

RLS Foundation Research Grant Program: 1997–2020

The RLS Foundation Research Grant Program supports basic and clinical research on restless legs syndrome (RLS).

In 1997, the RLS Foundation established the Research Grant Program to fund small research grants (\$25,000–\$35,000) to stimulate and provide data for larger grants at federal agencies such as the National Institutes of Health, Department of Defense, biotechnology and medical technology companies. Funding priorities include basic and clinical research to promote a better understanding, advance new treatments and find a cure for RLS. The Research Grant Program invites innovative approaches, interdisciplinary studies and support of promising postdoctoral candidates.

The primary areas of funding have been genetics, epidemiology, iron regulation, neurophysiology and animal models/treatment. The Foundation’s Scientific and Medical Advisory Board reviews grant applications and selects studies for funding based on scientific merit and alignment with funding priorities.

Since the grant program began, the Foundation has funded 47 research grants totaling over \$1.8 million. Eighty-five percent of the grant recipients reside in the United States and the remaining 15% of grant recipients are international. The average grant amount is \$39,000.

Ten of the recipients secured additional funding for their studies from government agencies, for total grant award dollars of over \$10 million. Recipients have published findings in over 25 papers and several book chapters.

Research Grant Program Makes Headway

In 2007, Dr. David Rye, funded in part by the RLS Foundation, discovered the first gene variant (BTBD9) that contributes substantially to the risk for RLS. In 2017 Dr. Sergi Ferré, with research grants from the RLS Foundation, hypothesized that the reason for increased glutamate

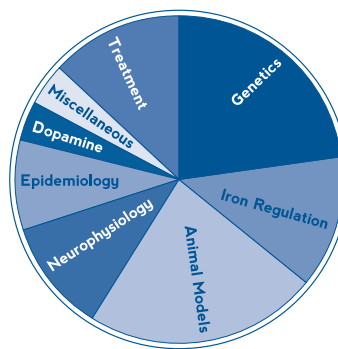
and dopamine transmission in RLS is due to a decrease in adenosine transmission; increased dopamine and glutamate transmission leads to PLMS and hyperarousal in RLS. Dr. Ferré’s team have also pinpointed a subtype of receptor in the brain – the dopamine D4 receptor – as a new target for dopamine drug development.

Dr. John Winkelman was awarded a grant in 2017 to develop the RLS Opioid Registry to evaluate the longterm safety and effectiveness of opioids for treatment of refractory RLS. This study will yield important data that will help to establish treatment parameters and future research.

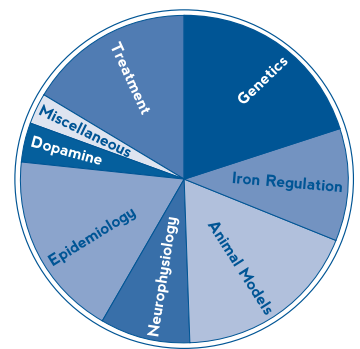
These studies advance our knowledge and understanding of the causes of RLS and paves the way to improved diagnostic methods and more effective treatments.

To keep our researcher's work moving forward toward a cure, please make your tax deductible contribution to the RLS Foundation at www.rls.org or call 512-366-9109.

% Studies



% Funds



Grants by Priority Area, 1997–2020

Priority Area	Number	Percent of Studies	Award	Percent of Funds
■ Genetics	11	23%	\$368,954	20%
■ Iron Regulation	6	13%	\$206,311	11%
■ Animal Models	11	23%	\$364,450	20%
■ Neurophysiology	5	11%	\$157,500	9%
■ Epidemiology	4	9%	\$326,356	18%
■ Dopamine	2	4%	\$69,600	4%
■ Treatment	6	13%	\$290,879	16%
■ Miscellaneous	2	4%	\$49,250	3%
TOTAL	47	100%	\$1,833,300	100%

Grant Award Recipients

Genetics

Lan Xiong, MD, PhD (2009)

Genome wide gene expression profile & iron regulation in RLS patients carrying the MEIS1 genetic risk variant

McGill University, Montreal, Canada

Guy Rouleau, MD, PhD (2008)

Defining the risk variants within the MEIS1, BTBD9, MAP2K5/LBXCOR1 genomic regions in RLS patients

Human Research Centre, Notre Dame Hospital, Montreal, Canada

Juliane Winkelmann, MD (2008)

Worldwide genome-wide association study for RLS: WW-GWA-RLS

Institute of Human Genetics
GSF National Research Center, Munich, Germany

David B. Rye, MD, PhD (2006, 2007, 2008)

RLS genome study - USA/ICELAND

Emory University School of Medicine, Atlanta, GA

Juliane Winkelmann, MD (2005)

EU-RLS-GENE – Three loci for RLS on chromosome 12q (RLS-1); 14q (RLS-2); and 9p (RLS-3) mapping study

Institute of Human Genetics
GSF National Research Center, Munich, Germany

Lan Xiong (2003)

Dissecting Genes Involved in Restless Legs Syndrome in French-Canadian Population with Elevated Prevalence

McGill University, Montreal, Canada

David B. Rye, MD, PhD (2002, 2004)

Genetic linkage analysis of RLS in Iceland

Emory University School of Medicine, Atlanta, GA

Guy Rouleau, MD, PhD (1999)

Searching for genes predisposing to restless leg syndrome in the French-Canadian population

Montreal General Hospital Research Institute,
Montreal, Canada

Iron Regulation

Padmavathi Ponnuru, PhD (2011)

A role for MEIS1 in brain iron deficiency in Restless Legs Syndrome

Drexel University College of Medicine,
Philadelphia, PA

Stephanie Miller Patton, PhD (2006)

The contributory role that iron-sulfur cluster proteins play in RLS

Pennsylvania State University College of Medicine, Hershey, PA

Stephanie Miller Patton, PhD (2005)

The contribution of iron regulatory proteins (IRPs) to the dysregulation of iron homeostasis in RLS

Pennsylvania State University Milton S. Hershey Medical Center,
Hershey, PA

James R Connor, PhD (2003)

Is Defective Transferrin Receptor Expression in the brain the underlying cause of RLS?

Pennsylvania State University Milton S. Hershey Medical Center,
Hershey, PA

James R. Connor, PhD (2001)

Elucidating mechanisms for regulation of iron acquisition by the brain

Pennsylvania State University, University Park, PA

Judith Owens, MD, MPH (1999–2000)

Restless leg and periodic limb movements in children with iron deficiency anemia and elevated lead

Brown University School of Medicine, Providence, RI

Animal Models

Yuqing Li, PhD (2015)

Characterization of Meis1 heterozygous knockout mice as a model of Willis-Ekbom Disease

University of Florida, Gainesville, FL

Sergi Ferré, MD, PhD (2014, 2015)

Measuring corticostriatal neurotransmission in iron-deficient rats as a model for screening of drugs potentially useful in WED-RLS

National Institute on Drug Abuse, Baltimore, MD

Yuan-Yang Lai, PhD (2012)

Effect of histamine H3 receptor antagonism on PLM in iron-deficient rats: an animal model of RLS and its treatment

University of California Los Angeles and Sepulveda Research Corporation, Los Angeles, CA

Subhabrata Sanyal, PhD (2011)

Genetic modeling of Restless Legs Syndrome in Drosophila

Emory University School of Medicine, Atlanta, GA

Seiji Nishino MD, PhD (2004)

PLMS in hypocretin-deficient narcoleptic dogs

Stanford Center for Narcolepsy Research, Palo Alto, CA

Byron C. Jones, PhD (2004)

Proposal to create mouse colony to identify candidate genes related to RLS

Pennsylvania State University, University Park, PA

Yuan-Yang Lai, PhD (2002)

Ventral mesopontine junction mediated muscle activity during sleep

University of California, Los Angeles, North Hills, CA

Felipe Espinosa, DVM, PhD (2001–2002)

Potential mouse model for human-RLS (hRLS)

University of Texas Southwestern Medical Center, Dallas, TX

David B. Rye, MD, PhD (2001)

Neural substrates of and pharmacologic interventions for restless legs syndrome and paroxysmal limb movements during sleep

Emory University School of Medicine, Atlanta, GA

David B. Rye, MD, PhD (2000)

Fellowship for Drs. Amanda Freeman and Glenda Keating - Non-human primate model of PLMS

Emory University School of Medicine, Atlanta, GA

Neurophysiology

Stephanie Miller Patton, PhD (2012)

The role that the nitric oxide pathway plays in regulating vasodilation of the legs in Restless Legs Syndrome

Pennsylvania State University College of Medicine, Hershey, PA

Stephanie Miller Patton, PhD (2009)

The role that the hypoxia response pathway & neuronal nitric oxide synthase (nNOS) plays in the mechanism of RLS

Pennsylvania State University College of Medicine, Hershey, PA

Douglas E. Wright, PhD (2006)

Contributions of Abnormal Sensory Input from Muscle in RLS

University of Kansas Medical Center, Kansas City, KS

Karin Stiasny-Kolster, MD (2004)

Quantitative sensory testing (QST) in RLS

Department of Neurology, Marburg, Germany

William Bara-Jimenez, MD (1997–1999)

Restless Legs Syndrome Foundation Fellowship

National Institute of Neurological Disorders and Stroke,
Bethesda, MD

Epidemiology

Hochang Benjamin Lee, MD (2013)

Subcortical white matter hyperintensities on brain magnetic resonance imaging: a comparison between early-onset and late-onset RLS subjects

Yale University, New Haven, CT

Jeffrey Durmer, MD, PhD (2005)

Identification of restless legs syndrome in children

Emory University School of Medicine, Atlanta, GA

Lorene M. Nelson, PhD and Stephen V. Van Den Eeden, PhD (2004)

Pilot study of restless legs syndrome in Kaiser Permanente

Stanford University School of Medicine, Stanford, CA

Kaiser Permanente Division of Research, Oakland, CA

Christopher J. Earley, MD, PhD (2001)

Epidemiological study of an elderly twin cohort

Johns Hopkins University Bayview Medical Center,

Baltimore, MD

Dopamine

Shawn Hochman, PhD (2003)

Spinal Dopamine Dysfunction and Restless Legs Syndrome

Emory University School of Medicine, Atlanta, GA

David Eidelberg, MD (2002)

A quantitative whole-brain imaging study of the dopamine transporter

in the RLS using FP-betaCIT PET Scanning

North Shore University Hospital, Manhasset, NY

Treatment

Sergi Ferré, MD, PhD (2019)

Elucidating the mechanisms of the therapeutic effects of opioids in RLS

National Institute on Drug Abuse, Baltimore, MD

John Winkelman, MD, PhD (2017–2019, 2019, 2020)

Multicenter Longitudinal Pilot Observational Study of Efficacy and

Tolerability of Long-term Treatment of Restless Legs Syndrome Using

Opioids (RLS Opioid Registry)

Harvard Medical School/Massachusetts General Hospital,

Boston, MA

William Ondo, MD (2016)

Treatment of RLS augmentation with Ecopipam, A D1 Specific Antagonist

Houston Methodist Neurological Institute, Houston, TX

Michael Polydefkis, MD (2000)

A Trial of gabapentin in RLS stratifying patients by presence/absence of small fiber neuropathy

Johns Hopkins University School of Medicine,

Baltimore, MD

Miscellaneous

William Padula, PhD, MS, Msc (2016)

Economic Evaluation of Restless Legs Syndrome (RLS)

Johns Hopkins Bloomberg School of Public Health, Baltimore,

MD

William G. Ondo, MD (2000)

Assistance with the Harvard Brain Tissue Resource Center

Baylor College of Medicine, Houston, TX

The RLS Foundation does not endorse or sponsor any products or services.



RESTLESS LEGS
SYNDROME
FOUNDATION

The RLS Foundation is dedicated to improving the lives of the men, women and children who live with this often devastating disease. Our mission is to increase awareness, improve treatments and through research, find a cure for restless legs syndrome.

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