



## David Myung, MD, PhD

Assistant Professor of Ophthalmology at the Stanford University Medical Center and, by courtesy, of Chemical Engineering

 NIH Biosketch available Online

### CLINICAL OFFICES

- **Stanford Byers Eye Institute**

2452 Watson Ct

MC 5353

Palo Alto, CA 94303

**Tel** (650) 723-6995

**Fax** (650) 725-6619

### ACADEMIC CONTACT INFORMATION

- **Administrative Contact**

Brianna Bennett

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### Bio

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#### BIO

Dr. Myung is an Assistant Professor of Ophthalmology at the Byers Eye Institute at Stanford and, by courtesy, of Chemical Engineering. He is a board-certified ophthalmologist and attending physician at the VA Palo Alto Health Care System specializing in cataract and corneal surgery and external diseases of the eye, and the Director of the Ophthalmic Innovation Program, a project-based fellowship in the development and regulatory science of new eye care technologies, as well as Co-Director of Teleophthalmology at the Byers Eye Institute. Dr. Myung leads an NIH-funded translational research laboratory focused on two areas of clinical need: (1) ophthalmic regenerative medicine through tissue engineering and drug delivery, and (2) global health through mobile technologies and telemedicine. His research group takes an interdisciplinary approach toward fostering regeneration of ocular tissues, by using chemistry to not only build biomimetic cellular architectures but also to target and release bioactive molecules to promote healing. Current projects are directed toward the localized delivery of growth factors and/or stem cells to wound sites, the synthesis of bioactive wound dressings and vehicles, and the creation of biopolymeric tissue scaffolds. Dr. Myung and colleagues also investigate the role of mobile technologies and artificial intelligence in enabling diagnostics and patient care outside of traditional health care settings. His goal is to challenge current paradigms of eye care delivery through new digital health technologies and telemedicine to increase access to care in resource-limited settings both in the US and abroad.

#### CLINICAL FOCUS

- Ophthalmology
- Cataract Surgery
- Corneal Transplantation
- Dry Eye
- External Eye Disease
- Telemedicine

#### ACADEMIC APPOINTMENTS

- Assistant Professor - Med Center Line, Ophthalmology
- Assistant Professor - Med Center Line (By courtesy), Chemical Engineering
- Member, Bio-X

- Member, Maternal & Child Health Research Institute (MCHRI)
- Faculty Fellow, Stanford ChEM-H

### **ADMINISTRATIVE APPOINTMENTS**

- Co-Director, Teleophthalmology, Byers Eye Institute at Stanford, (2017- present)
- Director, Ophthalmic Innovation Program, Byers Eye Institute at Stanford, (2016- present)

### **HONORS AND AWARDS**

- Small Projects in Rehabilitation Research (SPiRE) Award, Veterans Affairs Health Care System (2019)
- Career Development Award, Research to Prevent Blindness (RPB) Foundation (2018)
- E. Mathilda Ziegler Foundation Award, E. Mathilda Ziegler Foundation for the Blind (2018)
- Coulter Foundation Translational Research Seed Award, Coulter Foundation/Stanford University (2018)
- Mentored Clinical Scientist Research Career Development Award (K08), National Eye Institute / National Institutes of Health (2017)
- SPARK Translational Research Grant, Stanford University (2017)
- SPECTRUM Translational Research Grant (Co-Investigator), Stanford University (2014)
- Stanford Society of Physician Scholars Research Grant, Stanford University School of Medicine (2014)

### **BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS**

- Section Editor, Regenerative Medicine, Current Ophthalmology Reports (2016 - present)
- Member, Association for Research in Vision and Ophthalmology (2004 - present)
- Member, American Academy of Ophthalmology (2012 - present)

### **PROFESSIONAL EDUCATION**

- Board Certification: Ophthalmology, American Board of Ophthalmology (2019)
- Fellowship: Stanford Health Care Byers Eye Institute (2019) CA
- Residency: Stanford University Ophthalmology Residency (2015) CA
- Internship: Kaiser Permanente Santa Clara Internal Medicine Residency (2012) CA
- Medical Education: Stanford University School of Medicine Registrar (2011) CA
- Fellowship, Byers Eye Institute at Stanford , Cornea (2019)
- Residency, Byers Eye Institute at Stanford , Ophthalmology (2015)
- Internship, Kaiser Permanente Santa Clara Medical Center , Internal Medicine (2012)
- MD, Stanford University , Medicine (2011)
- PhD, Stanford University , Chemical Engineering (2008)
- MS, Stanford University , Chemical Engineering (2006)
- BA, Yale University , Molecular, Cellular and Developmental Biology (2000)

### **COMMUNITY AND INTERNATIONAL WORK**

- Teleophthalmology in Rural Nepal

### **LINKS**

- Lab Website: [http://med.stanford.edu/ophthalmology/research/David\\_Myung\\_Lab.html](http://med.stanford.edu/ophthalmology/research/David_Myung_Lab.html)
- Ophthalmic Innovation Program: [http://med.stanford.edu/ophthalmology/education/ophthalmic\\_innovation\\_fellowship.html](http://med.stanford.edu/ophthalmology/education/ophthalmic_innovation_fellowship.html)
- FDA Ophthalmic Digital Health Workshop: <http://www.cfom.info/meetings/OphthalmicDigitalHealth/index.html>

## Research & Scholarship

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### CURRENT RESEARCH AND SCHOLARLY INTERESTS

Novel biomaterials to reconstruct the wounded cornea

Mesenchymal stem cell therapy for corneal and ocular surface regeneration

Engineered biomolecule therapies for promote corneal wound healing

Telemedicine in ophthalmology

## Teaching

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### STANFORD ADVISEES

#### Postdoctoral Faculty Sponsor

Fang Chen, Gabriella Maria Rogers, Aaron Webel

#### Doctoral Dissertation Co-Advisor (NonAC)

Amy Madl

#### Doctoral Dissertation Reader (NonAC)

Sarah Hull

#### Postdoctoral Research Mentor

Gabriella Maria Rogers

## Publications

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### PUBLICATIONS

- **Utility and Feasibility of Teleophthalmology Using a Smartphone-Based Ophthalmic Camera in Screening Camps in Nepal.** *Asia-Pacific journal of ophthalmology (Philadelphia, Pa.)*  
Collon, S., Chang, D., Tabin, G., Hong, K., Myung, D., Thapa, S.  
; 9 (1): 54–58
- **Multifunctional materials for implantable and wearable photonic healthcare devices** *NATURE REVIEWS MATERIALS*  
Lee, G., Moon, H., Kim, H., Lee, G., Kwon, W., Yoo, S., Myung, D., Yun, S., Bao, Z., Hahn, S.  
2020
- **Engineering an electrospun nanofiber to direct corneal epithelial cell proliferation and morphology**  
Vo, C., Lee, H., Fernandes-Cunha, G., Myung, D.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019
- **An engineered dimeric fragment of hepatocyte growth factor improves corneal epithelial wound healing in vitro**  
Carter, K., Ye, A., Fernandes-Cunha, G., Cochran, J. R., Myung, D.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019
- **A novel device for secondary intraocular lens placement: Design and Ex Vivo Evaluation**  
Buickians, D., Myung, D., Blumenkranz, M. S., Brodie, F.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019
- **Enhanced wound healing effects of secretome derived from human mesenchymal stem cells cultured on electrospun fibers**  
Myung, D., Fernandes-Cunha, G., Lee, H., Djalilian, A. R.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019

- **Biophysical characterization of a simultaneous interpenetrating polymer network composed of crosslinked collagen and hyaluronic acid**  
Lai, K., Lee, H., Hull, S., Fernandes-Cunha, G., Myung, D.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019
- **Effects of mesenchymal stem cells encapsulated within crosslinked collagen carrier gels on alkali burns in a corneal organ culture model**  
Blanco, I., Fernandes-Cunha, G., Hull, S., Lee, H., Na, K., Djalilian, A. R., Myung, D.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019
- **Nonmydriatic Photographic Screening for Diabetic Retinopathy in Pregnant Patients with Pre-existing Diabetes in a County Population**  
Veerappan, M., Myung, D., Jelks, A., Pan, C. K.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019
- **Characterization of bioorthogonally crosslinked collagen gels with encapsulated corneal stromal stem cells**  
Hull, S., Fernandes-Cunha, G., Putra, I., Eslani, M., Djalilian, A. R., Heilshorn, S., Myung, D.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019
- **Corneal Wound Healing Effects of Mesenchymal Stem Cell Secretome Delivered Within a Viscoelastic Gel Carrier** *STEM CELLS TRANSLATIONAL MEDICINE*  
Fernandes-Cunha, G., Na, K., Putra, I., Lee, H., Hull, S., Cheng, Y., Blanco, I., Eslani, M., Djalilian, A. R., Myung, D.  
2019; 8 (5): 478–89
- **Evaluating New Ophthalmic Digital Devices for Safety and Effectiveness in the Context of Rapid Technological Development.** *JAMA ophthalmology*  
Bodnar, Z. M., Schuchard, R., Myung, D., Tarver, M. E., Blumenkranz, M. S., Afshari, N. A., Humayun, M. S., Morse, C., Nischal, K., Repka, M. X., Sprunger, D., Trese, M., Eydelman, et al  
2019
- **Characterizing the impact of 2D and 3D culture conditions on the therapeutic effects of human mesenchymal stem cell secretome on corneal wound healing in vitro and ex vivo.** *Acta biomaterialia*  
Carter, K., Lee, H. J., Na, K. S., Fernandes-Cunha, G. M., Blanco, I. J., Djalilian, A., Myung, D.  
2019
- **Bio-Orthogonally Crosslinked, In Situ Forming Corneal Stromal Tissue Substitute** *ADVANCED HEALTHCARE MATERIALS*  
Lee, H., Fernandes-Cunha, G. M., Na, K., Hull, S. M., Myung, D.  
2018; 7 (19)
- **In situ-forming hyaluronic acid hydrogel through visible light-induced thiolene reaction** *REACTIVE & FUNCTIONAL POLYMERS*  
Lee, H., Fernandes-Cunha, G. M., Myung, D.  
2018; 131: 29–35
- **Mechanical properties of collagen gels crosslinked by copper-free click chemistry and their effects on encapsulated keratocytes**  
Lee, H., Fernandes-Cunha, G., Heilshorn, S., Myung, D.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2018
- **Suppression of alkali burn-induced corneal injury by mesenchymal stem cells encapsulated within crosslinked collagen gels**  
Na, K., Cunha, G., Lee, H., Djalilian, A. R., Myung, D.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2018
- **Synergistic corneal wound healing effects of human mesenchymal stem cell secreted factors and hyaluronic acid-based viscoelastic gel**  
Rogers, G., Putra, I., Lee, H., Cheng, Y., Eslani, M., Djalilian, A. R., Myung, D.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2018
- **Effects of engineered cellular microenvironments on the secretome of human mesenchymal stem cells**  
Hull, S., Fernandes-Cunha, G., Lee, H., Heilshorn, S., Myung, D.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2018
- **Immobilization of growth factors to collagen surfaces using visible light.** *Biomacromolecules*  
Fernandes Cunha, G. M., Lee, H. J., Kumar, A., Kreymerman, A., Heilshorn, S. C., Myung, D.  
2017
- **Clinical Application of a Smartphone-Based Ophthalmic Camera Adapter in Under-Resourced Settings in Nepal** *Journal of Mobile Technology in Medicine*

- Mercado, C., Welling, J., Oliva, M., Li, J., Gurung, R., Ruit, S., Tabin, G., Chang, D., Thapa, S., Myung, D.  
2017; 6 (3): 34-42
- **Training time and quality of smartphone-based anterior segment screening in rural India.** *Clinical ophthalmology (Auckland, N.Z.)*  
Ludwig, C. A., Newsom, M. R., Jais, A., Myung, D. J., Murthy, S. I., Chang, R. T.  
2017; 11: 1301-7
  - **Tethering Growth Factors to Collagen Surfaces Using Copper-free Click Chemistry: Surface Characterization and In Vitro Biological Response.** *ACS applied materials & interfaces*  
Lee, H. J., Fernandes-Cunha, G., Putra, I., Koh, W. G., Myung, D.  
2017
  - **SMARTPHONE-BASED DILATED FUNDUS PHOTOGRAPHY AND NEAR VISUAL ACUITY TESTING AS INEXPENSIVE SCREENING TOOLS TO DETECT REFERRAL WARRANTED DIABETIC EYE DISEASE** *RETINA-THE JOURNAL OF RETINAL AND VITREOUS DISEASES*  
Toy, B. C., Myung, D. J., He, L., Pan, C. K., Chang, R. T., Polkinhorne, A., Merrell, D., Foster, D., Blumenkranz, M. S.  
2016; 36 (5): 1000-1008
  - **A novel smartphone ophthalmic imaging adapter: User feasibility studies in Hyderabad, India** *INDIAN JOURNAL OF OPHTHALMOLOGY*  
Ludwig, C. A., Murthy, S. I., Pappuru, R. R., Jais, A., Myung, D. J., Chang, R. T.  
2016; 64 (3): 191-200
  - **Comparative In vitro Cytotoxicity of Artificial Tears** *JSM Ophthalmology*  
Zhen, L., Myung, D., Yu, C. Q., Ta, C. N.  
2015; 3 (1): 1-6
  - **Grafting of Cross-Linked Hydrogel Networks to Titanium Surfaces** *ACS APPLIED MATERIALS & INTERFACES*  
Muir, B. V., Myung, D., Knoll, W., Frank, C. W.  
2014; 6 (2): 958-966
  - **Simple, Low-Cost Smartphone Adapter for Rapid, High Quality Ocular Anterior Segment Imaging: A Photo Diary** *Journal of Mobile Technology and Medicine*  
Myung, D., Jais, A., He, L., Chang, R. T.  
2014; 3 (1)
  - **3D Printed Smartphone Indirect Lens Adapter for Rapid, High Quality Retinal Imaging** *Journal of Mobile Technology in Medicine*  
Myung, D., Jais, A., He, L., Blumenkranz, M., Chang, R.  
2014; 3 (1)
  - **Pupil Size and LASIK: A Review** *JOURNAL OF REFRACTIVE SURGERY*  
Myung, D., Schallhorn, S., Manche, E. E.  
2013; 29 (11): 734-?
  - **In vivo biocompatibility of two PEG/PAA interpenetrating polymer networks as corneal inlays following deep stromal pocket implantation** *JOURNAL OF MATERIALS SCIENCE-MATERIALS IN MEDICINE*  
Tan, X. W., Hartman, L., Tan, K. P., Poh, R., Myung, D., Zheng, L. L., Waters, D., Noolandi, J., Beuerman, R. W., Frank, C. W., Ta, C. N., Tan, D. T., Mehta, et al  
2013; 24 (4): 967-977
  - **Biocompatibility of poly(ethylene glycol)/poly(acrylic acid) interpenetrating polymer network hydrogel particles in RAW 264.7 macrophage and MG-63 osteoblast cell lines.** *Journal of biomedical materials research. Part A*  
Yim, E. S., Zhao, B., Myung, D., Kourtis, L. C., Frank, C. W., Carter, D., Smith, R. L., Goodman, S. B.  
2009; 91 (3): 894-902
  - **Bioactive interpenetrating polymer network hydrogels that support corneal epithelial wound healing.** *Journal of biomedical materials research. Part A*  
Myung, D., Farooqui, N., Zheng, L. L., Koh, W., Gupta, S., Bakri, A., Noolandi, J., Cochran, J. R., Frank, C. W., Ta, C. N.  
2009; 90 (1): 70-81
  - **Progress in the development of interpenetrating polymer network hydrogels** *POLYMERS FOR ADVANCED TECHNOLOGIES*  
Myung, D., Waters, D., Wiseman, M., Duhamel, P., Noolandi, J., Ta, C. N., Frank, C. W.  
2008; 19 (6): 647-657
  - **Development of hydrogel-based keratoprostheses: A materials perspective** *234th National Meeting of the American-Chemical-Society*

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Myung, D., Duhamel, P., Cochran, J. R., Noolandi, J., Ta, C. N., Frank, C. W.  
WILEY-BLACKWELL.2008: 735-41

- **Glucose-permeable interpenetrating polymer network hydrogels for corneal implant applications: A pilot study** *CURRENT EYE RESEARCH*  
Myung, D., Farooqui, N., Waters, D., Schaber, S., Koh, W., Carrasco, M., Noolandi, J., Frank, C. W., Ta, C. N.  
2008; 33 (1): 29-43
- **Progress in the development of interpenetrating polymer network hydrogels.** *Polymers for advanced technologies*  
Myung, D., Waters, D., Wiseman, M., Duhamel, P. E., Noolandi, J., Ta, C. N., Frank, C. W.  
2008; 19 (6): 647-57
- **Design and fabrication of an artificial cornea based on a photolithographically patterned hydrogel construct** *BIOMEDICAL MICRODEVICES*  
Myung, D., Koh, W., Bakri, A., Zhang, F., Marshall, A., Ko, J., Noolandi, J., Carrasco, M., Cochran, J. R., Frank, C. W., Ta, C. N.  
2007; 9 (6): 911-922
- **Histological processing of pH-sensitive hydrogels used in corneal implant applications** *JOURNAL OF HISTOTECHNOLOGY*  
Farooqui, N., Myung, D., Koh, W., Masek, M., Dalal, R., Carrasco, M. R., Noolandi, J., Frank, C. W., Ta, C. N.  
2007; 30 (3): 157-163
- **Prospective randomized comparison of 1-day versus 3-day application of topical levofloxacin in eliminating conjunctival flora.** *European journal of ophthalmology*  
Ta, C. N., Sinnar, S., He, L., Myung, D., Mino De Kaspar, H.  
2007; 17 (1): 689-695
- **Biomimetic strain hardening in interpenetrating polymer network hydrogels** *POLYMER*  
Myung, D., Koh, W., Ko, J., Hu, Y., Carrasco, M., Noolandi, J., Ta, C. N., Frank, C. W.  
2007; 48 (18): 5376-5387
- **Glucose permeability of human, bovine, and porcine corneas in vitro** *OPHTHALMIC RESEARCH*  
Myung, D., Derr, K., Huie, P., Noolandi, J., Ta, K. P., Ta, C. N.  
2006; 38 (3): 158-163

## PRESENTATIONS

- Synergistic corneal wound healing effects of human mesenchymal stem cell secreted factors and hyaluronic acid-based viscoelastic gel - Association for Research in Vision and Ophthalmology (ARVO) National Meeting 2018
- Mechanical properties of collagen gels crosslinked by copper-free click chemistry and their effects on encapsulated keratocytes - Association for Research in Vision and Ophthalmology (ARVO) National Meeting 2018
- Effects of engineered cellular microenvironments on the secretome of human mesenchymal stem cells - Association for Research in Vision and Ophthalmology (ARVO) National Meeting 2018
- Suppression of alkali burn-induced corneal injury by mesenchymal stem cells encapsulated within crosslinked collagen gels - Association for Research in Vision and Ophthalmology (ARVO) National Meeting 2018