

WHAT IS TOURETTE'S SYNDROME?

Tourette's syndrome is a neurological disorder characterized by recurrent "tics," including rapid eye blinking, grimaces or other involuntary body movements, or uncontrolled grunts or verbal outbursts. It is named after French physician Georges Gilles de la Tourette, who in 1885 identified the previously unexplained relationships between involuntary movements and sounds and compulsive rituals or behaviors.

Tics tend to occur in repetitive bursts. Motor tics can include involuntary eyelid blinking, grimacing, shoulder shrugs, hopping, kicking, tapping or other motions. Vocal tics can take the form of unintelligible grunting, sniffing or "clicking" sounds, or repetition of words or phrases. The severity and nature of the symptoms vary widely.

The disorder usually emerges during childhood and is commonly associated with obsessive and compulsive behaviors, attention deficits, hyperactivity, irritability, impulsiveness or other mood affectations. Many people who have Tourette's syndrome encounter difficulties in planning and completing tasks, including school work.

Certain blood pressure and anti-psychotic medications sometimes can help diminish severe tics, but they are used judiciously because their side effects may be more unpleasant than the Tourette's syndrome symptoms.

the TOURETTE'S SYNDROME PROGRAM

Research objectives

The UC Davis M.I.N.D. Institute has assembled a team of research scientists who are embarking on a series of intensive studies of Tourette's syndrome. Their findings may eventually lead to development of blood tests to distinguish between different types of the disorder and to identify causes and effective treatments for those different types.

Preliminary findings

Our initial studies of a group of children, most of whom have Tourette's syndrome and attention-deficit/hyperactivity disorder (ADHD), revealed that they exhibit abnormal expression of genes that are associated with natural-killer cells that attack viruses and suppress autoimmunity.

Five-year research program

The researchers have now embarked on a study of 800 children over a five-year period. Study subjects will ultimately include 100 children with obsessive-compulsive disorder; 100 children with ADHD; 100 children with executive dysfunction; 100 children with Tourette's syndrome; 100 children with Tourette's syndrome and ADHD; 100 children with Tourette's syndrome and obsessive-compulsive disorder; 100 children with Tourette's syndrome and executive dysfunction; and 100 children who have none of these disorders.

The team also has initiated studies that will isolate children who have Tourette's syndrome from those who also have ADHD and obsessive-compulsive disorder. The UC Davis research team is preparing to mount a study examining the effects of stress in children who have Tourette's syndrome. The researchers plan to analyze the brain blood flow in children with Tourette's syndrome as they attempt to perform "executive functions," which are the high-order processes involved in executing tasks such as planning, organizing, initiating, pacing and maintaining behaviors toward a goal.

A child who develops tics does not necessarily have Tourette's syndrome.

During their pre-adolescent or teenage years, many children experience tics that at some point materialize and then disappear. Such "transient tics" are harmless and do not require treatment. Chronic tics that endure a year or longer, however, may require medical attention.

Diagnosis of Tourette's syndrome can be made only through observation by a physician. No diagnostic laboratory test has been devised to confirm the presence of the disorder. Development of a diagnostic test is a principal objective of the UC Davis M.I.N.D. Institute Tourette's syndrome program.

THE RESEARCH TEAM

Frank Sharp, an internationally renowned clinical neurologist and neuroscientist with the UC Davis M.I.N.D. Institute, directs the Tourette's syndrome research program. He is a UC Davis professor of neurology who specializes in neuroscience and genetics.

Silvia Bunge, a professor in the Helen Wills Neuroscience Institute at UC Berkeley, is using functional magnetic resonance imaging (fMRI) to monitor blood-flow responses in various brain regions while research subjects perform executive functioning tasks. Her lab is following up on prior behavioral and fMRI research on Tourette's syndrome.

Blythe Corbett, a UC Davis assistant professor of psychiatry and behavioral sciences, is studying the diurnal rhythm and responsiveness of salivary cortisol in children with Tourette's syndrome to better understand the relationship between biological indices of stress, clinical symptoms and other contributory factors, such as gene expression.

Paul Ashwood, a UC Davis assistant professor of medical microbiology and immunology, oversees assessment of immune responses in children. Participants include children who have Tourette's syndrome alone or in combination with ADHD, obsessive-compulsive disorder or executive dysfunction.

Donald Gilbert, a pediatric neurologist, is director of the Movement Disorder Clinic and the Tourette's Syndrome Clinic at Cincinnati Children's Hospital Medical Center. He has contributed clinical material and blood samples for analysis by Tourette's syndrome researchers.

Joan Gunther, a clinical psychologist in the UC Davis Department of Neurology, scores the psychological evaluations of children and adults with Tourette's syndrome, obsessive-compulsive disorder, ADHD and executive dysfunction.

Pieter Hoekstra, a neurologist with the Child and Adolescent Psychiatry Center at University Hospital Groningen in the Netherlands, has supplied the Tourette's syndrome program with 100 blood samples drawn from subjects with and without Tourette's syndrome. The researchers will determine if the findings among American subjects correspond to subjects of recent European descent.

Isaac Liao, a researcher in the UC Davis Department of Neurology, is conducting studies to correlate gene expression in peripheral blood with changes in blood flow that occur in the brain during a decision-making task. His findings will be instrumental in evaluating differences between children who have Tourette's syndrome and those who do not.

Lisa Lit is a researcher in the UC Davis Department of Neurology who has been investigating the effects of co-morbid ADHD and obsessive-compulsive disorder on gene expression profiles in the blood of children and teenagers who have Tourette's syndrome.

Julie Schweitzer, a UC Davis associate professor of psychiatry and behavioral sciences, is an internationally recognized expert in ADHD and in fMRI studies of children and adults with ADHD.

Boryana Stamova, a researcher in the UC Davis Department of Neurology, will help process RNA and DNA and analyze expression profiles in the blood of children who have Tourette's syndrome; children who also have ADHD, obsessive-compulsive disorder or executive dysfunction; and children who do not exhibit any of these disorders.

Janet Zotovich, clinical research coordinator in the UC Davis Department of Neurology, recruits participants, assists in rating tic severity, conducts portions of psychological assessments, coordinates blood draws and storing, and obtains family and medical histories.

Program funding

The Tourette's syndrome research program was initiated on the strength of grants from Merck, the Tourette Syndrome Association and the RDM Positive Impact Foundation. The foundation was established by Ron and Darin Mittelstaedt of El Dorado Hills, who created and wholly fund the foundation, allocating \$300,000 per year for as long as five years – potentially totaling \$1.5 million for this research.

About the UC Davis M.I.N.D. Institute

The UC Davis M.I.N.D. (Medical Investigation of Neurodevelopmental Disorders) Institute is a unique, collaborative center bringing together parents, scientists, clinicians and educators for research on autism, fragile X syndrome, Tourette's syndrome, attention-deficit/hyperactivity disorder, learning disabilities and other neurodevelopmental disorders.

Tourette's syndrome research program contacts

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