by Tissue Banks International, Boston, MA
- 2015 Organizer/course director, attending physicians, Descemet Membrane Endothelial Keratoplasty Training Course, sponsored by Tissue Banks International, Las Vegas, NV

#### Mentoring

##### Pre-doctoral Advisees /Mentees (publications listed are first or second author by the mentee)

- 2004-2005 Irina Bhykovskaya, BS, Johns Hopkins medical student, present position ophthalmology attending, Encino, CA, [BC]4.
- 2006-2007 César Briceño, AB, Johns Hopkins medical student, present position assistant professor of clinical ophthalmology (oculoplastics), University of Pennsylvania, [OR]21.
- 2009-2012 Huan Meng BS, lab manager in the Jun lab, present position ophthalmology resident, Tufts University, [OR]39,42,43,47,49,57.
- 2010 (Fall) Heechul Jun, Johns Hopkins undergraduate student, present position unknown. Enrolled in semester long clinical practicum tutorial course no. 268. Preceptor: AS Jun.

- 2010 (Fall) Christine Friedman, Johns Hopkins undergraduate student, present position unknown. Enrolled in semester long clinical practicum tutorial course no. 268. Preceptor: AS Jun.
- 2013, 2014 Angela Zhu, BS, Case Western medical student, present position cornea fellow, Bascom Palmer Eye Institute. Completed a 4 month research externship in the Jun lab. [OR]59,66, [RA]9, [CR]13, [GL]2,3, [LT]2.
- 2014 Hyeck-Soo Son, University of Heidelberg medical student, present position ophthalmology resident, University of Heidelberg. Completed a 2 month research externship in the Jun lab. [OR]53, [CR]18.
- 2015 Benjamin Botsford, Tufts medical student, present position ophthalmology resident, University of Pittsburgh. Completed a 2 month research externship in the Jun and Yiu labs. [OR]71.
- 2016-2017 Marcus Daniels, BS, Johns Hopkins medical student, present position radiology residency applicant.
- 2016-present Operating room preceptor for multiple Baltimore city high school students interested in health professions as part of the Merit Scholar Program, <https://www.meritbaltimore.org/>
- 2017-2019 Diana Mannschrek, BSN, Johns Hopkins medical student, present position pediatrics resident, University of North Carolina – Chapel Hill, [CR]21.
- 2017-2019 Anvesh Annadanam, BS, Johns Hopkins medical student, matched for ophthalmology residency at University of Michigan (7/20), [OR]80.
- 2017-2020 Derick Ansah, BS, Johns Hopkins medical student, matched for ophthalmology residency at University of Rochester (7/21), [OR]85.
- 2018-2020 Kendrick Wang, BS, Johns Hopkins medical student, matched for ophthalmology residency at Yale University (7/21), [OR]82.
- Post-doctoral Advisees /Mentees (publications listed are first author by the mentee)
- 2003-2004 Husam Ansari, MD, PhD, Wilmer resident, present position glaucoma attending, Boston, MA, [RA]3.
- 2003-2004 Margaret Chang, MD, Wilmer resident, present position retina attending, Sacramento, CA, [CR]2.
- 2004-2005 Daniel Garibaldi, MD, Wilmer resident, present position oculoplastics attending, East Meadow, NY, [OR]12.
- 2004-2006 Leejee H. Suh, MD, Wilmer resident, present position associate professor of ophthalmology (cornea), Columbia University, first place winner of the annual Mitchell Prize Competition for Resident Research at the Wilmer Eye Institute (\$10,000), recipient of the Walter Stark, MD, Resident Research Grant Award (\$2000), [OR]20, [CR]3, [BC]3.
- 2005-2008 Stephen Oster, MD, PhD, Wilmer resident, present position retina attending, La Jolla, CA, [OR]23.
- 2005-2008 Holly B. Hindman, MD, Wilmer resident, present position cornea attending, Rochester, NY, recipient of the Peter McDonnell, MD, Resident Research Grant Award (\$2000) and the Walter Stark, MD, Resident Research Grant Award (\$2000), first place winner of the annual Mitchell Prize Competition for Resident Research at the Wilmer Eye Institute (\$10,000), one of five papers selected nationwide for presentation at the Association of University Professors of Ophthalmology Resident and Fellow Research Forum (2008), [OR]19,33, [GL]1.
- 2005-2006 Linda Rose, MD, Wilmer cornea fellow, present position associate professor of ophthalmology and cornea service director, University of New Mexico, [OR]21, [RA]4.

- 2006-2007 B. Michael Walker, MD, Wilmer cornea fellow, present position cornea and cataract attending, Sheridan, WY, [CR]6.
- 2006-2008 Zhiyou Wang, PhD, post-doctoral research fellow (Jun lab), present position unknown, [OR]18.
- 2007-2009 Shameema Sikder, MD, Wilmer resident, present position associate professor (cornea) Wilmer, recipient of the Albert Jun, MD, PhD, Resident Research Grant Award (\$2000), first place winner of the annual Mitchell Prize Competition for Resident Research at the Wilmer Eye Institute (\$10,000), [OR]30,31.
- 2007-2008 Sachin Kalyani, MD, Wilmer cornea fellow, present position cornea attending, Annapolis, MD, recipient of the Ronald Michels, MD, Fellow Research Grant Award (\$2000).
- 2007-2008 Katayoon Ebrahimi, MD, Wilmer eye pathology fellow, present position unknown, [CR]7,8,9.
- 2008-2009 Divya Srikumaran, MD, Wilmer resident, present position assistant professor (cornea) Wilmer, recipient of the James P. Dunn, MD, Resident Research Grant Award (\$2000), second place winner of the annual Mitchell Prize Competition for Resident Research at the Wilmer Eye Institute (\$5000), [OR]53.
- 2008-2010 Christoph Engler, MD, post-doctoral research fellow (Jun lab), present position unknown, recipient of the Eye Bank Association of America Research Grant Award (\$10,000), [OR]26,27,29,35,38, [OM]2010.
- 2008-2010 Clare Kelliher, MBBCh, post-doctoral research fellow (Jun lab), cornea attending, Baltimore, MD, recipient of the Albert Jun, MD, PhD, Fellow Research Grant Award (\$2000) recipient of the Eye Bank Association of America Research Grant Award (\$10,000), recipient of the Sir William Wilde Medal for best poster at the Irish College of Ophthalmology Annual Meeting (2009), [OR]24,37.
- 2009-2010 Bryan Lee, MD, JD, Wilmer resident, present position cornea attending, Los Altos, CA, [OR]36 [CR]11.
- 2009-2010 Sungdong Chang, MD, post-doctoral research fellow (Jun lab), present position assistant professor of ophthalmology (cornea), Keimyung University, Korea, recipient of the Richard Kolker, MD Fellow Research Grant Award (\$2000).
- 2010-2013 Mario Matthaei, MD, post-doctoral research fellow (Jun lab), present position ophthalmology fellow (cornea), University of Cologne, recipient of the Fuchs Dystrophy Fellow Research Grant Award (\$2000), the Eye Bank Association of America Research Grant Award (received twice for \$10,000 each), and the German Research Foundation Fellowship (70% funding for post-doctoral studies in the US for 18 months, €80,600), [OR]42,43,45,48,54,59, [RA]8.
- 2011-2012 Eun Chul Kim, MD, post-doctoral research fellow (Jun lab), present position professor of ophthalmology (cornea), Catholic University, Korea, recipient of the Albert Jun, MD, PhD, Fellow Research Grant Award (\$2000), [OR]41,49,56,57,73 (co-first author), [CR]12.
- 2011-2012 Gustavo Bonfadini, MD, post-doctoral research fellow (Jun lab), present position cornea and cataract attending and medical director of the eye bank, Rio de Janeiro, Brazil, recipient of the Keratoconus Fellow Research Grant Award (\$2000), [OR]44,46,64, [CR]19, [OM]2019.
- 2011-2012 Frank Hwang, MD, Wilmer cornea fellow, present position cornea and cataract attending, Loma Linda, CA, recipient of the Richard Kolker, MD, Fellow Research Grant Award (\$2000).
- 2011-2012 Valliammai Muthappan, MD, Wilmer resident, present position unknown, recipient of the Kraig Scot Bower, MD, Resident Research Grant Award (\$2000).
- 2012 Eva-Maria Lackner, MD, post-doctoral research fellow (Jun lab), present position cornea attending, Graz, Austria, recipient of the European Society of Cataract and Refractive Surgery Young Ophthalmologists Observership Grant (€1000), [OR]52.

- 2014-2015 Lucas MM Vianna, MD, PhD, post-doctoral research fellow (Jun lab), present position cornea and cataract attending, Cabo Frio, Brazil, and chief, cornea and external diseases division, State University of Rio de Janeiro, Brazil, [OR]60,61,62,67, [CR]16,20.
- 2014-2016 Tetsuya Toyono, MD, PhD, post-doctoral research fellow (Jun lab), present position assistant professor of ophthalmology (cornea), University of Tokyo, Japan, recipient of the Japan Eye Bank Association Overseas Grant (¥2,000,000) and the Eye Bank Association of America Research Grant Award (\$10,000), [OR]70,73 (co-first author).
- 2014-2016 Guadalupe Villarreal, MD, Wilmer resident, present position glaucoma attending, Falls Church, VA, recipient of the Eye Bank Association of America Research Grant Award (\$8,605), [BC]6.
- 2015-2016 Gustavo Vedana, MD, post-doctoral research fellow (Jun lab), present position cataract and refractive surgery attending, Porto Alegre, Brazil, [RA]5.
- 2016-2020 Maria Carolina Marquezan, MD, post-doctoral research fellow (Jun lab), present position cornea and cataract attending, Brasilia, Brazil, [OR]88.
- 2017-2018 Brad P. Barnett, MD, PhD, Wilmer resident, present position assistant professor of ophthalmology (cornea), Duke University, recipient of the Albert Jun, MD, PhD, Resident Research Grant Award (\$2000), [BC]7.
- 2019-present Varun Kumar, PhD, post-doctoral research fellow (Jurkunas lab), Massachusetts Eye and Ear Infirmary, Harvard Medical School. I am a co-mentor on Dr. Kumar's NIH K99 grant award.

#### Faculty mentees

- 2011-2019 Eric Singman, MD, PhD, Wilmer associate professor (general eye service division). I chaired the search committee which hired Dr. Singman as inaugural division chief of the general eye service (resident clinic) in 2011. Dr. Singman was promoted to associate professor in 2019.
- 2016-present Wei Wang, PhD, Wilmer research associate (cornea division). Dr. Wang oversees a cultured endothelial cell therapy research project in the Jun lab.
- 2016-present Madhuparna Roy, PhD, Wilmer research associate (cornea division). Dr. Roy oversees a gene therapy for corneal dystrophies research project in the Jun lab.
- 2016-present Irene Kuo, MD, Wilmer associate professor (cornea division) currently under consideration for promotion to professor. Since 2016, Dr. Kuo and I have met regularly to discuss research projects and academic progress.
- 2016-present Shameema Sikder, MD, Wilmer associate professor (cornea division). Dr. Sikder and I meet regularly to discuss research projects and academic progress. Dr. Sikder was promoted to associate professor in 2020.
- 2016-present Uri Soiberman, MD, Wilmer assistant professor (cornea division). I am a co-mentor on Dr. Soiberman's NIH KO8 grant.
- 2016-present Meraf Wolle, MD, MPH, Wilmer assistant professor (cornea division). I am a co-mentor on Dr. Wolle's NIH K23 grant.
- 2017-present James Foster, PhD, Wilmer research associate (cornea division). Dr. Foster and I meet regularly to discuss research projects and grant applications.

#### Thesis committees

- 2005 Marc Rofail, MD, master of philosophy thesis, "Open globe injuries at the Royal Brisbane Hospital – 12 year audit: prognostic indicators,

- enucleation, and quality of life.” University of Queensland, Australia. Served as an international expert thesis examiner at the request of the thesis advisor, Graham Lee, MD, Associate Professor of Ophthalmology, University of Queensland, Australia.
- 2011 Nicole Van Bergen, doctor of philosophy thesis, “Mitochondrial dysfunction in the retina contributes to vision loss.” University of Melbourne, Australia. Served as an international expert thesis examiner at the request of the thesis advisor, Ian Trounce, PhD, Associate Professor of Ophthalmology, University of Melbourne, Australia.
- 2011-2012 Gustavo Bonfadini, MD, doctor of philosophy thesis, “Improved accuracy of refractive outcomes using an optimized intraocular lens constant in combined endothelial keratoplasty and cataract surgery.” Federal University of São Paulo, Brazil. Thesis co-mentor.
- 2012-2016 Jeremy Chae, DVM, doctor of philosophy thesis, “Investigation of biomaterials-based strategies for corneal reconstruction.” Department of biomedical engineering, Johns Hopkins University, graduate oral examination and thesis committee member.
- 2016 Lucas Vianna, MD, doctor of philosophy thesis, “Use of human serum for human corneal endothelial cell culture.” Federal University of São Paulo, Brazil, thesis co-mentor.
- 2016-2020 Maria Carolina Marquezan, MD, doctor of philosophy thesis, “Reverse SMILE with an excimer laser treated biomaterial: a novel approach to corneal reshaping using an intracorneal implant.” Federal University of São Paulo, Brazil, thesis co-mentor
- 2020-present Aditya Josyula, doctor of philosophy thesis, “Engineering drug-eluting nanofiber-based surgical devices.” Department of chemical and biomolecular engineering, Johns Hopkins University, thesis committee member.

#### Educational Program Building / Leadership

- 2004-2010 Director of Medical Student Education
- 2004-2010 Basic Ophthalmology (Required) Clerkship, Course Director (5% effort).  
Directed the following major innovations/improvements:
- 1) Development of formal objectives for each clerkship activity
  - 2) Development of quantitative patient criteria
  - 3) Development of a student evaluation tool focusing on core competencies and formative feedback
  - 4) Implementation of Standardized Patient experience
  - 5) Implementation of Patient Tracker on-line software to record student-patient encounters standardized across all clinical clerkships
  - 6) Implementation of E-value course evaluation system standardized across all clinical clerkships
  - 7) Statistical analysis and validation of test questions on internal clerkship final exam
  - 8) Implementation of on-line examination format
- 2004-2016 Elective Ophthalmology Clerkship, Course Director. This course is a one month, clinical elective offered 12 times per year to medical students with particular interest in ophthalmology. Each student is assigned an individualized schedule of 20 full day assignments with a clinic or OR preceptor which covers the spectrum of clinical settings and sub-specialties in ophthalmology. Small group discussion sessions covering a variety of topics are also included. Approximately 20-25 students per year enroll in this course.
- 2006-2011 Genes to Society Course Special Sensory and Motor Planning Committee (Co-Director for planning the ophthalmology course content in the new medical school curriculum)
- 2007 Co-author, Ashley Cole standardized patient case (pseudotumor cerebri), Comprehensive Clinical Skills Exam.
- 2008-2016 Author and preceptor, Terry Henry standardized patient case (angle closure glaucoma), Comprehensive Clinical Skills Exam.
- 2012-2013 Co-author and preceptor, angle closure glaucoma case, Team Based Learning exercise, Year 1 anatomy course.

- 2009-2012 Ophthalmology Interest Group Faculty Liaison. Student organization composed of students interested in ophthalmology residency. Regular meetings held to discuss topics related to ophthalmology residency, the match process, and clinical ophthalmology.
- 2010-2016 Longitudinal Clerkship Course, Ophthalmology Section Director. This experience is an ophthalmic clinical skills practicum for all first year medical students.
- 2010-2016 Transition to the Wards Course, Ophthalmology Section Director (3% effort). This experience is an ophthalmic clinical skills practicum for all second year medical students.
- 2011 Invited podium presentation faculty judge (5 faculty total), 3<sup>rd</sup> Annual Medical Student Research Day.
- 2011-2016 Vice Chair for Education, Wilmer Eye Institute. Responsible for oversight of departmental education involving medical students, residents, and fellows (clinical and research). Directed departmental part-time faculty teaching activities.
- Directed the following major innovations/ improvements:
- 1) Recruiting two directors of medical student education and a new residency program director.
  - 2) Implementing recommendations of a department-wide, comprehensive residency education task force including the establishment of a group of 14 divisional education champions (DECs) who direct residency education at Wilmer.
  - 3) Securing up to 10% salary support from departmental funds for each DEC's effort toward residency education.
  - 4) Securing 20% salary support from departmental funds for two associate residency program directors.
  - 5) Establishing a standing post-doctoral fellow advocacy committee.
  - 6) Preparing and presenting overview of Wilmer's educational programs at the Dean's Departmental Review 2013.
  - 7) Initiating an improved mentoring system which assigns pre-selected, highly engaged Wilmer faculty to underrepresented minority JHUSOM medical students interested in ophthalmology and initiating an underrepresented minority student survey of opinions about ophthalmology as a residency and career choice (see OTHER PROFESSIONAL ACCOMPLISHMENTS Contributions to Diversity section).

Educational Demonstration Activities to external audiences

## **RESEARCH ACTIVITIES**

### **Research Focus**

My main research interests are the cellular pathophysiology, genetic causes, and novel treatment approaches of the two leading causes of corneal transplantation in the United States, Fuchs endothelial corneal dystrophy (FECD) and keratoconus. I also have major research interests in techniques and outcomes of corneal transplantation and eye banking and technology development and transfer related to anterior segment disease treatment.

### **Research Program Building / Leadership**

As a principal investigator, I established a renowned research program investigating pathogenesis and potential novel treatments for Fuchs dystrophy, the leading cause of corneal transplantation worldwide. I chaired the cornea section of the Annual Meeting Program Committee for ARVO, the world's largest eye and vision research organization. I am a senior editor for *Cornea*, the leading scientific journal in our field.

As Wilmer's vice chair for education, I supported the department's research activities through the establishment of a standing post-doctoral fellow advocacy committee which includes research leaders and post-doctoral fellows who are tasked with overseeing and improving the research training experience in the department.

### **Research Demonstration Activities**

#### **Inventions, Patents, Copyrights**

1. Clear, rigid, intra-corneal implant to alter and stabilize the shape of the cornea (2010). US patent application 13/394,173, patent cooperation treaty (PCT) US 2010/047989
2. Chronic lithium treatment for Fuchs endothelial dystrophy (2013). US provisional patent 61/757,268

3. Chronic minocycline treatment for Fuchs endothelial corneal dystrophy (2013). Johns Hopkins University disclosure C11638
4. Chronic non-steroidal anti-inflammatory (NSAID) treatment for Fuchs endothelial corneal dystrophy (2013). US provisional patent 61/757,279, PCT US2014/013269, WO 2014/117117
5. Clear, rigid, and ultra-violet light transmissible device to stabilize and flatten the shape of the cornea during simultaneous corneal collagen cross-linking (CXL, 2013). Johns Hopkins University disclosure C12141
6. Human serum supplemented media for human corneal endothelial cell culture (2014). Johns Hopkins University disclosure C13262
7. An intraocular lens calculation “super formula” (2014). Johns Hopkins University disclosure C13313
8. AMPK activation for the treatment of Fuchs endothelial corneal dystrophy (2015). US provisional patent 62/181,382
9. Xeno-free medium with insulin-like growth factor-1 for human corneal endothelial cell culture for cell therapy or corneal tissue preservation for corneal transplantation (2015). Johns Hopkins University disclosure C13803
10. Gene expression marker set for validation of *ex vivo* expanded human corneal endothelial cells for therapeutic application (2016). Johns Hopkins University disclosure C14343
11. Helix reversible lacrimal canalicular occlusion device and associated materials and methods for delivery and recovery (2018). US provisional patent 62/714,136, WO 2020/028021A1
12. Lacrimal canalicular delivery system and methods of use (2018). US provisional patent 62/714,219, PCT US2019/041790, WO 2020/028022A1
13. Cylindrical, adjustable eye speculum device (2018). Johns Hopkins University disclosure C15389
14. Apparatus and method for intraocular lens selection using post-operative measurements (2018). US patent application 16/145,751.
15. Sleeve device for suture-free glaucoma tube coverage (2019). Johns Hopkins University disclosure C15602
16. Moisture membrane device for dry eye (2019). Johns Hopkins University disclosure C15750
17. Lacrimal canalicular stent (2019). Johns Hopkins University disclosure C16067
18. Apparatus and method for corneal refractive measurements optimization using post-operative measurements (2019). US provisional patent 62/855,364.
19. Hammerhead irrigation and aspiration tip for cataract surgery (2019). US provisional patent 62/858,078. <http://jhu.technologypublisher.com/techcase/C15462>

### Technology Transfer Activities

1. Alpha 2 collagen VIII (Col8a2) Q455K knock-in mouse model of Fuchs endothelial corneal dystrophy (2013). Johns Hopkins University disclosure C12645. Available to the world-wide scientific community through Jackson Laboratory, <https://www.jax.org/strain/029749>.
2. Alpha 2 collagen VIII (Col8a2) L450W knock-in mouse model of Fuchs endothelial corneal dystrophy (2014). Johns Hopkins University disclosure C13003. Available to the world-wide scientific community through Mutant Mouse Resource and Research Centers, [https://www.mmrrc.org/catalog/sds.php?mmrrc\\_id=42276](https://www.mmrrc.org/catalog/sds.php?mmrrc_id=42276).



3. CRISPR/Cas9 based treatments for corneal dystrophies and microsatellite repeat expansion diseases (2015). US patent application 15/741,444, PCT US2016/040962, WO 2017/004616 additional patent applications filed in Australia, Brazil, Canada, Chile, China, European Patent Office, Eurasian Patent Organization, Israel, India, Japan, Korea, Mexico, New Zealand, Singapore, licensed to Hunterian Medicine, Cambridge, MA.
4. Microsurgical forcep with infusion sleeve and tissue holding instrument for endothelial keratoplasty (2017). US patent application 16/210,683, FDA approved for clinical use. Microsurgical forcep with infusion sleeve licensed to KeraLink International/CorneaGen, Seattle, WA. Tissue holding instrument available as Peregrine DMEK donor tissue spoon through Amber Surgical, Exton, PA.
5. Implantable lens capsule for intraocular lens insertion (2017). US provisional patent 62/554,080, PCT US2018/049517, WO 2019/050925. Prototype under development with Gore Corporation, Newark, DE. <http://jhu.technologypublisher.com/techcase/C14721>
6. Telomerase transformed Fuchs corneal endothelial dystrophy cell lines 35 (F35T) and 20 (F20T). F35T is the first published *TCF4* repeat expanded Fuchs dystrophy patient endothelial cell line. These cell lines have been licensed worldwide to numerous academic institutions (Case Western University, Loma Linda University, Methodist Hospital Research Institute, Scripps Research Institute, Singapore National Eye Centre, University College London, University of Basel, UC San Diego, University of Cologne, UT Southwestern,) and companies (Beam Therapeutics, Pfizer).
7. Co-founder and consultant, Hunterian Medicine ([www.hunterian.com](http://www.hunterian.com)), Cambridge, MA, a start-up company seeking to develop and commercialize CRISPR based therapeutics.
8. Co-founder and consultant, Advanced Euclidean Solutions, Rockville, MD, a start-up company seeking to develop and commercialize improved intraocular lens (IOL) calculation technologies and creator of the IOL calculation website, [www.iolcalc.com](http://www.iolcalc.com).

## SYSTEM INNOVATION AND QUALITY IMPROVEMENT ACTIVITIES

### System Innovation Focus

My system innovation and quality improvement efforts have focused on improving the efficiency and efficacy of clinical care on the cornea service, the general eye service (resident clinic), and the ophthalmology unit at Johns Hopkins Aramco Healthcare in Dhahran, Saudi Arabia.

### System Innovation and Quality Improvement efforts within JHM:

In 2015, I participated in the Ambulatory Management Program offered by Johns Hopkins Medicine (see Other Professional Accomplishments section). The final project for this program which is still in use today implemented a standard technician work-up protocol in the Wilmer general eye service (resident clinic) which shortened patient visit times.

### System Innovation and Quality Improvement efforts outside of JHM:

#### System Innovation and Quality Improvement Program Building/Leadership:

Johns Hopkins Aramco Health (JHAH): A 10 year comprehensive collaboration between Johns Hopkins Medicine and Saudi Aramco in Dhahran, Saudi Arabia, JHAH, was established in 2014. A three year Partner Contribution Agreement was initiated in 2018-2021, for which I am the project lead, to improve the ophthalmology unit at JHAH. The major needs of the unit were determined to relate primarily to anterior eye health and included the following objectives with status as of 2020:

Train the lead corneal surgeon at JHAH in Descemet membrane endothelial keratoplasty surgery and graft preparation – completed with ongoing outcomes data collection using a tool developed by the cornea division at Wilmer.

Establish an eye bank to receive and distribute corneal transplant tissue at JHAH – completed as the second eye bank in Saudi Arabia and the first in the Eastern Province of this country.

Improve contact lens services through training, establishment of vendor relationships, and provision of administrative and clinical support for contact lens providers – completed.

Improve efficiency and volume of care provision – in process. Key progress includes increased utilization of administrative support for surgical scheduling and improved OR block time utilization and turnover times.

Establish a public health screening program at JHAH for keratoconus which is endemic in Saudi Arabia – in process with IRB protocol development and procurement of instruments for disease screening.

## ORGANIZATIONAL ACTIVITIES

### Institutional Administrative Appointments (all JHM unless specified)

2000-2004	Member, Wilmer Residency Education Committee
2003	Member, Wilmer Residency Strategic Planning Committee
2004-2009	Member, Education Policy and Curriculum Committee (EPCC)
2004-2010	Member, Clinical Clerkship Directors Sub-committee of the EPCC
2004-2010	Member, Medical Student Promotions Committee, JHM
2004-2007	Member, Liaison Committee for Medical Education (LCME) Accreditation Review Committee
2006	Member, Wilmer Emergency Room Review Committee
2006-2007	Member, Wilmer New Building Planning Committee
2006-2007	Member, Wilmer General Eye Service Planning Group
2007	Member, Wilmer at Columbia Faculty Search Committee
2007-2008	Co-Director, The Johns Hopkins Marfan Eye Center
2007-2008	Wilmer Retreat Planning Committee
2007-2009	Fourth floor co-captain, Wilmer New Building Transition Team
2008-2011	Member, Wilmer Uveitis Faculty Search Committee
2008-2010	Member, Genes to Society Nervous System and Special Senses Curriculum Development Team
2008-2010	Member, Genes to Society Special Sensory and Motor Curriculum Development Subcommittee
2008-2011	Co-leader, Genes to Society Special Sensory and Motor Curriculum Module
2009-2010	Member, Wilmer Refractive Surgery Director Search Committee
2009-2011	Member, Wilmer/King Khalid Eye Specialist Hospital (Riyadh, Saudi Arabia) Affiliation Search Committee
2009-2010	Member, Wilmer at Columbia Faculty Search Committee
2010-2011	Fifth floor captain, Wilmer/Smith Building Principal Investigators' Group
2010-2011	Chair, Wilmer General Eye Service Clinician Educator Search Committee
2010-present	Member, Wilmer Research Advisory Committee (group of 7 Wilmer faculty members selected to advise Vice Chair for Research)
2011-2016	Vice Chair for Education, Wilmer
2011-2012	Chair, Didactic Education Directorate (Subcommittee), Wilmer Residency Education Task Force
2012-2013	Chair, Wilmer Residency Education Task Force Implementation Group
2012-2016	Member, Wilmer Residency Program Education Committee
2013	Member, Wilmer at Belair Faculty Search Committee
2013-2014	Member, Wilmer Comprehensive Eye Service Search Committee
2014	Member, Department of Surgery Chair Search Committee
2014-2016	Member, Wilmer Uveitis Faculty Search Committee
2016-2018	Chair, Wilmer Anterior Segment/External Disease Basic Science Faculty Search Committee
2018	Member, Wilmer Retina Division Chief Search Committee
2019-present	Member, Wilmer Bethesda Cornea Faculty Search Committee
2019-present	Chair, Wilmer Belair Cornea Faculty Search Committee

### Editorial Activities

#### Editorial Board appointments

2003-2004	Assistant Editor, Contemporary Ophthalmology (CME review journal)
2012-2019	Editorial Board Member, Cornea, the journal of The Cornea Society

2019-present Senior Editor, Cornea

Other peer review activities [*non medico-legal*]

Journal peer review activities

American Journal of Ophthalmology

American Journal of Ophthalmology Case Reports

American Journal of Pathology

Archives of Ophthalmology (now JAMA Ophthalmology)

Biophysical Journal

British Journal of Ophthalmology

Case Reports in Ophthalmological Medicine

Cornea

Current Eye Research

Experimental Eye Research

Investigative Ophthalmology and Visual Science

Journal of Cataract and Refractive Surgery

Journal of Clinical Investigation

Journal of Genetics

Journal of the Peripheral Nervous System

Molecular Vision

Nature

Ophthalmic Epidemiology

Ophthalmology

Ocular Immunology and Inflammation

PLoS ONE

PNAS (manuscript editor)

Progress in Retinal and Eye Research

Stem Cells

Advisory Committees, Review Groups/Study Sections

2008 Cole Foundation (American College of Surgeons), grant reviewer

2008 Cochrane Eyes and Vision Group, protocol reviewer

2009-2015 Tissue Banks International Medical and Scientific Advisory Committee, member

2010 Wellcome Trust (UK)/Department of Biotechnology India Alliance Early Career Fellowship, grant reviewer

2014 Special emphasis panel (study section) 2014/10 ZEY1 VSN (02), National Eye Institute, member

2016-present Lions VisionGift Medical Advisory Committee, member

2016-present Claes Dohlman, MD, PhD, Fellow Award selection committee, member

2017 Special emphasis panel (study section) 2017/10 ZRG1 BDCN J(81), National Eye Institute, member and June meeting co-chair

2020-present Mojo Vision Board of Advisors ([www.mojo.vision](http://www.mojo.vision)), member (ophthalmology)

Professional Societies

1998-present Member, American Academy of Ophthalmology

1998-present Member, Association for Research in Vision and Ophthalmology

2000-2002 Member, American Society of Cataract and Refractive Surgery Young Physicians and Residents Special Interest Group

2000-2003 Member, American Society of Cataract and Refractive Surgery

2004-2011 Member, American Society of Matrix Biology

2014-2015 Member, American Society of Cataract and Refractive Surgery

2014, -18, -20 Member, International Society for Eye Research

Conference Organizer

JHM/Regional

2009-present Course Director, Wilmer Residents Association Annual Meeting, Baltimore, MD

2014 Organizer, Corneal Transplantation Didactic Session, Johns Hopkins Cataract and Cornea Practicum, Baltimore, MD

International

2007 Organizer/Director, Endothelial Keratoplasty Workshop, offered as part of Current Concepts in Ophthalmology: a Forum for Global Ophthalmic Innovators. Baltimore, MD. Workshop attended by 45 U.S. and international ophthalmologists.

2010 Course Director, Pathways to Leadership in Ophthalmology Advanced Preceptorship Program for visiting Korean ophthalmologists sponsored by Wilmer Eye Institute/Johns Hopkins Medicine International/Innovara, Inc./Korean Ophthalmology Society, Baltimore, MD

2013 Annual Meeting Program Chair, ARVO Cornea Section Program Committee. ARVO is the largest international eye research organization, Seattle, WA.

2017 Co-organizer, Pre-ARVO Wilmer Eye Institute Mini-symposium on Anterior Eye Research, Baltimore, MD

2020-present Planning Committee Member, Biennial Fuchs Corneal Dystrophy and Endothelial Keratoplasty Symposium, Los Angeles, CA

Session Chair  
JHM/Regional

2008 Co-chair, Fuchs Corneal Dystrophy Symposium, Baltimore, MD

2010 Co-chair, Fuchs Corneal Dystrophy Symposium, Baltimore, MD

National

2015 Co-chair, IOLs and Lens-based Refractive Surgery, Ocular Surgery News New York, New York, NY

International

2009 (ARVO is the largest international eye and vision research organization and annual meeting)  
Discussion Leader, 5<sup>th</sup> Annual Association for Research in Vision and Ophthalmology (ARVO)/Pfizer Ophthalmics Research Institute, Ft. Lauderdale, FL

2009 Moderator, Corneal Wound Healing and Cell Biology Paper Session, ARVO Annual Meeting, Ft. Lauderdale, FL

2009 Moderator, Keratoconus Poster Session, ARVO Annual Meeting, Ft. Lauderdale, FL

2010 Moderator, Topics in Corneal Basic Research Paper Session, Asia Cornea Society Biennial Scientific Meeting, Kyoto, Japan

2010-2013 Member, ARVO Annual Meeting Cornea Section Program Committee. One of six committee members chosen to oversee the cornea program of the largest annual international eye research meeting.

2011 Co-chair, Cornea Symposium, Asia-ARVO Annual Meeting, Singapore

2012 Moderator, Surgical Innovations for the Treatment of Eye Disease Minisymposium, ARVO Annual Meeting, Ft. Lauderdale, FL

2012 Moderator, Corneal Endothelial Cell Biology and Disease Paper Session, ARVO Annual Meeting, Ft. Lauderdale, FL

2012 Panelist, Cornea, External Disease Original Paper Session, American Academy of Ophthalmology Annual Meeting, Chicago, IL. (AAO is the largest international clinical organization and annual meeting in ophthalmology)

2013 Moderator, Corneal Endothelium Paper Session, ARVO Annual Meeting, Seattle, WA

2013 Moderator, Stroma, Keratocytes, Development, and Dystrophies Paper Session, ARVO Annual Meeting, Seattle, WA

2014 Moderator, Oxidative Stress in Diseases of the Ocular Surface and Cornea Mini-symposium, ARVO Annual Meeting, Orlando, FL

2014 Moderator, Corneal Endothelium Paper Session, ARVO Annual Meeting, Orlando, FL

2014 Moderator, Ocular Surface Health and Disease, Corneal Dystrophies, and Genetics Paper Session, ARVO Annual Meeting, Orlando, FL

2015 Moderator, Corneal Endothelium, Dystrophies, Genetics Paper Session, ARVO Annual Meeting, Denver, CO

2015 Moderator, Cornea Surgery, Non-refractive Paper Session, ARVO Annual Meeting, Denver, CO

2015 Judge, Best Member in Training Poster Session, Genetics Cross-sectional Group, ARVO Annual Meeting, Denver, CO

- 2016 Moderator, Dysregulation of Autophagy and/or Mitophagy Leads to Mitochondrial Dysfunction in Ocular Disorders Symposium, ARVO Annual Meeting, Seattle, WA
- 2019 Moderator, Areas of Highest Unmet Need in Cornea Panel Discussion, 31<sup>st</sup> Biennial Cornea Conference, Harvard Medical School, Boston, MA
- 2020 Moderator, Genetics and Basic Research Session, Fuchs Corneal Dystrophy Symposium, Palm Beach Gardens, FL
- 2020 Moderator, Corneal Endothelium Paper Session, ARVO Annual Meeting, Baltimore, MD

Consultantships

- 2014-2015 Tissue Banks International, Descemet membrane endothelial keratoplasty program development, consultant
- 2020 Senju Pharmaceutical Co., pharmacologic therapy for Fuchs corneal dystrophy, consultant.
- 2020-present United States Department of Justice, expert witness.

**RECOGNITION**

Awards, Honors

- 1990 Honors Thesis *magna cum laude* in Biochemistry, Harvard University
- 1990 A.B. *cum laude* in Biochemistry, Harvard University
- 1990-1997 Pre-doctoral Fellowship, NIH Medical Scientist Training Program, Emory University School of Medicine
- 1997 Lange Achievement Award, Emory University School of Medicine
- 1999 A. Edward Maumenee Research Grant Award, Wilmer Eye Institute. Project Title: "Identification of Genes Expressed in Human Corneas Using Microarray Technology"
- 2000 Walter J. Stark Research Grant Award, Wilmer Eye Institute. Project Title: "Identification of Genes Associated with Corneal Graft Failure Using DNA Microarray Technology"
- 2001 Finalist, Association of University Professors of Ophthalmology/Research to Prevent Blindness Resident and Fellow Research Forum. One of five ophthalmology residents and fellows chosen nationwide to participate.
- 2001 Pepose Association for Research in Vision and Ophthalmology Annual Meeting Travel Grant Award, Wilmer Eye Institute
- 2002-2003 Fellow, Society of Heed Fellows, Heed Ophthalmic Foundation. Recognized as the most distinguished among 14 Fellows inducted in 2002.
- 2005-2008 Research to Prevent Blindness Career Development Award
- 2008 Inaugural Wilmer Scholar Award. Selected by Wilmer full professors as the most promising Wilmer assistant professor. Award included a \$100,000 research grant.
- 2008 Bill Anderson Memorial Lecturer, American Association of Tissue Banking, Savannah, GA
- 2009 Neil Miller, MD, Medical Student Teaching Award, JHM
- 2009 Research to Prevent Blindness Dolly Green Special Scholar Award
- 2013 Ralph and Sophie Heintz Lecturer, Francis I. Proctor Foundation and University of California, San Francisco
- 2013 Achievement Award, American Academy of Ophthalmology
- 2013 International Visiting Professor, 150<sup>th</sup> Anniversary of the Department of Ophthalmology, Medical University of Graz, Austria
- 2014 International Visiting Professor, Bowman Corneal Club, Liverpool, UK
- 2016 Commencement Speaker, Wilmer Eye Institute Resident Class of 2016, Baltimore, MD
- 2018 17<sup>th</sup> Annual Jack and Barry Kayes Lectureship in Ophthalmology and Visual Sciences, Washington University School of Medicine, St. Louis, MO
- 2018 12<sup>th</sup> Annual Boston Ophthalmology International Visiting Professor in Cornea and External Eye Diseases, sponsored by Massachusetts Eye and Ear Infirmary/Harvard Medical School, Boston University Department of Ophthalmology, and Boston VA Hospital Department of Ophthalmology, Boston, MA
- 2019 Resident Surgical Teaching Award, Wilmer Eye Institute, Baltimore, MD

Invited Talks

JHM/Regional

- 2004 Invited Speaker, Bausch and Lomb Scientific Symposium, Baltimore, MD
- 2006 Invited Speaker, Chesapeake Society of Ophthalmic Registered Nurses Annual Meeting, Baltimore, MD
- 2007 Invited Speaker, Wilmer Annual Nursing Conference, Baltimore, MD
- 2010 Invited Speaker, Wilmer Annual Nursing Conference, Baltimore, MD
- 2011 Invited Speaker, Wilmer Annual Nursing Conference, Baltimore, MD
- 2011 Invited Speaker, Chesapeake Society of Ophthalmic Registered Nurses Annual Meeting, Baltimore, MD
- 2014 Invited Speaker, 7<sup>th</sup> Annual Evidence Based Care in Optometry Conference, Baltimore, MD
- 2020 Invited Speaker, Wilmer Annual Nursing Conference, Baltimore, MD

#### National

- 2005 Visiting Professor, Duke Eye Center, Duke University, Durham, NC
- 2005 Visiting Professor, Scheie Eye Institute, University of Pennsylvania, Philadelphia, PA
- 2007 Invited Speaker, Eye-Q Vision Annual CME Series, Fresno, CA..
- 2008 Invited Speaker, Allergan, Inc., Irvine, CA
- 2008 Invited Speaker, Advanced Medical Optics, Inc., Santa Ana, CA
- 2009 Invited Speaker, Yale Cataract and Cornea Conference, Westbrook, CT
- 2009 Visiting Professor, New York Eye and Ear Infirmary, New York, NY
- 2011 Visiting Professor, Georgetown University, Washington, DC
- 2011 Invited Speaker, Pediatric Keratoplasty Association Annual Meeting, Ft. Lauderdale, FL
- 2011 Invited Speaker, Corneal Dystrophy Foundation Biennial Symposium, Portland, OR (One of three internationally renowned invited speakers)
- 2012 Visiting Professor, Yale University, New Haven, CT
- 2012 Visiting Professor, University of South Florida and West Coast of Florida Monthly Regional Ophthalmology Meeting, Tampa, FL
- 2013 Visiting Professor, Harkness Eye Institute, Columbia University, New York, NY
- 2014 Visiting Professor, Resident Research Day, Vanderbilt Eye Center, Nashville, TN
- 2015 Visiting Professor, Mayo Clinic Department of Ophthalmology, Rochester, MN
- 2015 Guest Speaker, Department of Ophthalmology and Visual Sciences Seminar Series, Case Western Reserve University, Cleveland, OH
- 2015 Guest Speaker, Translational Minisymposium Lecture Series, Department of Ophthalmology, University of Kentucky, Lexington, KY
- 2016 Visiting Professor, Massachusetts Eye and Ear Infirmary, Harvard Medical School, Boston, MA
- 2016 Visiting Professor, Kellogg Eye Institute, University of Michigan School of Medicine, Ann Arbor, MI
- 2017 Visiting Professor, Emory Eye Center, Emory University, Atlanta, GA
- 2017 Visiting Professor, Department of Ophthalmology, Stony Brook University, Stony Brook, NY
- 2018 Keynote Speaker, Eye Bank Association of America 57<sup>th</sup> Annual Meeting, Philadelphia PA
- 2019 Invited Speaker, Distinguished Lecture in Ophthalmology Series, University of Pittsburgh Medical Center, Pittsburgh, PA
- 2019 Visiting Professor, Department of Ophthalmology, New York University, New York, NY
- 2020 Distinguished Visiting Professor, Shiley Eye Institute, University of California – San Diego, San Diego, CA

#### International

- 2000 International Guest Speaker, “Identification of genes expressed in human corneas using microarray technology,” Third International Meeting on Cornea, External Disease, and Eye Banking, Istanbul, Turkey
- 2005 “Fuchs’ corneal dystrophy: past perspectives, emerging concepts, future directions,” Institute of Ophthalmology, University College London, UK
- 2005 International Guest Speaker, “Fuchs’ corneal dystrophy: when to transplant?,” Moorfields Eye Hospital Bicentenary Scientific Meeting, London, UK
- 2005 “Fuchs’ corneal dystrophy: past perspectives, emerging concepts, future directions,” Oxford Biomedica plc, Oxford, UK
- 2005 International Guest Speaker, “Fuchs’ corneal dystrophy: past perspectives, emerging concepts, future directions,” “Update on posterior capsule opacification,” and “Update on cataract prevention,” 39<sup>th</sup> Annual Congress of the Turkish Ophthalmological Society, Antalya, Turkey
- 2008 Visiting Professor, “Fuchs corneal dystrophy: past perspectives, emerging concepts, future directions” and “Challenging corneal cases,” Department of Ophthalmology, University of Alberta, Edmonton, Canada

- 2008 International Guest Speaker, “Combined surgery including phacoemulsification in Descemet stripping endothelial keratoplasty” and “Surgical treatment and gene therapy for Fuchs endothelial dystrophy,” World Ophthalmology Congress, Hong Kong
- 2009 “Keratoconus pathogenesis,” 5<sup>th</sup> Annual Association for Research in Vision and Ophthalmology (ARVO)/Pfizer Ophthalmics Research Institute, Ft. Lauderdale, FL
- 2009 “How to avoid dislocations in DSEK,” Modern Technologies and Techniques for Young Ophthalmologists to Know Symposium, American Academy of Ophthalmology Annual Meeting, San Francisco, CA
- 2010 “In vivo and in vitro analysis of alpha 2 collagen VIII mutations causing Fuchs endothelial corneal dystrophy,” Biology and Pathobiology of the Cornea Gordon Research Conference, Ventura, CA
- 2010 “Characterization of corneal endothelium and Descemet membrane in transgenic knock-in mice containing the L450W and Q455K alpha 2 collagen VIII mutations causing Fuchs endothelial corneal dystrophy,” Novel Gene Targeted Mutations Affecting Structure and Functions of the Cornea Symposium, ARVO Annual Meeting, Ft. Lauderdale, FL
- 2010 Keynote Speaker, “Cell culture and mouse model of Fuchs dystrophy,” Asia Cornea Society Biennial Scientific Meeting, Kyoto, Japan
- 2011 International Guest Speaker, “Characterization of alpha 2 collagen VIII mutant knock-in mice with Fuchs corneal dystrophy,” Asia-ARVO Annual Meeting, Singapore
- 2011 Visiting Professor, “100 years of Fuchs dystrophy” and “Lamellar keratoplasty,” National Taiwan University, Taipei, Taiwan
- 2011 Visiting Professor, “Lamellar keratoplasty,” Chinese University of Hong Kong
- 2011 “Cell culture and mouse models of Fuchs dystrophy: insights into cellular pathogenesis,” Improving therapy of dysfunctional corneal endothelium Special Interest Group, ARVO Annual Meeting, Ft. Lauderdale, FL
- 2011 International Keynote Speaker, “Keratoconus: causes, cures, and unanswered questions,” Homburg Keratoconus Symposium, Homburg, Germany.
- 2011 Visiting Professor, “A century of Fuchs dystrophy,” University of Salzburg, Austria
- 2011 Visiting Professor, “A century of Fuchs dystrophy” and “Corneal dystrophies,” University of Graz, Austria
- 2012 “Cultured corneal endothelium: potential and challenges for therapeutic application,” Translational Research for Treatment of Fuchs Corneal Dystrophy Special Interest Group, ARVO Annual Meeting, Ft. Lauderdale, FL
- 2012 “Techniques to improve success of endothelial keratoplasty,” Theory and Techniques of Corneal Surgery: An Interactive Course for Corneal Surgeons, American Academy of Ophthalmology Annual Meeting, Chicago, IL
- 2012 International Guest Speaker, “Studies of disease pathogenesis and drug discovery in a mouse model of Fuchs endothelial corneal dystrophy, Corneal Dystrophy Session, Asia Cornea Society Biennial Scientific Meeting, Manila, Philippines
- 2013 International Guest Speaker, “Keratoconus I,” “Keratoconus II,” “Lamellar keratoplasty,” “Use of Pentacam in management of anterior segment disease,” “Stromal and endothelial corneal dystrophies – an update,” AlHokama Eye Centre 5<sup>th</sup> Annual Scientific Meeting, Advances in Cornea and Refractive Surgery in conjunction with the 2013 Saudi Ophthalmology Annual Meeting (Pre-meeting cornea day, one of three internationally renowned speakers), Riyadh, Saudi Arabia
- 2013 International Guest Speaker, “Keratoconus,” “Lamellar keratoplasty,” “Use of Pentacam in management of anterior segment disease,” “Epithelial and Bowman layer corneal dystrophies,” Saudi Ophthalmology Annual Meeting (one of seven international speakers in anterior segment), Riyadh, Saudi Arabia
- 2013 “Fuchs endothelial corneal dystrophy: role of the unfolded protein response in cellular pathogenesis,” ER Stress and the Unfolded Protein Response in Ocular Health and Disease Symposium, ARVO Annual Meeting, Seattle, WA
- 2013 “Candidate and high throughput drug screening for Fuchs dystrophy,” Endothelial Dysfunction: from Pathophysiology to Treatment Special Interest Group, ARVO Annual Meeting, Seattle, WA
- 2013 “Femtosecond laser cataract surgery,” Cornea Section Networking Session, ARVO Annual Meeting, Seattle, WA
- 2013 International Guest Speaker, “Why does the cornea bulge in keratoconus?,” Keratoconus: Understanding the Disease and Treatments Symposium, XXX Pan-American Congress of Ophthalmology/XXXVII Brazilian Congress of Ophthalmology Meeting, Rio de Janeiro, Brazil
- 2013 International Guest Speaker, “Fuchs endothelial corneal dystrophy: surgical and medical treatments,” 150<sup>th</sup> Anniversary Celebration of the Department of Ophthalmology, Medical University of Graz, Austria
- 2014 International Guest Speaker, “Fuchs corneal dystrophy,” Bowman Cornea Club Annual Meeting (one of two invited speakers), Liverpool, UK

- 2014 “Drug screening for Fuchs endothelial corneal dystrophy,” Translational Research: Drug or Regenerative Medicine Special Interest Group, ARVO Annual Meeting, Orlando, FL
- 2014 Invited Speaker, “Fuchs endothelial corneal dystrophy: genetics, pathogenesis, and potential non-surgical treatment,” Corneal Development, Differentiation, and Genetics Symposium, International Society for Eye Research Biennial Meeting, San Francisco, CA
- 2014 “Descemet membrane endothelial keratoplasty,” Video Pearls in Keratoplasty session, Cornea Day, American Society of Cataract and Refractive Surgeons Annual Meeting, Boston, MA
- 2014 International Guest Speaker, “Molecular pathogenesis of Fuchs dystrophy,” Fuchs Dystrophy: Pathophysiology, Diagnostics, Progression, and Stage-related Conservative and Microsurgical Therapy Symposium, 112<sup>th</sup> Annual Congress of the German Ophthalmological Society, Leipzig, Germany
- 2014 Visiting Professor, “Fuchs endothelial corneal dystrophy: pathophysiology and approaches for medical treatment,” Catholic University of Korea, Seoul, Korea
- 2015 Invited Speaker, “Animal models of Fuchs dystrophy: what have we learned?,” Dystrophies, Degenerations, and Genetics Session, World Cornea Congress VII, San Diego, CA
- 2015 Invited Speaker, “New insights on the etiopathogenesis of ectatic corneal disorders,” Therapy for Corneal Ectasia in Infants and Adults session, American Society of Cataract and Refractive Surgeons Annual Meeting, San Diego, CA
- 2015 “Drug discovery for the treatment of Fuchs endothelial corneal dystrophy,” Regenerative Medicine vs. Pharmaceutical Agents: New Treatments for Corneal Endothelial Dysfunction Special Interest Group, ARVO Annual Meeting, Denver, CO
- 2015 International Guest Speaker, “Advanced research on corneal diseases, “Ultrathin DSAEK,” “Managing complications.” 1<sup>st</sup> Cornea and External Disease Educational Course, Federal University of São Paulo, Paulista School of Medicine, São Paulo, Brasil
- 2017 International Guest Speaker, “Deep anterior lamellar keratoplasty vs. penetrating keratoplasty,” “DMEK and new endothelial horizons,” “Multifocal IOL: binocular vs. monocular,” “Immediate vs. delayed sequential bilateral cataract surgery,” XXIII International Cornea and Refractive Surgery Course, Cancun, Mexico
- 2018 International Guest Speaker, “What the Fuchs! Everything you wanted to know and more about Fuchs endothelial corneal dystrophy,” 8<sup>th</sup> Annual Form and Function in Ocular Disease Symposium, Dalhousie University, Halifax, Canada
- 2018 “Gene editing for Fuchs corneal dystrophy,” Treatments on the Horizon for Fuchs Endothelial Corneal Dystrophy Minisymposium, ARVO Annual Meeting, Honolulu, HI
- 2018 “Gene editing for Fuchs corneal dystrophy (and more),” Mechanisms and Therapies for Corneal Endothelial Dysfunction Special Interest Group, ARVO Annual Meeting, Honolulu, HI
- 2018 “Gene editing for Fuchs endothelial dystrophy,” Corneal Dystrophies Session, International Society for Eye Research Biennial Meeting, Belfast, UK
- 2019 “Laser vision correction and cataract surgery,” Community Outreach Lecture, “Considerations for Descemet membrane endothelial keratoplasty,” Ophthalmology Unit Seminar, “Advances in corneal transplantation,” Hospital Grand Rounds, Johns Hopkins Aramco Healthcare, Dhahran, Saudi Arabia
- 2019 “Progress for CRISPR-Cas9 gene editing as therapy for Fuchs corneal dystrophy,” 31<sup>st</sup> Biennial Cornea Conference, Harvard Medical School, Boston, MA
- 2020 “Gene editing for Fuchs corneal dystrophy,” Genetics and Basic Research Session, Fuchs Corneal Dystrophy Symposium, Palm Beach Gardens, FL
- 2020 “Gene therapy is the future,” Fuchs Dystrophy 2020: State of the Art and Future Directions Spotlight Session, World Cornea Congress VIII, Boston, MA
- 2020 “Gene editing for Fuchs corneal dystrophy,” Biological Aspects of Human Corneal Endothelial Cells in Health and Disease, International Society for Eye Research Biennial Meeting, Buenos Aires, Argentina

## **OTHER PROFESSIONAL ACCOMPLISHMENTS** (*Optional*)

- 2015 Ambulatory Management Program, Johns Hopkins Medicine. This program, offered annually to selected participants, brings together and trains practice management teams, specifically physician directors, nurse managers and clinic managers. The program includes 46 hours of content over 19 days. A final project is presented and implemented in the attendee’s clinical area. As vice chair of education, I attended this program with members of the general eye service (resident clinic). Our final project which is still in use



today implemented a standard technician work-up protocol in the resident clinic which shortened patient visit times.

- 2020 Leadership Development Program, Johns Hopkins Medicine. This program, offered annually to selected participants, seeks to develop effectiveness in the organizational culture, prepare for the challenges of health care reform, strengthen bonds and communication among and between faculty and administrators, and advance leaders in the organization. The program includes 13 full days of content over 11 months
- 2020 (postponed until 2021 due to COVID-19 pandemic) Economics of Clinical Operations Course, Johns Hopkins Medicine. This course, offered semi-annually to selected participants, provides an overview of the organizational and governance structures, finances and funds flow, strategic plan, and payor and regulatory considerations for Johns Hopkins Medicine and Health System. The course includes 18 hours of content over two days.
- 2020 Lab to Market Bootcamp: What Johns Hopkins Inventors Need to Know About Commercialization, Johns Hopkins Technology Ventures. This course, offered annually to selected participants, seeks to assist inventors maximize the impact of their research by instructing the path for academic technologies to be developed into products that address real unmet needs in the market, which leads to commercial value creation. The course includes 16 hours of content over eight weeks.