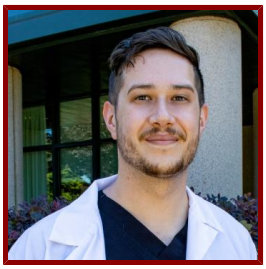
Stanford



Gabriel Velez, MD, PhD

Resident in Ophthalmology

SUPERVISORS

- Vinit Mahajan

Bio

BIO

Gabriel Velez is a PGY2 ophthalmology resident at Stanford. He received his bachelor's degree in molecular biology from Winona State University in 2014. He completed his MD and PhD degrees at the University of Iowa. His PhD research focused on studying the structure of the calpain-5 (CAPN5) protein and its role in the development of Neovascular Inflammatory Vitreoretinopathy (NIV), a rare blinding eye disease. His research interests include translational proteomics, retinal disease, ocular oncology, structural biology, biophysical chemistry, drug design, and bioinformatics.

CURRENT ROLE AT STANFORD

Resident Physician

HONORS AND AWARDS

- VRSF Research Award, VitreoRetinal Surgery Foundation (VRSF) (2023)
- Koichi Suzuki Predoctoral Award, The Biology of Calpains in Health and Disease Conference, Federation of American Societies for Experimental Biology (FASEB) (2019)
- X-Ray Methods in Structural Biology Course Attendee, Cold Spring Harbor Laboratory (CSHL) (2019)
- RapiData 2019 Macromolecular X-Ray Diffraction and Measurement Course, Stanford Synchrotron Radiation Lightsource (SSRL) (2019)
- SRC Travel Award, The Biology of Calpains in Health and Disease Conference, Federation of American Societies for Experimental Biology (FASEB) (2019)
- NEI Recognized Hispanic/Latino Researchers and Eye Care Professionals, National Eye Health Education Program (NEHEP) (2018)
- Trainee Scholar Travel Award, University of Iowa Carver College of Medicine (2018)
- Iowa Graduate Success Fellowship, University of Iowa Graduate College (2017)
- Ruth L. Kirschstein National Research Service (NRSA) F30 Award, National Eye Institute (NEI) (2017)
- SRC Travel Award, Biology & Chemistry of Vision Conference, Federation of American Societies for Experimental Biology (FASEB) (2017)
- Arthur A. Spector Award in Basic Science Research, University of Iowa Carver College of Medicine (2014)
- Medical Scientist Training Program (MSTP) Fellowship, University of Iowa Carver College of Medicine (2014)
- Sloan Pre-Doctoral Scholarship, Alfred P. Sloan Foundation (2014)
- Summa Cum Laude, Bachelor of Science, Winona State University (2014)
- Thomas Pietsch Scholarship, Winona State University (2013)
- Undergraduate Research & Creative Project Grant, Winona State University (2013)

- Mayo Summer Undergraduate Research (SURF) Fellowship, Mayo Clinic Foundation (2012-2013)
- Annual Dean's List, Winona State University (2010-2014)
- Presidential Honor's Scholarship, Winona State University (2010-2014)

PROFESSIONAL EDUCATION

- Residency, Stanford University , Ophthalmology (2026)
- Internship, Stanford University , General Surgery (2023)
- M.D., University of Iowa Carver College of Medicine , Medical Scientist Training Program (2022)
- Ph.D., University of Iowa Carver College of Medicine , Molecular Medicine (2020)
- B.S., Winona State University , Cell & Molecular Biology (2014)
- C.N.A., Normandale Community College , Certified Nursing Assistant Certification (2010)

INTERNET LINKS

- Google Scholar Profile: https://scholar.google.com/citations?user=n3FNdM0AAAAJ&hl=en&oi=ao
- Mahajan Lab Website: https://mahajanlab.stanford.edu/
- ORCID: https://orcid.org/0000-0003-0819-5933

Professional

WORK EXPERIENCE

- Undergraduate Research Assistant - Mayo Clinic (5/2012 - 4/2014)
- Graduate Research Assistant - University of Iowa (6/2014 - 5/2017)
- Visiting Student Researcher - Stanford University (7/2017 - present)

Publications

PUBLICATIONS

- **Liquid biopsy proteomics of uveal melanoma reveals biomarkers associated with metastatic risk.** *Molecular cancer*
  Velez, G., Nguyen, H. V., Chemudupati, T., Ludwig, C. A., Toral, M., Reddy, S., Mruthyunjaya, P., Mahajan, V. B.
  2021; 20 (1): 39
- **Structure-based phylogeny identifies Avoralstat as a TMPRSS2 inhibitor that prevents SARS-CoV-2 infection in mice.** *The Journal of clinical investigation*
  Sun, Y. J., Velez, G. n., Parsons, D. E., Li, K. n., Ortiz, M. E., Sharma, S. n., McCray, P. B., Bassuk, A. G., Mahajan, V. B.
  2021
- **Molecular Surgery: Proteomics of a Rare Genetic Disease Gives Insight into Common Causes of Blindness.** *iScience*
  Velez, G., Mahajan, V. B.
  2020; 23 (11): 101667
- **Structural Insights into the Unique Activation Mechanisms of a Non-classical Calpain and Its Disease-Causing Variants.** *Cell reports*
  Velez, G., Sun, Y. J., Khan, S., Yang, J., Herrmann, J., Chemudupati, T., MacLaren, R. E., Gakhar, L., Wakatsuki, S., Bassuk, A. G., Mahajan, V. B.
  2020; 30 (3): 881
- **Metabolite therapy guided by liquid biopsy proteomics delays retinal neurodegeneration.** *EBioMedicine*
  Wert, K. J., Velez, G. n., Kanchustambham, V. L., Shankar, V. n., Evans, L. P., Sengillo, J. D., Zare, R. N., Bassuk, A. G., Tsang, S. H., Mahajan, V. B.
  2020; 52: 102636
- **Personalized Proteomics for Precision Health: Identifying Biomarkers of Vitreoretinal Disease.** *Translational vision science & technology*
  Velez, G., Tang, P. H., Cabral, T., Cho, G. Y., Machlab, D. A., Tsang, S. H., Bassuk, A. G., Mahajan, V. B.
  2018; 7 (5): 12

- **A novel de novo CAPN5 mutation in a patient with inflammatory vitreoretinopathy, hearing loss, and developmental delay.** *Cold Spring Harbor molecular case studies*
  Velez, G., Bassuk, A. G., Schaefer, K. A., Brooks, B., Gakhar, L., Mahajan, M., Kahn, P., Tsang, S. H., Ferguson, P. J., Mahajan, V. B.
  2018; 4 (3)
- **Proteomic analysis of the human retina reveals region-specific susceptibilities to metabolic-and oxidative stress-related diseases** *PLOS ONE*
  Velez, G., Machlab, D. A., Tang, P. H., Sun, Y., Tsang, S. H., Bassuk, A. G., Mahajan, V. B.
  2018; 13 (2): e0193250
- **Therapeutic drug repositioning using personalized proteomics of liquid biopsies.** *JCI insight*
  Velez, G., Bassuk, A. G., Colgan, D., Tsang, S. H., Mahajan, V. B.
  2017; 2 (24)
- **Liquid Biopsy Proteomics in Ophthalmology.** *Journal of proteome research*
  Wolf, J., Franco, J. A., Yip, R., Dabaja, M. Z., Velez, G., Liu, F., Bassuk, A. G., Mruthyunjaya, P., Dufour, A., Mahajan, V. B.
  2024
- **Cross-Platform Identification and Validation of Uveal Melanoma Vitreous Protein Biomarkers.** *Investigative ophthalmology & visual science*
  Velez, G., Wolf, J., Dufour, A., Mruthyunjaya, P., Mahajan, V. B.
  2023; 64 (14): 14
- **Intraoperative Complications With Vitreous Biopsy for Molecular Proteomics** *OPHTHALMIC SURGERY LASERS & IMAGING RETINA*
  Mishra, K., Velez, G., Chemudupati, T., Tang, P. H., Mruthyunjaya, P., Sanislo, S. R., Mahajan, V. B.
  2023; 54 (1): 32-36
- **Proteomic analysis of autoimmune retinopathy implicates NrCAM as a potential biomarker.** *Ophthalmology science*
  Al-Moujahed, A., Velez, G., Vu, J. T., Lima de Carvalho, J. R., Levi, S. R., Bassuk, A. G., Sepah, Y. J., Tsang, S. H., Mahajan, V. B.
  2022; 2 (2)
- **Calpains as mechanistic drivers and therapeutic targets for ocular disease.** *Trends in molecular medicine*
  Vu, J. T., Wang, E., Wu, J., Sun, Y. J., Velez, G., Bassuk, A. G., Lee, S. H., Mahajan, V. B.
  2022
- **Surgical management of acanthamoeba chorioretinitis.** *American journal of ophthalmology case reports*
  Mishra, K., Velez, G., Roybal, C. N., Mahajan, V. B.
  2022; 25: 101388
- **Proteomic identification of candidate biomarkers that distinguish lens-induced uveitis from infectious endophthalmitis**
  Al Moujahed, A., Velez, G., Vu, J., Ferguson, P., Bassuk, A., Mahajan, V. B.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2021
- **Peptidomimetics Therapeutics for Retinal Disease.** *Biomolecules*
  Parsons, D. E., Lee, S. H., Sun, Y. J., Velez, G., Bassuk, A. G., Smith, M., Mahajan, V. B.
  2021; 11 (3)
- **Whole-Exome Sequencing of Patients with Posterior Segment Uveitis.** *American journal of ophthalmology*
  Li, A. S., Velez, G., Darbro, B., Toral, M. A., Yang, J., Tsang, S. H., Ferguson, P. J., Folk, J. C., Bassuk, A. G., Mahajan, V. B.
  2020
- **Proteomic analysis of intermediate uveitis suggests myeloid cell recruitment and implicates IL-23 as a therapeutic target.** *American journal of ophthalmology case reports*
  Sepah, Y. J., Velez, G. n., Tang, P. H., Yang, J. n., Chemudupati, T. n., Li, A. S., Nguyen, Q. D., Bassuk, A. G., Mahajan, V. B.
  2020; 18: 100646
- **Mechanisms of neurodegeneration in a preclinical autosomal dominant retinitis pigmentosa knock-in model with a Rho(D190N) mutation** *CELLULAR AND MOLECULAR LIFE SCIENCES*
  Sancho-Pelluz, J., Cui, X., Lee, W., Tsai, Y., Wu, W., Justus, S., Washington, I., Hsu, C., Park, K., Koch, S., Velez, G., Bassuk, A. G., Mahajan, et al
  2019; 76 (18): 3657–65
- **CAPN5 genetic inactivation phenotype supports therapeutic inhibition trials.** *Human mutation*

Wert, K. J., Koch, S. F., Velez, G., Hsu, C., Mahajan, M., Bassuk, A. G., Tsang, S. H., Mahajan, V. B.
2019

- **CAPN5 genetic inactivation phenotype supports therapeutic inhibition trials**
  Wert, K., Koch, S. F., Velez, G., Hsu, C., Mahajan, M., Bassuk, A. G., Tsang, S. H., Mahajan, V. B.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019

- **Gain-of-function mutations in a member of the Src family kinases cause autoinflammatory bone disease in mice and humans.** *Proceedings of the National Academy of Sciences of the United States of America*
  Abe, K., Cox, A., Takamatsu, N., Velez, G., Laxer, R. M., Tse, S. M., Mahajan, V. B., Bassuk, A. G., Fuchs, H., Ferguson, P. J., Hrabe de Angelis, M.
  2019

- **SCAPER-associated nonsyndromic autosomal recessive retinitis pigmentosa** *AMERICAN JOURNAL OF MEDICAL GENETICS PART A*
  Jauregui, R., Thomas, A. L., Liechty, B., Velez, G., Mahajan, V. B., Clark, L., Tsang, S. H.
  2019; 179 (2): 312–16

- **VCAN Canonical Splice Site Mutation is Associated With Vitreoretinal Degeneration and Disrupts an MMP Proteolytic Site** *INVESTIGATIVE OPHTHALMOLOGY & VISUAL SCIENCE*
  Tang, P. H., Velez, G., Tsang, S. H., Bassuk, A. G., Mahajan, V. B.
  2019; 60 (1): 282–93

- **Novel REEP6 gene mutation associated with autosomal recessive retinitis pigmentosa.** *Documenta ophthalmologica. Advances in ophthalmology*
  Lin, Y. n., Xu, C. L., Velez, G. n., Yang, J. n., Tanaka, A. J., Breazzano, M. P., Mahajan, V. B., Sparrow, J. R., Tsang, S. H.
  2019

- **VCAN Canonical Splice Site Mutation is Associated With Vitreoretinal Degeneration and Disrupts an MMP Proteolytic Site.** *Investigative ophthalmology & visual science*
  Tang, P. H., Velez, G. n., Tsang, S. H., Bassuk, A. G., Mahajan, V. B.
  2019; 60 (1): 282–93

- **In trans variant calling reveals enrichment for compound heterozygous variants in genes involved in neuronal development and growth.** *Genetics research*
  Cox, A. J., Grady, F. n., Velez, G. n., Mahajan, V. B., Ferguson, P. J., Kitchen, A. n., Darbro, B. W., Bassuk, A. G.
  2019; 101: e8

- **Proteomic insight into the pathogenesis of CAPN5-vitreoretinopathy.** *Scientific reports*
  Velez, G. n., Yang, J. n., Li, A. S., Tsang, S. H., Bassuk, A. G., Mahajan, V. B.
  2019; 9 (1): 7608

- **SCAPER-associated nonsyndromic autosomal recessive retinitis pigmentosa.** *American journal of medical genetics. Part A*
  Jauregui, R., Thomas, A. L., Liechty, B., Velez, G., Mahajan, V. B., Clark, L., Tsang, S. H.
  2018

- **ProSave: an application for restoring quantitative data to manipulated subsets of protein lists.** *Source code for biology and medicine*
  Machlab, D. A., Velez, G., Bassuk, A. G., Mahajan, V. B.
  2018; 13: 3

- **ProSave: an application for restoring quantitative data to manipulated subsets of protein lists** *SOURCE CODE FOR BIOLOGY AND MEDICINE*
  Machlab, D. A., Velez, G., Bassuk, A. G., Mahajan, V. B.
  2018; 13

- **Personalized Proteomics for Precision Health: Identifying Biomarkers of Vitreoretinal Disease** *TRANSLATIONAL VISION SCIENCE & TECHNOLOGY*
  Velez, G., Tang, P. H., Cabral, T., Cho, G. Y., Machlab, D. A., Tsang, S. H., Bassuk, A. G., Mahajan, V. B.
  2018; 7 (5)

- **Extracellular superoxide dismutase (SOD3) regulates oxidative stress at the vitreoretinal interface** *FREE RADICAL BIOLOGY AND MEDICINE*
  Wert, K. J., Velez, G., Cross, M. R., Wagner, B. A., Teoh-Fitzgerald, M. L., Buettner, G. R., McAnany, J., Olivier, A., Tsang, S. H., Harper, M. M., Domann, F. E., Bassuk, A. G., Mahajan, et al
  2018; 124: 408–19

- **Missense mutation in SLIT2 associated with congenital myopia, anisometropia, connective tissue abnormalities, and obesity** *ORPHANET JOURNAL OF RARE DISEASES*

Liu, K. Y., Sengillo, J. D., Velez, G., Jauregui, R., Sakai, L. Y., Maumenee, I. H., Bassuk, A. G., Mahajan, V. B., Tsang, S. H.
2018; 13: 138

- **A novel de novo CAPN5 mutation in a patient with inflammatory vitreoretinopathy, hearing loss, and developmental delay** *COLD SPRING HARBOR MOLECULAR CASE STUDIES*
  Velez, G., Bassuk, A. G., Schaefer, K. A., Brooks, B., Gakhar, L., Mahajan, M., Kahn, P., Tsang, S. H., Ferguson, P. J., Mahajan, V. B.
  2018; 4 (3)

- **Extracellular superoxide dismutase 3 (SOD3) regulates oxidative stress at the vitreoretinal interface.** *Free radical biology & medicine*
  Wert, K. J., Velez, G. n., Cross, M. R., Wagner, B. A., Teoh-Fitzgerald, M. L., Buettner, G. R., McAnany, J. n., Olivier, A. n., Tsang, S. H., Harper, M. M., Domann, F. E., Bassuk, A. G., Mahajan, et al
  2018

- **Fibrin Glue and Internal Limiting Membrane Abrasion for Optic Disc Pit Maculopathy.** *Ophthalmic surgery, lasers & imaging retina*
  Almeida, D. R., Chin, E. K., Arjmand, P. n., Velez, G. n., Evans, L. P., Mahajan, V. B.
  2018; 49 (12): e271–e277

- **Therapeutic drug repositioning using personalized proteomics of liquid biopsies** *JCI INSIGHT*
  Velez, G., Bassuk, A. G., Colgan, D., Tsang, S. H., Mahajan, V. B.
  2017; 2 (24)

- **Recessive coding and regulatory mutations in FBLIM1 underlie the pathogenesis of chronic recurrent multifocal osteomyelitis (CRMO) (vol 12, e0181222, 2017)** *PLOS ONE*
  Cox, A. J., Darbro, B. W., Laxer, R. M., Velez, G., Bing, X., Finer, A. L., Erives, A., Mahajan, V. B., Bassuk, A. G., Ferguson, P. J.
  2017; 12 (7): e0181222

- **Recessive coding and regulatory mutations in FBLIM1 underlie the pathogenesis of chronic recurrent multifocal osteomyelitis (CRMO)** *PLOS ONE*
  Cox, A. J., Darbro, B. W., Laxer, R. M., Velez, G., Bing, X., Finer, A. L., Erives, A., Mahajan, V. B., Bassuk, A. G., Ferguson, P. J.
  2017; 12 (3)

- **Structural modeling of a novel SLC38A8 mutation that causes foveal hypoplasia.** *Molecular Genetics & Genomic Medicine*
  Toral, M. A., Velez, G., Boudreault, K., Schaefer, K. A., Xu, Y., Saffra, N., Bassuk, A. G., Tsang, S. H., Mahajan, V. B.
  2017; 5 (3): 202-209

- **Crystal structure of the human calpain-5 catalytic core**
  Velez, G., Gakhar, L., Khan, S., Koster, H. J., Yang, J., Tsang, S. H., Bassuk, A. G., Mahajan, V. B.
  INT UNION CRYSTALLOGRAPHY.2017: A31–A32

- **Structural modeling of a novel SLC38A8 mutation that causes foveal hypoplasia** *Molecular Genetics & Genomic Medicine*
  Toral, M. A., Velez, G., Boudreault, K., Schaefer, K. A., Xu, Y., Saffra, N., Bassuk, A. G., Tsang, S. H., Mahajan, V. B.
  2017; 5 (3): 202-209

- **Personalized Proteomics in Proliferative Vitreoretinopathy Implicate Hematopoietic Cell Recruitment and mTOR as a Therapeutic Target** *American Journal of Ophthalmology*
  Roybal, C. N., Velez, G., Toral, M. A., Tsang, S. H., Bassuk, A. G., Mahajan, V. B.
  2017: 30521-4

- **Proteomic Analysis of Elevated Intraocular Pressure with Retinal Detachment.** *American journal of ophthalmology case reports*
  Velez, G. n., Roybal, C. N., Binkley, E. n., Bassuk, A. G., Tsang, S. H., Mahajan, V. B.
  2017; 5: 107–10

- **Dissection of Human Retina and RPE-Choroid for Proteomic Analysis.** *Journal of visualized experiments : JoVE*
  Cabral, T. n., Toral, M. A., Velez, G. n., DiCarlo, J. E., Gore, A. M., Mahajan, M. n., Tsang, S. H., Bassuk, A. G., Mahajan, V. B.
  2017

- **Gene Therapy Restores Mfrp and Corrects Axial Eye Length.** *Scientific reports*
  Velez, G. n., Tsang, S. H., Tsai, Y. T., Hsu, C. W., Gore, A. n., Abdelhakim, A. H., Mahajan, M. n., Silverman, R. H., Sparrow, J. R., Bassuk, A. G., Mahajan, V. B.
  2017; 7 (1): 16151

- **Small-angle X-ray scattering of calpain-5 reveals a highly open conformation among calpains** *JOURNAL OF STRUCTURAL BIOLOGY*

Gakhar, L., Bassuk, A. G., Velez, G., Khan, S., Yang, J., Tsang, S. H., Mahajan, V. B.
2016; 196 (3): 309-318

- **OCULAR HYPERTENSION AFTER INTRAVITREAL DEXAMETHASONE (OZURDEX) SUSTAINED-RELEASE IMPLANT.** *Retina (Philadelphia, Pa.)*
  Chin, E. K., Almeida, D. R., Velez, G., Xu, K., Peraire, M., Corbella, M., Elshatory, Y. M., Kwon, Y. H., Gehrs, K. M., Boldt, H. C., Sohn, E. H., Russell, S. R., Folk, et al
  2016: -?

- **BESTROPHIN1 mutations cause defective chloride conductance in patient stem cell-derived RPE** *HUMAN MOLECULAR GENETICS*
  Moshfegh, Y., Velez, G., Li, Y., Bassuk, A. G., Mahajan, V. B., Tsang, S. H.
  2016; 25 (13): 2672-2680

- **Calpain-5 Expression in the Retina Localizes to Photoreceptor Synapses** *INVESTIGATIVE OPHTHALMOLOGY & VISUAL SCIENCE*
  Schaefer, K. A., Toral, M. A., Velez, G., Cox, A. J., Baker, S. A., Borcherding, N. C., Colgan, D. F., Bondada, V., Mashburn, C. B., Yu, C., Geddes, J. W., Tsang, S. H., Bassuk, et al
  2016; 57 (6): 2509-2521

- **Precision Medicine Personalized Proteomics for the Diagnosis and Treatment of Idiopathic Inflammatory Disease** *JAMA OPHTHALMOLOGY*
  Velez, G., Roybal, C. N., Colgan, D., Tsang, S. H., Bassuk, A. G., Mahajan, V. B.
  2016; 134 (4): 444-448

- **Evidence supporting a critical contribution of intrinsically disordered regions to the biochemical behavior of full-length human HP1 gamma** *JOURNAL OF MOLECULAR MODELING*
  Velez, G., Lin, M., Christensen, T., Faubion, W. A., Lomberk, G., Urrutia, R.
  2016; 22 (1)

- **Functional Characterization of Nupr1L, A Novel p53-Regulated Isoform of the High-Mobility Group (HMG)-Related Protumoral Protein Nupr1** *JOURNAL OF CELLULAR PHYSIOLOGY*
  Lopez, M. B., Garcia, M. N., Grasso, D., Bintz, J., Molejon, M. I., Velez, G., Lomberk, G., Luis Neira, J., Urrutia, R., Iovanna, J.
  2015; 230 (12): 2936-2950

- **Paracrine WNT5A Signaling Inhibits Expansion of Tumor-Initiating Cells** *CANCER RESEARCH*
  Borcherding, N., Kusner, D., Kolb, R., Xie, Q., Li, W., Yuan, F., Velez, G., Askeland, R., Weigel, R. J., Zhang, W.
  2015; 75 (10): 1972-1982

- **Evidence supporting the existence of a NUPR1-like family of helix-loop-helix chromatin proteins related to, yet distinct from, AT hook-containing HMG proteins** *JOURNAL OF MOLECULAR MODELING*
  Urrutia, R., Velez, G., Lin, M., Lomberk, G., Luis Neira, J., Iovanna, J.
  2014; 20 (8)

- **Role for Kruppel-Like Transcription Factor 11 in Mesenchymal Cell Function and Fibrosis** *PLOS ONE*
  Mathison, A., Grzenda, A., Lomberk, G., Velez, G., Buttar, N., Tietz, P., Hendrickson, H., Liebl, A., Xiong, Y. Y., Gores, G., Fernandez-Zapico, M., LaRusso, N. F., Faubion, et al
  2013; 8 (9)

- **Critical role of the HP1-histone methyltransferase pathways in cancer epigenetics** *Medical Epigenetics*
  Velez, G., Urrutia, R., Lomberk, G.
  2013; 1 (1): 100-105