Harvard Medical School
CurriculumVitae

Date: October 13, 2017
Name: Jason Comander

Education

09/1993–06/1997	AB	Biology	Harvard College
09/1997–06/2006	MD	Medicine	Harvard Medical School (HMS)
09/1999–06/2005	PhD	Experimental Pathology	HMS

Postdoctoral Training

07/2006–06/2007	Intern	Medicine	Brigham & Women's Hospital
07/2007–06/2010	Resident	Ophthalmology	Massachusetts Eye and Ear (MEE), HMS
07/2010–06/2012	Clinical Fellow	Ophthalmology	Vitreoretinal Surgery, MEE

Faculty Academic Appointments

07/2012–	Instructor	Ophthalmology	HMS

Appointments at Hospitals/Affiliated Institutions

07/2012-	Assistant Surgeon in Ophthalmology	Ophthalmology	MEE

Other Professional Positions

2017-	Consultant	Editas Medicine	1 day per year

Major Administrative Leadership Positions

Local

2017-	Associate Director, Inherited Retinal Disorders Service	MEE

Committee Service

2016-	Human Studies Committee, member	MEE

2017	Search Committee for Biostatistician, member	MEE

Professional Societies

1999-	Member	Massachusetts Medical Society
1999-	Member	American Association for the Advancement of Science
2002-2006	Member	National Association for Vascular Biology
2007-	Member	American Academy of Ophthalmology

Editorial Acitivites

Ad hoc reviewer, including for *New England Journal of Medicine*, *Investigative Ophthalmology and Visual Science* (outstanding review reward)

Honors and Prizes

1993	Finalist	Presidential Scholars
1997	Scholarship	John Harvard Scholarship
1998	Scholarship	Harvard Medical School Medical Scientist Training Program Scholarship for MD/PhD
2005	Awardee	Massachusetts Medical Society Information Technology
2009	Attendee	Heed Foundation Retreat for Academic Ophthalmology
2014	Awardee	Research to Prevent Blindness (RPB) Career Development Award
2017	Nominee	HMS Excellence in Mentoring Awards

Report of Funded and Unfunded Projects

Funding Information

Past

2012-2016 Clinical Scientist Development Program
NIH / NEI K12 EY016335-10
Awardee
$472,598 direct costs yearly (program-wide)
The goal of this research is to expand our knowledge regarding the molecular genetics of inherited retinal diseases such as retinitis pigmentosa.

Current

2014-2017	Career Development Award Research to Prevent Blindness (RPB) PI $250,000 total The goal of this research is to use advanced genomic technologies to study a genetically diverse group of retinal diseases.
2016-2019	Enhanced Career Development Award Foundation Fighting Blindness (FFB) PI $510,000 total The goal of this research is find higher throughput methods for improving genetic diagnostics for retinitis pigmentosa.
2015-fully enrolled	Site PI. Safety and efficacy of rAAV-hRS1 in patients with X-linked retinoschisis. AGTC. NCT02416622. 4 patients enrolled, 1 treated, ongoing. (Funding level depends on enrollment.)
2015-fully enrolled	Investigator and surgeon (subretinal). Safety and dose escalation study of AAV2-hCHM in subjects with CHM gene mutations. Spark Therapeutics. NCT02341807. 1 patient treated, ongoing. (Funding level depends on enrollment.)
2015-fully enrolled	Investigator and surgeon (subretinal). Safety and tolerability of hRPC in retinitis pigmentosa. ReNeuron. NCT02464436. 4 treated, ongoing. (Funding level depends on enrollment.)

Report of Local Teaching and Training
Teaching of Students in Courses

2012,13,15	"Color Vision," HBTM 303qc. Vision: A System and its Assessment	HMS Lecturer, 1 Lecture per year
2016,2017	"Inherited Retinal disorders," Molecular Bases of Eye Disease Course	Harvard Department of Ophthalmology, Schepens Eye Research Institute (SERI) Lecturer, 1 Lecture per year
2016,2017	"Gene Therapy for Inherited Retinal disorders," GEN 228 "Genetics in Medicine- from Bench to Bedside"	HMS, BBS Program Lecturer, 1 Lecture per year

Formal Teaching of Residents, Clinical Fellows and Research Fellows (post-docs)

2012-	Introductory to Slit lamp Ophthalmoscopy Junior Ophthalmology Residents	HMS Lecture and Practical Session

Clinical Supervisory and Training Responsibilities

2012-	Attending, Ophthalmology Clinic and Operating Room Medical students, ophthalmology residents and fellows	HMS 1-2 days a week

Laboratory and Other Research Supervisory and Training Responsibilities

2013-	Supervision of laboratory technician / postdoctoral fellow, Ocular Genomics Institute	One hour lab meeting per week and 1:1 supervision five hours hour per week

Other Mentored Trainees and Faculty:

2017-	Secondary advisor for MEE postdocs, Bo Tian, Yi-Chieh Linda Poon	Regular meetings for fellowship and career advice

Local Invited Presentations

No presentations below were sponsored by outside entities

06/2013	"Diagnostics and therapeutics for retinitis pigmentosa," Research Faculty Meeting, MEE/HMS, Boston, MA
06/2013	"Diagnostics and treatments for retinitis pigmentosa," MEE Alumni Meeting, MEE/HMS, Boston, MA
2014, 2015, 2017	Expert Panel "Macular hole repair", Harvard Victrectomy Course, MEE/HMS, Boston, MA
10/2017	"Genetics in ophthalmology- practical relevance and examples from inherited retinal disorders" New England Ophthalmological Society, Boston, MA
10/2017	"Gene Therapy: Its Hope and Promise in Combatting Inherited Blinding Disease". 2017 Frederick G.P. Thorne President's Lecture Series, MEE, Boston, MA

(See also national / international presentations in "Professional meetings" section)

Report of Clinical Activities and Innovations

Current Licensure and Certification

2012-	American Board of Ophthalmology
2012-	Massachusetts Medical License

Practice Activities

2012-	Ophthalmology	MEE	Ambulatory care and surgery, 2-4 sessions per week

Clinical Innovations:

Experimental therapies for inherited retinal disorders, including delivery of subretinal injections (2016-present)	As a key member (surgeon/site PI/co-investigator) in multiple early phase clinical trials for inherited retinal disorders, I contributed to protocol design and revision, trial execution, and surgical innovation, including implementation of automated, pneumatic injection protocols. These innovations have affected clinical trial practice nationally and have potential to change management of these disorders worldwide.

Surgical methods to improve gene therapy delivery (2015-present)	Experiments to replace subretinal injections with an intravitreal approach have been presented at national conferences (1st author, as part of larger team). These techniques have the potential to influence gene therapy delivery worldwide and improve its safety and efficacy.
Diagnostics for Retinitis Pigmentosa (2015)	I conceived of the project and led a group effort to implement techniques and software to detect certain genetic mutations that cause retinitis pigmentosa that otherwise would be overlooked. This innovation has increased the ability to detect which mutations are responsible for a patient's disease.
DNA variant analysis for Retinitis Pigmentosa (2012-present)	This translational research to understand which DNA variants are pathogenic (see also in Narrative Report) has the potential to influence the diagnosis and treatment eligibility of patients with retinitis pigmentosa and other inherited retinal disorders.

Report of Technological and Other Scientific Innovations

January 1997	Fiber-Optic Delivery System for Laser Transscleral Treatment of Ocular Tumor Parel, Manns, Comander, Rol, Murray, Gonzalez-Cirre Invention Disclosure #UM97-12
June 2015	Method for improved viral transduction of the retina. Patent application. Jason Comander, Dean Eliott, Leo Kim, Luk Vandenberghe

Report of Education of Patients and Service to the Community

No presentations below were sponsored by outside entities

Activities

2015,2106	Educational presentations about genetic eye diseases and tours for community members of the Lions Eye Institute

Report of Scholarship

Peer reviewed publications in print or other media

Research investigations

1. Parel JM, **Comander J.** Mathematical modeling of gel injection adjustable keratoplasty (GIAK). *An Inst Barraquer* 1995; 25:271-279.

2. Sasoh M, Parel J-M, Fabrice Manns, Nose I, **Comander J**, Smiddy WE. Quantification of Holmium: YAG and Thulium: YAG Laser-Induced Scleral Shrinkage for Buckling Procedures. *Ophthalmic Surg Lasers* 1998; 29(5):410-421.

3. Robinson DS, Parel J-M, Denham DB, Gonzales-Cirre X, Manns F, Milne PJ, Schachner RD, Herron AJ, **Comander J**, Hauptman G. Interstitial Laser Hyperthermia Model Development for Minimally Invasive Therapy of Breast Carcinoma. *J Am Coll Surg* 1998: 186:284-292.

4. Garcia-Cardena G, **Comander J**, Anderson KR, Blackman BR, Gimbrone MA Jr. Biomechanical

activation of vascular endothelium as a determinant of its functional phenotype. *Proc Natl Acad Sci U S A.* 2001 Apr 10;98(8):4478-85.

5. **Comander J**, Weber GM, Gimbrone MA, Jr. and Garcia-Cardena G "Argus--a new database system for Web-based analysis of multiple microarray data sets." *Genome Res.* 2001 11(9): 1603-10.

6. Aach J, Bulyk ML, Church GM, **Comander J**, Derti A, Shendure J. Computational comparison of two draft sequences of the human genome. *Nature.* 2001 Feb 15;409(6822):856-9.

7. Garcia-Cardena G, **Comander JI**, Blackman BR Anderson KR and Gimbrone MA. "Mechanosensitive endothelial gene expression profiles: scripts for the role of hemodynamics in atherogenesis?" *Ann N Y Acad Sci.* 2001 947: 1-6.

8. Takayama K, Garcia-Cardena G, Sukhova GK, **Comander J**, Gimbrone MA, Jr. and Libby P. "Prostaglandin E2 suppresses chemokine production in human macrophages through the EP4 receptor." *J Biol Chem*. 2002 277(46): 44147-54.

9. Natarajan S* **Comander J***, Gimbrone MA, Jr. and Garcia-Cardena G. "Improving the statistical detection of regulated genes from microarray data using intensity-based variance estimation." *BMC Genomics.* 2004 5(1): 17. *Equal contributions

10. **Comander J**, Pineda R 2nd. Accommodating intraocular lenses: theory and practice. *Int Ophthalmol Clin*. 2010 Winter;50(1):107-17.

11. Comander J, Gardiner M, Loewenstein J. High-Resolution Optical Coherence Tomography Findings in Solar Maculopathy and the Differential Diagnosis of Outer Retinal Holes. *Am J Ophthalmol.* 2011 Sep;152(3):413-419.e6.

12. Mantopoulos D, Murakami Y, **Comander J**, Thanos A, Roh M, Miller JW, Vavvas DG. Tauroursodeoxycholic acid (TUDCA) protects photoreceptors from cell death after experimental retinal detachment. *PLoS One*. 2011;6 (9):e24245.

13. Comander J, Weigel-DiFranco C, Sandberg MA, Berson EL. Visual Function in Carriers of X-Linked Retinitis Pigmentosa. *Ophthalmology.* 2015 Sep;122(9):1899-906.

14. Bujakowska KM, White J, Place E, Consugar M, **Comander J**. Efficient In Silico Identification of a Common Insertion in the MAK Gene which Causes Retinitis Pigmentosa. *PLoS One*. 2015 Nov 11;10(11):e0142614.

15. Davoudi S, Navarro-Gomez D; Shen L; Ung C; Ren A, Sullivan L, Kwong M, Janessian M, **Comander J**, Gai X, Lobo A, Papaliodis George, Sobrin L. *NOD2* genetic variants and sarcoidosis-associated uveitis. *American Journal of Ophthalmology Case Reports*. 2016;(3)39e42.

16. Sevgi DD, Davoudi S, **Comander J**, Sobrin L. Retinal pigmentary changes in chronic uveitis mimicking retinitis pigmentosa. *Graefes Arch Clin Exp Ophthalmol.* 2017 May 18.

17. Davoudi S, Ebrahimiadib N, Yasa C, Sevgi DD, Roohipoor R, Papavasilieou E, **Comander J**, Sobrin L. Outcomes in Autoimmune Retinopathy Patients Treated With Rituximab. *Am J Ophthalmol.* 2017 May 5.

Non-peer reviewed scientific or medical publications/materials in print or other media

Proceedings of meetings

1. Parel J-M, **Comander J**, Simon G, Takesue Y, Villain F. Mathematical model of annular keratophakia: intracorneal ring (ICR) and gel adjustable keratoplasty (GIAK). In: J-M Parel, Q Ren (eds), Ophthalmic Technologies IV, SPIE Publishers, Bellingham WA 1994, Proc. 2126:366-375.

2. Sasoh M, Parel JM, Shen JH, Nose I, **Comander J,** Smiddy W. Laser scleral buckling: In vitro quantification for Ho: YAG and Tm: YAG lasers. In: J-M Parel, Q Ren, K Joos, (eds), Ophthalmic Technologies V, SPIE Publishers, Bellingham WA, 1995, Proc. 2393:299-305.

3. **Comander J**, Simon G, Takesue Y, Villain F, Parel J-M: Measuring ocular characteristics after gel injection adjustable keratoplasty (GIAK) in the rabbit. In: J-M Parel, Q Ren, K Joos, (eds). Ophthalmic Technologies V, SPIE Publishers, Bellingham WA, 1995, Proc. 2393:85-91.

4. **Comander J**, Parel J-M, Robinson DS, Manns F, Denham DB, Rol PO. Mathematical modeling of laser induced hyperthermia. In: J-M Parel, PO Rol, KM Joos (eds), Ophthalmic Technologies VI, SPIE Publishers, Bellingham WA, 1996, Proc. 2673:102-107.

5. Robinson DS, Parel J-M, Denham DB, Manns F, Gonzalez-Cirre X, **Comander J**, Schachner R, Herron A. Interstitial hyperthermia endoablation of breast tissues: results of an experimental in-vivo pilot study. In: Rox Anderson (ed), *Lasers in Surgery: Advanced Characterization, Therapeutics, and Systems VI*. SPIE Publishers, Bellingham WA, 1996;Proc. 2671:142-144.

6. Robinson DS, Parel J-M, Gonzalez-Cirre X, Denham BD, Manns F, Milne PJ, Schachner RD, Herron AJ, **Comander J**, Hauptmann G. Update of Laser Hyperthermic Treatment for Primary Breast Cancers: *Ex vivo* and *In vivo* models. In RR Anderson et al., *Lasers in Surgery: Advanced Characterization, Therapeutics and Systems VII*, SPIE 1997. Proc. #2970:605-608.

7. **Comander J**, Chen CS, Mannix C, Wei C. Non-invasive, continuous toxin detection in mammalian cells. Annual meeting of the Defense Advanced Research Projects Agency's MicroFluidic Molecular Systems (DARPA's MicroFlumes), 1998 (Proc.).

Invited papers

1. **Comander J**, Loewenstein J, Sobrin L. Diagnostic testing and disease monitoring in birdshot chorioretinopathy. Semin Ophthalmol. 2011 Jul-Sep;26(4-5):329-36.

2. Hafler BP, **Comander J**, Weigel DiFranco C, Place EM, Pierce EA. Course of Ocular Function in PRPF31 Retinitis Pigmentosa. Semin Ophthalmol. 2016;31(1-2):49-52. PMID: 26959129.

3. Huckfeldt RM, **Comander J**. Management of Cystoid Macular Edema in Retinitis Pigmentosa. Semin Ophthalmol. 2016 Oct 17:1-9. PubMed PMID: 27748628.

Professional Educational Materials or Reports in Print or Other Media

8/2017 "Eclipse viewing safety tips". Local media: NBC Boston / NECN TV segment; MEE blog/website; Mass. General Hospital blog/website

Thesis

Comander J. "Transcriptional and Functional Modulation of the Endothelial Cell Inflammatory Response by a Biomechanical Stimulus." [Dissertation] Harvard Medical School, Division of Medical Sciences

Abstracts, Poster Presentations and Exhibits Presented at Professional Meetings

1. **Comander J**, Kim L, Carvalho L, Xiao R, Eliott D. et al. Internal limiting membrane as a barrier to AAV transduction. Retinal Gene Therapy Conference; 2015 May 08; c2015.
2. Rahmani S, **Comander J**, Weigel C, Sandberg M. A Biomarker for Disease Course in Patients with Autosomal Dominant Retinitis Pigmentosa due to RHO Mutations. ARVO 2016
3. **Comander J**, Vandenberghe, L. et al Characterization of the limitations to gene transfer and associated inflammation following intravitreal AAV injection in nonhuman primates. ARVO 2016
4. Vandenberghe L, **Comander J**, et al. Novel Surgical Method for Intravitreal AAV Administration Overcomes Transduction Barriers in Non-Human Primates. American Society of Gene & Cell Therapy Conference 2016.
5. Wassmer S., **Comander J**, et al. Delayed inflammatory response to intravitreal AAV gene transfer in non-human primates. American Society of Gene & Cell Therapy Conference 2016.
6. **Comander J**, Wan A. A functional genomics approach for characterizing variants of unknown significance: assaying known and novel rhodopsin variants. ARVO 2017.
7. Davoudi S, et al., **Comander J,** Sobrin L. Clinical, Adaptive Optics Imaging and Electrophysiologic Outcomes in Autoimmune Retinopathy Patients with Rituximab. ARVO 2017.
8. Pierce E, Kinga M, et al., **Comander J**. The Effect Of Vitamin A On Progression Of Retinitis Pigmentosa Is Not Determined By The Underlying Genetic Cause Of Disease. ARVO 2017.

Narrative Report

Overview: I am a clinician-scientist whose work is focused on improving the diagnosis and treatment of inherited retinal diseases. I have been fortunate to obtain extensive training and experience in biomedical research, starting at a young age 25 years ago, and continuing with an MSTP-funded MD/PhD program. Since finishing my clinical training 5 years ago, I have obtained funding (K12, career development awards) to pursue research. I conduct laboratory-based translational research and clinical research (~75% effort) in the Ocular Genomics Institute / Berman-Gund Laboratory for the Study of Inherited Retinal Degenerations at Mass Eye and Ear. I have a part-time clinical practice specializing mostly in inherited retinal diseases. As part of my clinical effort, I have the opportunity to teach HMS students, residents and fellows. I also serve as the Associate Director for the Inherited Retinal Disorders Service.

Area of Excellence: Clinical Expertise and Innovation

Over the last two years, I have established a reputation as an expert in subretinal injections for gene therapy for inherited retinal disorders. Over the past year, our team in the Inherited Retinal Disorders department has opened enrollment in three interventional clinical trials. As part of this team, I was the site-PI for the first patient treated with gene therapy at MEE. I am co-investigator and the primary surgeon for a first-in-human stem cell trial, and for another gene therapy trial. With this experience, I have developed a reputation as an expert in delivering gene and stem cell therapies for retinal disorders, with multiple groups requesting my participation in designing and executing future clinical trials for inherited retinal disorders.

Significant Supporting Activity: Investigation

1. Multiplexed functional characterization of variants of unknown significance in retinitis pigmentosa: My clinical work seeing patients with inherited retinal diseases and evaluating their genetic testing results has helped me appreciate an under-studied problem -- that the major bottleneck in the genetics of Mendelian diseases is interpreting the significance of DNA variants of unknown significance (VUS). We have developed a system to rapidly characterize hundreds of variants in one experiment. We

characterized all known and novel variants in rhodopsin, the gene which is the most common cause of dominant retinitis pigmentosa. The results solved three pedigrees with a rhodopsin VUS, and these findings have direct applications for selection of the correct patients for gene therapy treatment trials. This work has been presented at international conferences, is being prepared for publication, and was featured in a foundation's blog (http://www.blindness.org/blog/index.php/to-treat-an-inherited-retinal-disease-its-good-to-know-exactly-whats-wrong-with-the-gene/).

2. Improvement of the delivery of gene therapy: Experiments in primates, performed as part of a large team including MEE virologist Luk Vandenberghe, have advanced our ability to deliver genes to the mammalian retina. My largest contribution was towards a surgical method to improve delivery of genes to the retina. These improvements, which generated intellectual property for MEE, will hopefully enter human clinical trials for inherited eye diseases.

Recognition: In addition to publications, progress in these research investigations have been recognized with: Over $1M in total support (including a K12 grant and two career development awards); serving as site-PI, co-investigator, and surgeon on multiple human clinical trials; invitations to speak locally, and poster/paper presentations nationally and internationally; serving as an award-winning ad hoc reviewer for journals; and by appointment to our institutional IRB/Human Subjects Committee.

Teaching and Education: I teach several classes a year about ocular physiology or pathophysiology to HMS students and MEE postdocs, including a skills course for the junior HMS Ophthalmology residents where each resident examines my dilated eye. I regularly teach trainees at HMS and MEE during and after my clinics, and mentor fellows in the operating room. These contributions to teaching and education have been recognized by nomination for the HMS Excellence in Mentoring Award in 2017.

Summary: In this exciting time of progress in the field of inherited retinal diseases, my contributions include: laboratory-based investigation for improved diagnostics; translational projects to improve gene delivery; and increasing responsibility in the implementation and design of human clinical trials. I feel fortunate to have a found a field where these interests add synergistically and help develop my reputation for quality translational research in inherited retinal diseases.