BIOGRAPHICAL SKETCH

NAME: Alemi, Hamid

eRA COMMONS USER NAME (credential, e.g., agency login): alemih

POSITION TITLE: Resident Physician

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE (if applicable)	START DATE MM/YYYY	COMPLETION DATE MM/YYYY	FIELD OF STUDY
Tehran University, Iran	MD	09/2010	05/2018	Medicine
Tehran University, Iran	MPH	03/2013	05/2018	Epidemiology
Schepens Eye Res. Inst., Harvard Med. School, Boston, MA	Postdoctoral Fellow	01/2019	05/2023	Ocular Immunology
Yale School of Medicine, New Haven, CT	Internship	06/2023	06/2024	Internal Medicine
Baylor School of Medicine, Houston, TX	Residency	07/2024	10/2024	Internal Medicine
Tufts School of Medicine, Boston, MA	Residency	12/2024	Current	Ophthalmology

A. Personal Statement

I am an ophthalmology resident with a background in both clinical training and postdoctoral research, with a focus on anterior segment and corneal disease. During my postdoctoral fellowship at Mass Eye and Ear, I worked within a translational research program aimed at bridging experimental models and human ocular pathology.

My work centered on developing and characterizing murine surgical models, including Descemet stripping only and endothelial keratoplasty, with close attention to adapting technique and instrumentation to the constraints of the murine eye. I also contributed to the development of a nitrogen mustard model of chemical corneal injury, using anterior segment OCT, in vivo confocal microscopy, histopathology, and cellular assays to evaluate injury across corneal layers and assess its fidelity to the human condition.

In addition, I was involved in investigating α-melanocyte-stimulating hormone as a pharmacologic approach to preserving corneal endothelial cell viability following injury. Across these projects, my work required integrating imaging, histologic, and molecular data to characterize disease mechanisms and evaluate potential therapeutic strategies. This experience strengthened my ability to identify clinically meaningful research questions and pursue them with scientific rigor. I am committed to an academic career that combines surgery and clinic with ongoing translational investigation, and to contributing to a research environment where clinical observation and laboratory inquiry inform each other.

B. Positions and Honors

Positions and Employment

2014 - 2019 Predoctoral Research Fellow, Department of Endocrinology and Metabolism, Tehran University, Tehran, Iran

2017 - 2019 Student, Tissue Engineering Lab, Farabi Eye Hospital, Tehran University, Tehran, Iran

2019 - 2023 Postdoctoral Research Fellow, Schepens Eye Research Institute, Harvard Medical School, Boston, MA

2023 - 2024 Internal Medicine Intern, Yale New Haven Hospital, Yale School of Medicine, New Haven, CT

2024 – 2024 Internal Medicine Resident PGY-2, Baylor School of Medicine, Houston, TX

2024 - Ophthalmology Resident, New England Eye Center, Tufts School of Medicine, Boston, MA

Other Experience and Professional Memberships

2019 - Member, ARVO

2024 - Member, AAO

Honors

2010	Full Merit Scholarship, Tehran University of Medical Sciences
2010	Member, Iran National Elites Foundation
2010	Member, National Organization of Exceptional Talents
2010	Gold Medal, National Biology Olympiad, Iran
2014	Gold Medal, National Medicine Olympiad, Iran
2019	T32 Training Grant Scholar, National Eye Institute
2020	ARVO Foundation Travel Grant, ARVO
2020	Best Poster Finalist, ARVO
2021	Qais Farjo Memorial Travel Grant, ARVO
2022	Best Paper Award, Eye Banking & Cornea Forum (EBAA/Cornea Society)

C. Contribution to Science

(1) α-Melanocyte-Stimulating Hormone as a Pharmacologic Therapy for Corneal Endothelial Protection and Regeneration

The corneal endothelium has minimal regenerative capacity, and no pharmacologic treatment exists for its loss. As a postdoctoral fellow in Dr. Reza Dana's laboratory, I contributed to a research program investigating α-MSH as a therapeutic candidate for this unmet need, including generating preliminary data and participating in proposal development. Dr. Dana was awarded NIH R21 and DOD IIRA funding for this work. The program produced three complementary lines of evidence: (1) in a corneal transplantation model, α-MSH protected endothelial cells from immune-mediated injury; (2) in a controlled acute injury model, α-MSH reduced endothelial damage and engaged a regenerative response — endothelial cells underwent measurable proliferation and contributed to resurfacing of the damaged area, challenging the view of the murine corneal endothelium as post-mitotic; and (3) in a murine model of Fuchs dystrophy developed with Dr. Ula Jurkunas, α-MSH slowed endothelial cell loss during disease progression and supported recovery after the phenotype was established. Together, these studies represent the first proof-of-concept for a pharmacologic strategy targeting both degeneration and regeneration in corneal endothelial disease. This work was recognized with two ARVO Foundation travel grants, including the Qais Farjo Memorial Travel Grant.

*1. **Alemi H*,** Wang S*, Blanco T, Kahale F, Singh RB, Ortiz G, Musayeva A, Yuksel E, Pang K, Deshpande N. The neuropeptide α-Melanocyte–stimulating hormone prevents persistent corneal edema following injury. The American Journal of Pathology. 2024;194(1):150-164.*

2. Kahale F**, **Alemi H*,** Naderi A, Deshpande N, Lee S, Wang S, Singh RB, Dohlman T, Yin J, Jurkunas U. Neuropeptide alpha-Melanocyte stimulating hormone preserves corneal endothelial morphology in a murine model of Fuchs dystrophy. Scientific Reports. 2024;14(1):18842.

3. Marzidovšek ZL, Blanco T, Sun Z, **Alemi H**, Ortiz G, Nakagawa H, Chauhan SK, Taylor AW, Jurkunas UV, Yin J. The neuropeptide alpha-melanocyte–stimulating hormone is critical for corneal endothelial cell protection and graft survival after transplantation. The American Journal of Pathology. 2022;192(2):270-280.

(2) Development of Novel In Vivo Murine Models for Corneal Endothelial Injury

Much of the work described above would not have been possible without reliable ways to injure the corneal endothelium in mice. As a postdoctoral fellow, I contributed to the establishment of three models that addressed this gap. A transcorneal freezing injury model allowed quantitative characterization of endothelial cell loss kinetics and the contribution of newly generated cells to recovery — dynamics that steady-state observations could not capture. A Descemet Stripping Only (DSO) model isolated damage to Descemet membrane and endothelium while sparing the stroma, providing the anatomical precision needed to study endothelial-specific wound healing in a pattern that mirrors human endothelial keratoplasty. A murine model of Descemet Stripping Automated Endothelial Keratoplasty (DSAEK) extended this to the immunological domain, enabling study of allogeneic graft rejection and local inflammatory mechanisms underlying endothelial cell loss after transplantation. Before these models existed, the corneal endothelium could not be reliably injured in mice

without confounding stromal or epithelial damage. They have since served as platforms for the α-MSH studies above and for ongoing work in endothelial protection and graft survival.

1. Nakagawa H, **Alemi H***, Wang S, Kahale F, Blanco T, Liu C, Yin J, Dohlman TH, Dana R. Descemet Stripping Only Technique for Corneal Endothelial Damage in Mice. Cornea. 2023;42(4):470-475.*

*2. Nakagawa H, Blanco T, Kahale F, Wang S, Musayeva A, **Alemi H**, Dohlman TH, Dana R. A novel murine model of endothelial keratoplasty. Cornea. 2023;42(2):224-231.*

(3) Characterization of Mustard Gas Keratopathy Using a Novel Nitrogen Mustard Model in Mice

Mustard gas keratopathy is a chronic, often blinding complication of chemical weapons exposure whose pathophysiology remains poorly understood. Existing models have relied on sulfur mustard vapor, restricted to military-affiliated facilities, or on rabbit subjects, limiting accessibility and reproducibility. As co-first author, I helped develop a nitrogen mustard-based murine model that addressed both barriers. Using anterior segment OCT, in vivo confocal microscopy, histopathology, and clinical examination, we mapped the temporal evolution of corneal injury across all major anatomical compartments over four weeks. The model revealed two distinct clinical trajectories defined by exposure dose: a late-onset pattern, in which transient epithelial recovery preceded chronic erosions and stromal edema, and a chronic pattern marked by persistent epitheliopathy from the time of injury. Layer-specific findings — [limbal stem cell deficiency](/rare-disease/limbal-stem-cell-deficiency), subbasal nerve degeneration with incomplete recovery, transient activated keratocyte mobilization, and sustained endothelial cell loss — faithfully recapitulated cardinal features of human mustard gas keratopathy. The model also identified a previously unappreciated early therapeutic window in which intervention may prevent progression to chronic disease. By making this research accessible outside military-affiliated settings, this work provides a foundation for future mechanistic and therapeutic studies in a condition with occupational, military, and humanitarian relevance.

*1. **Alemi H***, Dehghani S*, Forouzanfar K, Surico PL, Narimatsu A, Musayeva A, Sharifi S, Wang S, Dohlman TH, Yin J, Chen Y, Dana R. Insights into mustard gas keratopathy: Characterizing corneal layer-specific changes in mice exposed to nitrogen mustard. Experimental Eye Research. 2023;236:109657.*

(4) Diabetes Mellitus and Its Systemic Complications: Foundations Relevant to Microvascular and Retinal Disease

During my medical and MPH training at Tehran University of Medical Sciences, I contributed to a series of clinical and population-level studies in collaboration with endocrinologists, cardiologists, and epidemiologists at Tehran University and Johns Hopkins University, examining the drivers of diabetic complications and end-organ damage. This work addressed several directions: the relationship between blood pressure patterns and microvascular injury, including diabetic nephropathy; population-level characterization of glycemic control and barriers to insulin initiation using nationwide data from the National Program for Prevention and Control of Diabetes in Iran; the association between extracellular heat shock protein 70 and insulin resistance independent of obesity and systemic inflammation; and, in my doctoral dissertation, the cardiovascular effects of glucose-lowering therapies, including a trial comparing sitagliptin and pioglitazone as add-on therapies and an analysis of blood pressure differences across glucose-lowering modality groups. This training provided a foundation in clinical research methodology and biostatistics that continues to inform how I approach research questions in ophthalmology.

1. **Alemi H**, Khaloo P, Mansournia MA, Rabizadeh S, Salehi SS, Mirmiranpour H, Meftah N, Esteghamati A, Nakhjavani M. Pulse pressure and diabetes treatments: Blood pressure and pulse pressure difference among glucose lowering modality groups in type 2 diabetes. Medicine (Baltimore). 2018;97(6):e9791.
2. **Alemi H**, Khaloo P, Rabizadeh S, Mansournia MA, Mirmiranpour H, Salehi SS, Esteghamati A, Nakhjavani M. Association of extracellular heat shock protein 70 and insulin resistance in type 2 diabetes; independent of obesity and C-reactive protein. Cell Stress Chaperones. 2019;24(1):69-75.
3. Najafi MT, Khaloo P, **Alemi H**, Jaafarinia A, Blaha MJ, Mirbolouk M, Mansournia MA, Afarideh M, Esteghamati S, Nakhjavani M, Esteghamati A. Ambulatory blood pressure monitoring and diabetes complications: Targeting morning blood pressure surge and nocturnal dipping. Medicine (Baltimore). 2018;97(38):e12185.
4. Khaloo P, Asadi Komeleh S, **Alemi H**, Mansournia MA, Mohammadi A, Yadegar A, Afarideh M, Esteghamati S, Nakhjavani M, Esteghamati A. Sitagliptin vs. pioglitazone as add-on treatments in patients with uncontrolled type 2 diabetes on the maximal dose of metformin plus sulfonylurea. J Endocrinol Invest. 2019;42(7):851-857.

D. Scholastic Performance

Peer-Reviewed Publications

1. **Alemi H***, Wang S*, Blanco T, Kahale F, Singh RB, Ortiz G, Musayeva A, Yuksel E, Pang K, Deshpande N. The neuropeptide α-melanocyte-stimulating hormone prevents persistent corneal edema following injury. *American Journal of Pathology*. 2024;194(1):150–164.
2. Kahale F*, **Alemi H***, Naderi A, Deshpande N, Lee S, Wang S, Singh RB, Dohlman T, Yin J, Jurkunas U. Neuropeptide alpha-melanocyte stimulating hormone preserves corneal endothelial morphology in a murine model of Fuchs dystrophy. *Scientific Reports*. 2024;14(1):18842.
3. **Alemi H***, Dehghani S*, Forouzanfar K, Surico PL, Narimatsu A, Musayeva A, Sharifi S, Wang S, Dohlman TH, Yin J. Insights into mustard gas keratopathy: characterizing corneal layer-specific changes in mice exposed to nitrogen mustard. *Experimental Eye Research*. 2023;236:109657.
4. Nakagawa H*, **Alemi H***, Wang S, Kahale F, Blanco T, Liu C, Yin J, Dohlman TH, Dana R. Descemet stripping only technique for corneal endothelial damage in mice. *Cornea*. 2023;42(4):470–475.
5. Blanco T, Musayeva A, Singh RB, Nakagawa H, Lee S, **Alemi H**, Gonzalez-Nolasco B, Ortiz G, Wang S, Kahale F. The impact of donor diabetes on corneal transplant immunity. *American Journal of Transplantation*. 2023;23(9):1345–1358.
6. Nakagawa H, Blanco T, Kahale F, Wang S, Musayeva A, **Alemi H**, Dohlman TH, Dana R. A novel murine model of endothelial keratoplasty. *Cornea*. 2023;42(2):224–231.
7. Mohammadi A, Rabizadeh S, Mirmoosavi S, **Alemi H**, Mirmiranpoor H, Bagheri S, Moradi K, Esteghamati A, Nakhjavani M. Eight weeks of vitamin C supplementation restores the lost correlation between serum leptin and C-reactive protein in patients with type 2 diabetes. *Current Pharmaceutical Design*. 2023;29(43):3497–3503.
8. Chen Y, Wang S, **Alemi H**, Dohlman T, Dana R. Immune regulation of the ocular surface. *Experimental Eye Research*. 2022;218:109007.
9. Marzidovšek ZL, Blanco T, Sun Z, **Alemi H**, Ortiz G, Nakagawa H, Chauhan SK, Taylor AW, Jurkunas UV, Yin J. The neuropeptide alpha-melanocyte-stimulating hormone is critical for corneal endothelial cell protection and graft survival after transplantation. *American Journal of Pathology*. 2022;192(2):270–280.
10. Singh RB, Blanco T, Mittal SK, **Alemi H**, Chauhan SK, Chen Y, Dana R. Pigment epithelium-derived factor enhances the suppressive phenotype of regulatory T cells in a murine model of dry eye disease. *American Journal of Pathology*. 2021;191(4):720–729.
11. Molla GJ, Ismail-Beigi F, Larijani B, Khaloo P, Moosaie F, **Alemi H**, Mansournia MA, Ghadimi T, Ghaemi F, Nakhjavani M. Smoking and diabetes control in adults with type 1 and type 2 diabetes: a nationwide study from the 2018 national program for prevention and control of diabetes of Iran. *Canadian Journal of Diabetes*. 2020;44(3):246–252.
12. Rajab A, Khaloo P, Rabizadeh S, **Alemi H**, Salehi S, Majdzadeh R, Mirmiranpour H, Rajab A, Esteghamati A, Nakhjavani M. Barriers to initiation of insulin therapy in poorly controlled type 2 diabetes based on self-determination theory. *Eastern Mediterranean Health Journal*. 2020;26(11):1331–1338.
13. Heidari F, Rabizadeh S, Sadat Salehi S, Akhavan S, Khaloo P, **Alemi H**, Mirmiranpour H, Esteghamati A, Nakhjavani M. Serum HSP70 level in patients with endometrial cancer with and without diabetes. *Gynecological Endocrinology*. 2020;36(4):351–355.
14. Esteghamati A, Ismail-Beigi F, Khaloo P, Moosaie F, **Alemi H**, Mansournia MA, Afarideh M, Molla GJ, Ghadimi T, Shadnoush M. Determinants of glycemic control: phase 2 analysis from nationwide diabetes report of National Program for Prevention and Control of Diabetes (NPPCD-2018). *Primary Care Diabetes*. 2020;14(3):222–231.
15. Zheng Q, Jones FK, Leavitt SV, Ung L, Labrique AB, Peters DH, Lee EC, **Alemi H**, et al. HIT-COVID, a global database tracking public health interventions to COVID-19. *Scientific Data*. 2020;7(1):286.
16. **Alemi H***, Khaloo P*, Rabizadeh S, Mansournia MA, Mirmiranpour H, Salehi SS, Esteghamati A, Nakhjavani M. Association of extracellular heat shock protein 70 and insulin resistance in type 2 diabetes; independent of obesity and C-reactive protein. *Cell Stress and Chaperones*. 2019;24(1):69–75.
17. Khaloo P, **Alemi H**, Mansournia MA, Rabizadeh S, Salehi SS, Blaha MJ, Mirbolouk MH, Mirmiranpour H, Esteghamati A, Nakhjavani M. Loss of inverse association between Framingham risk score and estimated glomerular filtration rate in moderate to severe diabetic kidney disease. *Archives of Iranian Medicine*. 2019;22(2):91–98.
18. Rabizadeh S, Mansournia MA, Salehi SS, Khaloo P, **Alemi H**, Mirbolouk H, Blaha MJ, Esteghamati A, Nakhjavani M. Comparison of primary versus secondary prevention of cardiovascular disease in patients with

type 2 diabetes: focus on achievement of ABC goals. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*. 2019;13(3):1733–1737.
19. Ghazizadeh Z, Khaloo P, **Alemi H**, Rabizadeh S, Mirmiranpour H, Esteghamati A, Nakhjavani M. Definition of an oxidative stress status by combined assessment of malondialdehyde and oxidized-LDL: a study in patients with type 2 diabetes and control. *Meta Gene*. 2019;19:91–97.
20. **Alemi H**, Khaloo P, Mansournia MA, Rabizadeh S, Salehi SS, Mirmiranpour H, Meftah N, Esteghamati A, Nakhjavani M. Pulse pressure and diabetes treatments: blood pressure and pulse pressure difference among glucose lowering modality groups in type 2 diabetes. *Medicine*. 2018;97(6):e9791.
21. Khaloo P, Komeleh SA, **Alemi H**, Mansournia M, Mohammadi A, Yadegar A, Afarideh M, Esteghamati S, Nakhjavani M, Esteghamati A. Sitagliptin vs. pioglitazone as add-on treatments in patients with uncontrolled type 2 diabetes on the maximal dose of metformin plus sulfonylurea. *Journal of Endocrinological Investigation*. 2018:1–7.
22. Najafi MT, Khaloo P, **Alemi H**, Jaafarinia A, Blaha MJ, Mirbolouk M, Mansournia MA, Afarideh M, Esteghamati S, Nakhjavani M. Ambulatory blood pressure monitoring and diabetes complications: targeting morning blood pressure surge and nocturnal dipping. *Medicine*. 2018;97(38):e12185.

Peer-Reviewed Published Abstracts and Conference Presentations

1. **Alemi H**, Wang S, Forouzanfar K, Dehghani S, Elbasiony E, Kahale F, Dohlman TH. Characterization of corneal fibrosis in young versus adult mice following mechanical injury. ARVO Annual Meeting 2023; New Orleans, LA.
2. **Alemi H**, Wang S, Deshpande N, Blanco T, Pang K, Yuksel E, Nakagawa H, Singh RB, Dohlman T, Yin J. Efficacy of neuropeptide alpha-melanocyte stimulating hormone in suppressing corneal edema following acute injury. Cornea and Eye Bank Forum 2022; Chicago, IL.
3. **Alemi H**, Singh RB, Blanco T, Nakagawa H, Dohlman TH, Chen Y, Chauhan SK, Yin J, Dana R. Regulatory T-cells promote corneal graft survival by modulating post-transplantation alloimmune response. Cornea and Eye Banking Forum 2021; New Orleans, LA.
4. **Alemi H**, Wang S, Deshpande N, Blanco T, Pang K, Yuksel E, Nakagawa H, Singh RB, Dohlman T, Yin J. Efficacy of neuropeptide alpha-melanocyte stimulating hormone in suppressing corneal edema following acute injury. ARVO Annual Meeting 2021; Virtual.

Non-Peer-Reviewed Publications

1. **Alemi H**, Soukiasian SH. Contact lens wearer experiences persistent decreased vision, ocular pain. Ocular Surgery News. August 10, 2025.
2. **Alemi H**, Barouch FC. Woman presents with 1 week of left eye pain, redness, and photophobia. Ocular Surgery News. June 25, 2025.

Completed Research Support

Iran National Elites Foundation Training Grant 09/23/16 - 09/24/2017
Alemi, Hamid
Blood pressure and pulse pressure differences among glucose-lowering modality groups in type 2 diabetes
Goals: Determine how glycemic control regulates pulse and blood pressure in type 2 diabetes

5T32EY007145-21, National Eye Institute (NEI) 2019/12/01-2020/11/30
Alemi, Hamid
The function of vitamin D in preventing corneal endothelial cell loss during storage and transplantation
Goals: To determine the effect of vitamin D on corneal preservation before transplantation and vitamin D deficiency on the function and survival of CEnC in the murine cornea