



---

**ELIZABETH ENGLE, M.D.**

CRANIAL NERVE DEVELOPMENT IN HEALTH AND DISEASE

---

OCTOBER 6, 2016

4:00 P.M.

208 LIGHT HALL



SPONSORED BY:  
MEDICAL SCIENTIST TRAINING PROGRAM

---

Upcoming Discovery Lecture:

**JOHN W. KAPPLER, PH.D.**

*Department of Biomedical Research National Jewish Health Investigator, HHMI*

*Member, National Academy of Sciences*

*Distinguished Professor of Immunology and Microbiology*

*Member, Program in Structural Biology and Biophysics*

*October 20, 2016*

*208 Light Hall / 4:00 P.M.*

VANDERBILT  UNIVERSITY  
MEDICAL CENTER

## CRANIAL NERVE DEVELOPMENT IN HEALTH AND DISEASE

---

As a child neurologist, I hypothesized that patients born with complex eye-movement disorders, previously thought to be myogenic, may have defects in cranial motor neuron development. As a physician-scientist, my lab has clinically and genetically defined multiple related human malformation syndromes now referred to as the congenital cranial dysinnervation disorders (CCDDs). Consistent with my hypothesis, these disorders perturb steps in the development of cranial motor neurons or their axons, providing a paradigm for studying neuronal development. CCDD gene mutations fall into two classes: loss-of-function mutations in genes whose restricted expression patterns account for the resulting phenotype, and missense mutations in genes with broad expression that affect the development of select cranial motor neurons. The latter mutations are often recurrent and typically alter residues that highlight critical protein interaction interfaces, providing a powerful tool for dissecting disease mechanisms. We model CCDDs in vitro and in vivo mice and have found that a subset alter the axon cytoskeleton and cause errors in axon growth and guidance, potentially converging on a common mechanism of selective vulnerability. While we continue to define the genetic etiologies of additional CCDDs, we are also now striving to define the steps underlying normal cranial axon growth and guidance.

---



### **ELIZABETH ENGLE, M.D.**

**INVESTIGATOR, HOWARD HUGHES  
MEDICAL INSTITUTE**

**PROFESSOR OF NEUROLOGY AND  
OPHTHALMOLOGY, HARVARD MEDICAL SCHOOL**

**SENIOR ASSOCIATE, BOSTON CHILDREN'S HOSPITAL**

**ASSOCIATE MEMBER, THE BROAD INSTITUTE**

---

Dr. Engle received her B.A. from Middlebury College and her M.D. from Johns Hopkins University School of Medicine. She then trained as an intern and resident in pediatrics at Johns Hopkins, as a fellow in neuropathology at Massachusetts General Hospital, and as a resident in adult and child neurology in the Longwood Neurology Training Program and Boston Children's Hospital. Nearing the end of her neurology residency, Dr. Engle cared for a toddler born with a complex eye movement disorder that segregated in his family as a dominant trait. Interested in the etiology of his rare disorder, she pursued a research fellowship in genetics. As a result, this little boy became the proband for Dr. Engle's research career, which now spans from patients through genetics to molecular mechanisms in order to understand human cranial nerve and axon guidance disorders. Her work has defined the human congenital cranial dysinnervation disorders and has been recognized by high-profile publications and by receipt of multiple honors, including the E. Mead Johnson Award for Research in Pediatrics from the Society for Pediatric Research, the Sidney Carter Award in Child Neurology from the American Academy of Neurology, and a Research Award for Vision from the Alcon Institute. In addition to her research, Dr. Engle continues to care for patients, primarily consulting for children and adults with rare eye movement and other cranial nerve disorders. She teaches in both the clinical and laboratory settings, and has served on multiple committees that set the direction for neuroscience and ophthalmology research both locally and nationally.

---