

CURRICULUM VITAE

Name

Stuart K Gardiner

Position Title

Senior Scientist, Discoveries in Sight, Devers Eye Institute, Legacy Health System, Portland, OR, 97232, USA

Education / Training

Institution And Location	Degree	Year(s)	Field Of Study
University of Cambridge, Cambridge, UK	MA (Hons –1 st class)	1995-8	Mathematics & Statistics
University of Cambridge, Cambridge, UK	MMath	1998-9	Statistics
Nottingham Trent University, Nottingham, UK	PhD	2000-3	Applied Medical Statistics

Positions and Employment

2004 – 2006: Postdoctoral Research Fellow, Discoveries in Sight, Devers Eye Institute, Portland, Oregon, USA

2006 – 2012: Assistant Scientist, Discoveries in Sight, Devers Eye Institute, Portland, Oregon, USA

2007 – present: Legacy Research Statistician, Legacy Health, Portland, Oregon, USA.

2012 – 2021: Associate Scientist, Discoveries In Sight, Devers Eye Institute, Portland, Oregon, USA

2020 – present: Co-Director of Clinical Epidemiology & Biostatistics, Devers Eye Institute, Portland, Oregon, USA

2021 – present: Senior Scientist, Discoveries In Sight, Devers Eye Institute, Portland, Oregon, USA

Research Interests

My primary research involves using data analytic techniques to improve the acquisition and use of clinical data in ophthalmology. Specifically, we aim to enable earlier and more accurate diagnoses of the presence and progression of glaucoma in individuals. This involves improving the clinical instruments and accompanying analysis tools for both functional and structural testing of the eye, grounded in evolving knowledge of the physiology and pathophysiology; together with assessment of risk factors that might provide prognostic information. Additionally, I provide advice on study design and analysis, and help with data analysis and interpretation, for studies across a range of medical disciplines, in my role as the chief research statistician for the Legacy Health hospital group.

Previous Work

Published Papers

1. **Gardiner SK**, Crabb DP. Frequency of testing for detecting visual field progression. *Br J Ophthalmol* 2002; 86:560-564. PMID: PMC1771142.
2. **Gardiner SK**, Crabb DP. Examination of different pointwise linear regression methods for determining visual field progression. *Invest Ophthalmol Vis Sci* 2002; 43:1400-1407. PMID: 11980853.

3. **Gardiner SK**, Crabb DP, Fitzke FW, Hitchings R. Reducing noise in suspected glaucomatous visual fields by using a new spatial filter. *Vision Res* 2004; 44:839-848. PMID: 14967209.
4. **Gardiner SK**, Johnson CA, Cioffi GA. Evaluation of the structure-function relationship in glaucoma. *Invest Ophthalmol Vis Sci* 2005; 46:3712-7. PMID: 16186353.
5. **Gardiner SK**, Demirel S, Johnson CA. Modeling the sensitivity to variability relationship in perimetry. *Vision Res* 2006; 46:1732-45. PMID: 16412491.
6. **Gardiner SK**, Anderson DR, Fingeret M, McSoley JJ, Johnson CA. Evaluation of decision rules for Frequency Doubling Technology (FDT) screening tests. *Optom Vis Sci* 2006; 83:432-37. *Optom Vis Sci*. 2006. PMID: 16840859.
7. **Gardiner SK**, Johnson CA, Spry PGD. Normal age-related sensitivity loss for a variety of visual functions throughout the central visual field. *Optom Vis Sci* 2006; 83:438-43. PMID: 16840869.
8. Newkirk MR, **Gardiner SK**, Demirel S, Johnson CA. Assessment of false positives with the Humphrey Field Analyzer II perimeter with the SITA Algorithm. *Invest Ophthalmol Vis Sci* 2006; 47:4632-7. PMID: 17003461.
9. Strouthidis NG, Vinciotti V, Tucker AJ, **Gardiner SK**, Crabb DP, Garway-Heath DF. Structure and function in glaucoma; the relationship between a functional visual field map and an anatomical retinal map. *Invest Ophthalmol Vis Sci* 2006; 47:5356-62. PMID: 17122124.
10. Quinn LM, **Gardiner SK**, Wheeler DT, Newkirk M, Johnson CA. Frequency Doubling Technology perimetry in normal children. *Am J Ophthalmol* 2006; 142:983-9. PMID: 17046702.
11. **Gardiner SK**, Swanson WH, Demirel S, McKendrick AM, Turpin A, Johnson CA. A two-stage neural spiking model of visual contrast detection. *Vision Research* 2008; 48:1859-69. PMCID: PMC2553713.
12. **Gardiner SK**, Demirel S, Johnson CA. Is there evidence for continued learning over multiple years in perimetry? *Optom Vis Sci* 2008; 85:1043-1048. PMCID: PMC2720782.
13. **Gardiner SK**, Demirel S. Assessment of patient opinions of different clinical tests used in the management of glaucoma. *Ophthalmology* 2008; 115:2127-2131. PMCID: PMC3704561.
14. Demirel S, Fortune B, Fan J, Levine RA, Torres R, Nguyen H, Mansberger SL, **Gardiner SK**, Cioffi GA, Johnson CA. Predicting progressive glaucomatous optic neuropathy using baseline standard automated perimetry data. *Invest Ophthalmol Vis Sci* 2009; 50:674-680. PMCID: PMC2759404.
15. Strouthidis NG, **Gardiner SK**, Sinapis C, Burgoyne CF, Garway-Heath DF. The spatial pattern of neuroretinal rim loss in ocular hypertension. *Invest Ophthalmol Vis Sci* 2009; 50:3737-3742. PMID: 19357354.
16. Strouthidis NG, Yang H, Reynaud J, Grimm J, **Gardiner SK**, Fortune B, Burgoyne CF: Comparison of clinical and spectral domain optical coherence tomography optic disc margin Anatomy. *Invest Ophthalmol Vis Sci* 2009; 50:4709-4718. PMCID: PMC2751811.
17. Asaoka R, Strouthidis NG, Kappou V, **Gardiner SK**, Garway-Heath DF. HRT-3 Moorfields reference plane: Effect on rim area repeatability and identification of progression. *Br J Ophthalmol* 2009; 93:1510-1513. PMID: 19535359.
18. Nguyen HT, Pikey KP, **Gardiner SK**, Gritz D, Krishnadas R, Cioffi GA, Mansberger SL. Intraobserver variability of confocal scanning laser ophthalmoscopy with and without stereo photographs. *Br J Ophthalmol* 2009; 93:1552-1553. PMCID: PMC3747839.
19. Strouthidis NG, **Gardiner SK**, Owen VMF, Zuniga C, Garway-Heath DF. Predicting progression to glaucoma in ocular hypertensive patients. *J Glaucoma* 2010; 19:304-9. PMID: 19730117.
20. Sklenicka S, **Gardiner SK**, Dierks EJ, Potter BE, Bell RB. Survival analysis and risk factors for recurrence in oral squamous cell carcinoma: Does surgical salvage affect outcome? *Journal of Oral and Maxillofacial Surgery* 2010; 68:1270-1275. PMID: 20347201.
21. **Gardiner SK**, Demirel S, Johnson CA. Perimetric indices as predictors of future glaucomatous functional change. *Optom Vis Sci* 2011; 88: 56-62. PMCID: PMC3746834.

22. Chen JW, Gombart ZJ, Rogers S, **Gardiner SK**, Cecil S, Bullock RM. Pupillary reactivity as an early indicator of increased intracranial pressure: The introduction of the Neurological Pupil Index. *Surg Neurol Int* 2011; 2: 82. PMID: PMC3130361.
23. Krupin T, Liebmann JM, Greenfield DS, Ritch R, **Gardiner SK**. A randomized trial of Brimonidine versus Timolol in preserving visual function: results from the Low-pressure Glaucoma Treatment Study. *Am J Ophthalmol* 2011; 151: 671-681. PMID: 21257146.
24. **Gardiner SK**, Demirel S, Johnson CA, Swanson WH. Assessment of linear-scale global indices for perimetry in terms of progression in early glaucoma. *Vision Research* 2011; 51: 1801-1810. PMID: PMC3152648.
25. **Gardiner SK**, Johnson CA, Demirel S. Cup size predicts subsequent functional change in early glaucoma. *Optom Vis Sci* 2011; 88: 1470-1476. PMID: PMC3223562.
26. Yang H, Qi J, Hardin C, **Gardiner SK**, Strouthidis NG, Fortune B, Burgoyne CF. Spectral Domain Optical Coherence Tomography Enhanced Depth Imaging of the normal and glaucomatous non-human primate optic nerve head. *Invest Ophthalmol Vis Sci* 2012; 53: 394-40. PMID: PMC3292373.
27. Demirel S, De Moraes CG, **Gardiner SK**, Liebmann JM, Cioffi GA, Gordon MO, Kass MA for the Ocular Hypertension Treatment Study. The rate of visual field change in the Ocular Hypertension Treatment Study. *Invest Ophthalmol Vis Sci* 2012; 53: 224-227. PMID: PMC3292359.
28. De Moraes CG, Demirel S, **Gardiner SK**, Liebmann JM, Cioffi GA, Ritch R, Gordon MO, Kass MA for the Ocular Hypertension Treatment Study. Effect of treatment on the velocity of visual field progression in the Ocular Hypertension Treatment Study observation group. *Invest Ophthalmol Vis Sci* 2012; 53: 1704-1709. PMID: PMC3342789.
29. Reynaud J, Cull G, Wang L, Fortune B, **Gardiner SK**, Burgoyne, CF and Cioffi GA. Automated quantification of optic nerve axons in primate glaucomatous and normal eyes - method and comparison to semi-automated manual quantification. *Invest Ophthalmol Vis Sci* 2012; 53: 2951-2959. PMID: PMC3382379.
30. Tang K, **Gardiner SK**, Gould C, Osmundsen B, Winter III WE. Robotic surgical staging for obese patients with endometrial cancer. *Am J Obstet Gynecol* 2012; 206(6): 513.e1-6. PMID: 22409959.
31. **Gardiner SK**, Johnson CA, Demirel S. Factors predicting the rate of functional progression in early and suspected glaucoma. *Invest Ophthalmol Vis Sci* 2012; 53: 3598-3604. PMID: PMC3406886.
32. Chandran R, **Gardiner SK**, Simon M, Spurgeon SE. Survival trends in mantle cell lymphoma in the United States over sixteen years 1992-2007. *Leuk Lymphoma* 2012; 53: 1488-93. PMID: 22242824.
33. Fazio M, Grytz R, Bruno L, Girard M, **Gardiner SK**, Girkin CA, Downs JC. Regional variations in mechanical strain in the posterior human sclera. *Invest Ophthalmol Vis Sci* 2012; 53: 5326-5333. PMID: PMC3416039.
34. **Gardiner SK**, Johnson CA, Demirel S. The effect of test variability on the structure-function relation in glaucoma. *Graefe's Arch Ophthalmol* 2012; 250(12): 1851-1861. PMID: PMC3763816.
35. **Gardiner SK**, Fortune B, Wang L, Downs C, Burgoyne CF. Intraocular pressure magnitude and fluctuation as predictors of rates of structural change in non human primate experimental glaucoma. *Experimental Eye Research* 2012; 103: 1-8. PMID: PMC3462301.
36. Wackym PA, Ratigan JA, Birck JD, Johnson SH, Doornink J, Bottlang M, **Gardiner SK**, Black FO. Rapid cVEMP and oVEMP responses elicited by a novel head striker and recording device. *Otol Neurotol* 2012; 33: 1392-1400. PMID: PMC Journal – In Process.
37. De Moraes CG, Demirel S, **Gardiner SK**, Liebmann JM, Cioffi GA, Ritch R, Gordon MO, Kass MA for the Ocular Hypertension Treatment Study. The rate of visual field progression in eyes with optic disc hemorrhages in the Ocular Hypertension Treatment Study. *Arch Ophthalmol* 2012; 13: 1-6. PMID: 23229692.
38. De Moraes CG, Liebmann JM, Greenfield DS, **Gardiner SK**, Ritch R, Krupin T for the Low-Pressure Glaucoma Treatment Group. Risk factors for visual field progression in the Low-

- pressure Glaucoma Treatment Study. *Am J Ophthalmol* 2012; 154: 702-711. PMID: 22835512.
39. **Gardiner SK**, Demirel S, De Moraes CG, Liebmann JM, Cioffi GA, Ritch R, Gordon MO, Kass MA for the Ocular Hypertension Treatment Study. Series length used during trend analysis affects sensitivity to changes in progression rate in the Ocular Hypertension Treatment Study. *Invest Ophthalmol Vis Sci* 2013; 54: 1252-1259. PMID: PMC3597197.
 40. **Gardiner SK**, Demirel S, Gordon MO, Kass MA for the Ocular Hypertension Treatment Study. Seasonal changes in visual field sensitivity and intraocular pressure in the Ocular Hypertension Treatment Study. *Ophthalmology* 2013; 120: 724-730. PMID: PMC3618610.
 41. Hegsted D, Gritsiouk Y, Schlesinger P, Gardiner SK, Gubler KD. Utility of the risk assessment profile for risk stratification of venous thrombotic events for trauma patients. *Am J Surg* 2013; 205: 517-520. PMID: 23592157.
 42. Gritsiouk Y, Hegsted D, **Gardiner SK**, Merriman L, Gubler KD. Use of volunteer student abstractors for a retrospective cohort analysis: a study of inter-rater reliability. *Am J Surg* 2013; 205: 552-556. PMID: 23592162.
 43. Lloyd MJ, Mansberger SL, Fortune B, Nguyen H, Torres R, Demirel S, **Gardiner SK**, Johnson CA, Cioffi GA. Features of optic disc progression in patients with ocular hypertension and early glaucoma. *J Glaucoma*. 2013; 22: 343-8. PMID: 23719180.
 44. Pathak M, Demirel S, **Gardiner SK**. Nonlinear, multilevel mixed-effects approach for modeling longitudinal standard automated perimetry data in glaucoma. *Invest Ophthalmol Vis Sci* 2013; 54: 5505-5513. PMID: PMC3747790.
 45. Gordon S, **Gardiner SK**. Central line infections in repaired catheters: a retrospective review. *J Vasc Access* 2013; 18: 164-166. PMID: 26362005.
 46. **Gardiner SK**, Fortune B, Demirel S. Signal-to-noise ratios for structural and functional tests in glaucoma. *Trans Vis Sci Tech* 2013; 2: 3. PMID: PMC3812901.
 47. Goren D, Demirel S, Fortune B, **Gardiner SK**. Correlating perimetric indices with three nerve fiber layer thickness measures. *Optom Vis Sci* 2013; 90: 1353-1360. PMID: PMC3895434.
 48. Chandran R, **Gardiner SK**, Smith SD, Spurgeon SE. Improved survival in hairy cell leukemia over three decades: a SEER database analysis of prognostic factors. *Br J Haematology* 2013; 163: 407-9. PMID: 23889044.
 49. Mansberger SL, Gleitsmann K, **Gardiner SK**, Sheppler C, Demirel S, Wooten K, Becker TM. Comparing the effectiveness of telemedicine and traditional surveillance in providing diabetic retinopathy screening examinations: a randomized controlled trial. *Telemed J E Health* 2013; 19: 942-8. PMID: PMC3850428.
 50. Grytz R, Fazio M, Girard M, Libertiaux V, Bruno L, **Gardiner SK**, Girkin C, Downs JC. Material properties of the posterior human sclera. *J Mech Behav Biomed Mater*. 2014; 29: 602-17. PMID: PMC3778040.
 51. He L, Yang H, **Gardiner SK**, Williams G, Hardin C, Strouthidis NG, Fortune B, Burgoyne CF. Longitudinal detection of optic nerve head changes by spectral domain optical coherence tomography in early experimental glaucoma. *Invest Ophthalmol Vis Sci* 2014; 55: 574-586. PMID: PMC3908685.
 52. **Gardiner SK**, Ren R, Yang H, Fortune B, Burgoyne CF, Demirel S. A method to estimate the amount of neuroretinal rim tissue in glaucoma: comparison with current methods for measuring rim area. *Am J Ophthalmol* 2014; 157 (3): 540-549. PMID: PMC3944716.
 53. Huston RK, Markell AM, McCulley EA, Pathak M, Rogers SP, Sweeney SL, Dolphin NG, **Gardiner SK**. Decreasing necrotizing enterocolitis and gastrointestinal bleeding in the neonatal intensive care unit. *Child Obesity Nutr* 2014; 6 (2): 86 - 93.
 54. Ren R, Yang H, **Gardiner SK**, Fortune B, Hardin C, Demirel S, Burgoyne CF. Anterior lamina cribrosa surface depth, age and visual field sensitivity in the Portland Progression Project. *Invest Ophthalmol Vis Sci* 2014; 55: 1531-1539. PMID: PMC3954157.
 55. He L, Ren R, Yang H, Hardin C, Reyes L, Reynaud J, **Gardiner SK**, Fortune B, Demirel S, Burgoyne CF. Anatomic vs acquired image frame discordance in spectral domain optical coherence tomography minimum rim measurements. *PLoS One* 2014; 9 (3): e92225. PMID: PMC3958478.

56. Miller LD, **Gardiner SK**, Gubler KD. Emergency department referral for organ donation: more organ donors and more organs per donor. *Am J Surg* 2014; 207: 728-734. PMID: 24791635.
57. **Gardiner SK**. Effect of a variability-adjusted algorithm on the efficiency of perimetric testing. *Invest Ophthalmol Vis Sci* 2014; 55: 2983-2992. PMID: PMC4012942.
58. Fazio MA, Grytz RG, Morris JS, Bruno L, **Gardiner SK**, Girkin CA, Downs JC. Age-related changes in human peripapillary scleral strain. *Biomech and Model Mechanobiol* 2014; 13: 551-563. PMID: PMC3875631.
59. Sheppler CR, Lambert WE, **Gardiner SK**, Becker TM, Mansberger SL. Predicting adherence with diabetic eye exams: development of the compliance with annual diabetic eye exams survey. *Ophthalmology* 2014; 121: 1212-1219. PMID: 24518614.
60. Furlanetto RL, De Moraes CG, Teng CC, Liebmann JM, Greenfield DS, **Gardiner SK**, Ritch R, Krupin T for the Low-pressure Glaucoma Treatment Study Group. Risk factors for optic disc hemorrhage in the low-pressure glaucoma treatment study. *Am J Ophthalmol* 2014; 157: 945-952. PMID: 24513094.
61. Gritsiouk Y, Hegsted DA, Schlesinger P, **Gardiner SK**, Gubler KD. A retrospective analysis of the effectiveness of low molecular weight heparin for venous thromboembolism prophylaxis in trauma patients. *Am J Surg* 2014; 207: 648-652. PMID: 24560359.
62. **Gardiner SK**, Swanson WH, Goren D, Mansberger SL, Demirel S. Assessment of the reliability of standard automated perimetry in regions of glaucomatous damage. *Ophthalmology* 2014; 121: 1359-69. PMID: PMC4082764.
63. Deng L, Demirel S, **Gardiner SK**. Reducing variability in visual field assessment for glaucoma through filtering that combines structural and functional information. *Invest Ophthalmol Vis Sci* 2014; 55: 4593-4602. PMID: PMC4112605.
64. Kinast RM, Barker GT, Day SH, **Gardiner SK**, Mansberger SL. Factors related to online patient satisfaction with ophthalmologists. *Ophthalmology* 2014; 121: 1843-1845. PMID: 24856505.
65. Yang H, He L, **Gardiner SK**, Reynaud J, Williams GA, Hardin C, Strouthidis NG, Downs JC, Fortune B. Age-related differences in longitudinal structural change by spectral domain optical coherence tomography in early experimental glaucoma. *Invest Ophthalmol Vis Sci* 2014; 55: 6409-6420. PMID: PMC4197684.
66. Grytz R, Fazio MA, Libertiaux V, Bruno L, **Gardiner SK**, Girkin CA, Downs JC. Age- and race-related differences in human scleral material properties. *Invest Ophthalmol Vis Sci* 2014; 55: 8163-8172. PMID: PMC4266082.
67. Wright TM, Goharian I, **Gardiner SK**, Sehi M, Greenfield DS. Short-term enhancement of visual field sensitivity in glaucomatous eyes following surgical intraocular pressure reduction. *Am J Ophthalmol* 2015; 159: 378-385. PMID: 25447113.
68. Pathak M, Demirel S, **Gardiner SK**. Non-linear trend analysis of longitudinal pointwise visual field sensitivity in suspected and early glaucoma. *Trans Vis Sci Tech* 2015; 4: 8. PMID: PMC4324450.
69. Lockwood H, Reynaud J, **Gardiner SK**, Grimm J, Libertiaux V, Downs JC, Yang H, Burgoyne CF. Lamina cribrosa microarchitecture in normal monkey eyes part 1 - methods and initial results. *Invest Ophthalmol Vis Sci* 2015; 56:1618-1637. PMID: PMC4354245.
70. **Gardiner SK**, Demirel S, Goren D, Mansberger SL, Swanson WH. The effect of stimulus size on the reliable stimulus range of perimetry. *Trans Vis Sci Tech* 2015; 4: 2. PMID: PMC4378323.
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73. Mansberger SL, Sheppler C, Barker G, **Gardiner SK**, Demirel S, Wooten K, Becker TM. Long-term comparative effectiveness of telemedicine in providing diabetic retinopathy

- screening examinations: a randomized controlled trial. *JAMA Ophthalmol* 2015; 133: 518-25. PMID: 25741666.
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 81. Chandran R, **Gardiner SK**, Fenske TS, Spurgeon SE. Survival trends in T cell prolymphocytic leukemia: A SEER database analysis. *Leuk Lymphoma* 2016; 57: 942-4. PMID: 26292711.
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92. **Gardiner SK**, Demirel S. Detecting change using standard global perimetric indices in glaucoma. *Am J Ophthalmol* 2017; 176: 148–156. PMID: PMC5376527.
93. Yang H, Reynaud J, Lockwood H, Williams G, Hardin C, Reyes L, Stowell C, **Gardiner SK**, Burgoyne CF. The connective tissue phenotype of glaucomatous cupping in the monkey eye - clinical and research implications. *Prog Ret Eye Res* 2017; 59: 1-52. PMID: PMC5603293.
94. Pathak M, Demirel S, **Gardiner SK**. Reducing variability of perimetric global indices from eyes with progressive glaucoma by censoring unreliable sensitivity data. *Trans Vis Sci Tech* 2017; 6: 11. PMID: PMC5518759.
95. **Gardiner SK**, Mansberger SL, Demirel S. Detection of functional change using cluster trend analysis in glaucoma. *Invest Ophthalmol Vis Sci* 2017; 58: BIO180-BIO190. PMID: PMC5516565.
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Other

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Service

2014 – Present: Editorial Board Member, Invest Ophthalmol Vis Sci
 2016: Participant, World Glaucoma Congress Global Consensus Meeting on Diagnosis of Primary Open Angle Glaucoma
 2017: Grant Reviewer, Medical Research Foundation of Oregon
 2020 – 2021: Guest Editorial Board Member, Focus on Data, Invest Ophthalmol Vis Sci
 2021: Grant Reviewer, NIH BIVT (Brain Imaging, Vision, Bioengineering and Low Vision Technology Development) Study Section
 2021: Grant Reviewer, Austrian Science Fund (FWF)

Professional Organizations

2002 – present: Member, Association for Research in Vision and Ophthalmology (ARVO)
 2002 – present: Member, Imaging and Perimetry Society

Funding

NEI R01 EY 020922

1 Aug 2011 – 30 Jun 2023

Role: Principal Investigator

Functional Testing for Glaucoma

Major Goals: This project aims to explain and reduce the variability observed in functional testing of the visual field in patients with glaucoma. This will allow earlier and more accurate assessment of a patient's current status and response to treatment. It will improve the ability to design an appropriate and cost-efficient personalized management strategy to preserve vision, with the aim of maintaining a patient's quality of life.

NEI R01 EY031686

30 Sep 2020 – 31 Aug 2024

Role: Principal Investigator

Blood flow and hemodynamics in glaucoma

Major Goals: This project will provide important new information about the role of blood flow in glaucoma. It is known that blood flow in the retina is altered during the disease; this project aims to determine whether that is the result of retinal ganglion cell loss, or a factor that contributes to cell loss, or both. This will be achieved by longitudinal testing of blood flow in the optic nerve head and retina in human participants with glaucoma, and comparison against other clinical testing modalities. It will reveal new targets both for diagnostic testing and for treatment, and elucidate the processes by which glaucoma progresses and ultimately leads to blindness.

NEI R01 EY029087 (PI: Marsh-Armstrong, N)

17 Jul 2018 – 30 Jun 2023

Role: Co-Investigator

Optic Nerve Head Glymphatics and Debris Clearance

Major Goals: We will test the hypotheses that: 1) ONH debris is removed either by astrocytes using glymphatic channels for waste disposal, or, alternatively, by CNS myeloid cells, 2) and the balance of these pathways differs in the ONH relative to elsewhere in the Optic Nerve (ON), and 3) is highly perturbed within the ONH early in glaucomatous optic neuropathy. If we are correct, then either

increasing ONH astrocytes' phagocytosis or capacity to flush waste, or inhibiting recruitment of discrete CNS myeloid cells into ONH parenchyma will be rational therapeutic strategies for glaucoma.

NEI R34 EY 0313427 (PI: Mansberger, SL)

1 Apr 2021 – 31 Mar 2023

Role: Co-Investigator

80 Years and Older Vision & Hearing Important Persons Project (80VIP)

Major Goals: This project is to design and test protocols for a future U34 grant aimed at elucidating causes of vision, hearing and balance loss in over 80 year old individuals.

Bright Focus Foundation Award (PIs: Yang, H and Chaudary, P)

1 Jul 2022 – 30 Jun 2024

Role: Co-Investigator

Novel Techniques to Correlate Structural and Molecular Alterations in Non-human Primate Early Glaucoma

Major Goals: To use quantitative proteomics and immunohistochemistry to characterize changes in the optic nerve head in experimental glaucoma, and colocalize them to optical coherence tomography images that show localized structural changes compared to healthy eyes.

Completed Funding

NEI R21 EY18698 (PI: Levine, RA)

1 Jul 2009 – 30 Jun 2011

Role: Co-Investigator.

Measuring and Predicting Visual Field Progression with Longitudinal-Survival CART

Major Goals: The goals of this project are to develop classification and regression tree methods for longitudinal survival data that assist in prediction of which eyes with glaucoma or high-risk ocular hypertension are likely to undergo progression.

NEI R01 EY018926 (PIs: Downs, JC and Girkin, CA)

1 Apr 2010 – 31 Mar 2012

Role: Consultant

Age-related Changes in Optic Nerve Head Structure and Biomechanics

Major Goals: The major goals of this project are to build 3D reconstructions of the optic nerve heads (ONH) from human donor eyes, perform 3D histomorphometric quantification of their ONH anatomy, perform biomechanical testing of their posterior scleral shells, and construct finite element models to predict IOP-related stress and strain within their load bearing tissues. From these data, we will determine age-related changes in human ONH anatomy, ONH biomechanics, and scleral material properties.

CDC U48 DP002673 (PI: Becker, TM)

14 Jul 2010 – 13 Jul 2012

Role: Consultant

The Comparative Effectiveness of Telemedicine to Detect Diabetic Retinopathy

Major goals: Diabetic retinopathy is the leading cause of blindness in working-age adults, and both the disease and ensuing blindness disproportionately affect American Indians and Alaskan Natives (AI/AN). Less than 50% of AI/AN diabetic patients receive annual eye exams. This proposal will address three critical gaps in knowledge: 1) the efficacy for detecting diabetic retinopathy with telemedicine and traditional surveillance methods; 2) the health behavior factors related to receiving annual diabetic eye examinations with telemedicine and traditional surveillance methods; and 3) the cost-effectiveness of telemedicine and traditional surveillance methods.

NEI R01 EY 019674 (PI: Demirel, S)

30 Sep 2009 – 29 Sep 2014

Role: Co-investigator

Predicting the Rate of Progression in Glaucoma

Major Goals: This project seeks to predict the future rate of vision loss in patients with glaucoma, both earlier and more accurately than is currently possible. If a patient is at risk of rapid disease progression, possibly resulting eventual visual disability or blindness, this may warrant more frequent

monitoring and/or more aggressive therapy. The project will also provide new information about glaucomatous pathophysiology, which can be used to direct future developments in diagnostic testing and treatment strategies.

NEI R01 EY021281 (PI: Burgoyne, CF)

1 Feb 2015 – 31 Jan 2019

Role: Co-investigator

Optic Nerve Head SDOCT Imaging in Glaucoma

Major Goals: To use spectral domain optical coherence tomography (SDOCT) imaging to test three hypotheses regarding glaucomatous damage to the visual system. First, that clinically detectable neural, glial and connective tissue alterations occur deep in the optic nerve head at a very early stage in the pathophysiology of glaucomatous damage. Second, that the location and magnitude of the earliest of these ONH changes, (detectable in vivo by SDOCT), will predict the location of subsequent alterations of the peripapillary retinal nerve fiber layer and orbital optic nerve axon loss. Third, that ONH connective tissue structural stiffness is altered both by age and glaucomatous damage and that it underlies the clinical appearance of the glaucomatous optic disc.

NEI R01 EY011610 (PI: Burgoyne, CF)

1 Mar 2017 – 28 Feb 2021

Role: Co-investigator

IOP-Related Force and Failure in the Optic Nerve Head

Major Goals: The goal of this project is to identify clinical targets that predict eye-specific optic nerve head (ONH) behavior (depth of cupping and remodeling) and retinal ganglion cell (RGC) axon susceptibility within the monkey unilateral experimental glaucoma model so as to translate this knowledge to human patients in future research. To do so we will first test the hypothesis that the behavior and susceptibility of individual eyes to glaucomatous damage can be predicted from the results of in vivo spectral domain optical coherence tomography (SDOCT) ONH compliance testing, post-mortem 3D reconstruction of the ONH connective tissues and stress/strain outputs of engineering finite element (FE) models. We will then test the hypothesis that ONH connective tissue deformation and remodeling are linked to RGC axon susceptibility in an age-related manner by being both more robust and more protective of axons in compliant and/or young ONHs.