Christopher A. Walsh is Bullard Professor of Pediatrics and Neurology at Harvard Medical School, Chief of the Division of Genetics and Genomics at Boston Children's Hospital (BCH), an Investigator of the Howard Hughes Medical Institute, and an Associate Member of the Broad Institute. Dr. Walsh completed his MD and PhD degrees at the University of Chicago, neurology residency and chief residency at Massachusetts General Hospital, and postdoctoral training in Genetics at Harvard Medical School. In 1993 he became Assistant Professor of Neurology at Harvard and Beth Israel Deaconess Medical Center, and he has been the Bullard Professor since 1999. From 2003-2007 he served as Director of the Harvard-MIT Combined MD-PhD training program. He moved to BCH in 2006, where the Division of Genetics and Genomics diagnoses and treats children with diverse rare and orphan diseases and is undertaking more than a dozen clinical trials of innovative medical and gene therapies for genetic disorders.

Dr. Walsh’s research has focused on the development, function, and evolution and of the human cerebral cortex, pioneering the analysis of genetic diseases that affect the developing brain by fostering worldwide collaborations with physicians and families. His laboratory has identified genetic causes for dozens of brain diseases of children, associated with autism, intellectual disability, seizures, and cerebral palsy. He has discovered that some of these disease genes were important targets of the evolutionary processes that shaped the human brain. In 2017 he inaugurated the Allen Discovery Center for Human Brain Evolution at Boston Children’s Hospital and Harvard Medical School, collaboratively with Drs. Michael Greenberg and David Reich, bringing together brain science with evolutionary genetics to search for the key changes in the genome that endow humans with our unique abilities for language, art, culture, and science.

Presentation Title: One Brain, Many Genomes: Somatic Mutation and Genomic Diversity in Human Brain from Birth to Old Age

Although it had long been assumed that the genomes of all neurons are identical, recent work has shown that every cell division causes mutations even during normal development, and that postmitotic neurons continue to accumulate mutations throughout life. Clonal somatic mutations create a mosaic brain that in some cases is associated with brain malformations, and autism spectrum disorders, and may underlie other neuropsychiatric diseases. The mutations that arise during development also represent a permanent forensic cell lineage map of the body. This lecture will discuss mutations that distinguish the genome of one neuron from the neuron next to it in human brain, and the implications for normal brain development, and neurological diseases.