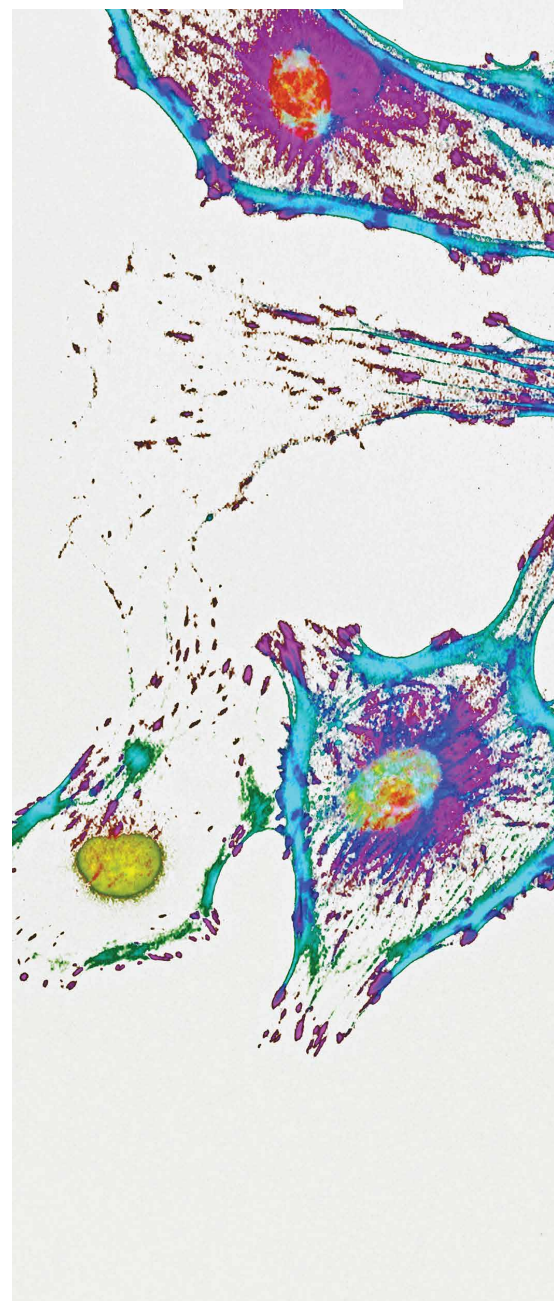


Washington University Neurofibromatosis (NF) Center

nfcenter.wustl.edu





THE NF CENTER: EXCEPTIONAL CARE THROUGH GROUNDBREAKING RESEARCH

An international leader in research and treatment of neurofibromatosis (NF), the Washington University NF Center unites outstanding basic laboratory and clinical investigators with expert clinicians to provide comprehensive treatment options for children and adults with these complex genetic conditions.

What is Neurofibromatosis?

Neurofibromatosis (NF) encompasses a set of complex genetic disorders that affects nearly every organ system, causing tumors to grow in the brain and throughout the body. There are three distinct types of NF:

- Neurofibromatosis type 1 (NF1)
- Neurofibromatosis type 2 (NF2)
- Schwannomatosis

While half of people with NF inherit the disorder from an affected parent, new cases can also arise spontaneously through mutations in the *NF* and related genes. Diagnosed most often in children and young adults, NF occurs in all races, ethnic groups, and both sexes.

The most common of these conditions is NF1, affecting over 1 in 3,000 people worldwide. Children with NF1 typically come to medical attention when they are noted to have birthmarks (café-au-lait macules) on their skin. Individuals with NF1 are prone to develop a wide variety of medical complications, including, but not limited to, developmental delays, autism, bone defects, sarcomas, nerve tumors (neurofibromas) and brain cancers (gliomas). Importantly, every individual with NF1 is unique, such that the clinical problems and their severity vary from person to person. This variability limits our ability to predict what types of complications will arise or to provide personalized care.

Much less common than NF1, individuals with NF2 can develop cataracts and many different types of brain and nerve tumors, causing problems with vision, hearing and balance. Similarly, individuals with Schwannomatosis are prone to spine and peripheral nerve tumors, resulting in chronic pain and disability.

Current treatments for NF are aimed at controlling symptoms, including surgery for painful and disfiguring tumors. As such, there is an urgent need to identify and evaluate new molecularly-based treatments for NF1, NF2 and Schwannomatosis. Progress in this area will require the seamless integration of advanced laboratory investigation with clinical research and care.

“The treatments of today came from the research of yesterday, the treatments of tomorrow will only come from what we do now.”



- Discovering new treatments for brain and nerve tumors in NF1 and NF2
- Exploring the cellular and molecular basis for NF1 optic glioma development and vision loss
- Identifying prognostic and therapeutic strategies for neurofibromas and malignant sarcomas in NF1
- Understanding the factors that contribute to autism, ADHD, and learning deficits in children with NF1
- Defining risk factors for the development of cancer in NF
- Developing personalized therapeutic approaches to tailor treatments to the specific problems arising in any given individual with NF (precision medicine)

Center investigators employ a wide variety of technologies and approaches to unravel the mysteries of NF, ranging from genomic sequencing and mathematic analyses to behavioral studies and cellular engineering strategies. By leveraging the expertise of a diverse group of laboratory and clinical researchers, we are able to accelerate progress in the field.

Laboratory researchers in the Center employ a diverse number of genetic, molecular, and cellular methods to understand how the *NF* genes function in health, and how mutations in these genes lead to the development of nervous system abnormalities, such as brain tumors. Coupling these approaches with a unique collection of human biospecimens and small-animal models, ongoing studies are designed to discover the causes for the various medical problems that arise in people with NF, which are used, in turn, to identify new treatments.

In addition to these basic and translational research efforts, there are a large number of clinical studies underway. These investigations involve novel NF patient databases and registries, genomic and biochemical analyses, patient-focused studies and clinical treatment trials in which promising new drugs are evaluated as part of national consortium efforts.

The Center boasts a long list of significant research achievements to date, which include the first whole genome sequencing of NF1 brain tumors, the identification of novel brain and nerve tumor therapies, the largest international study characterizing autism in NF1, and the discovery of causes for vision loss from NF1 optic gliomas. Furthermore, scientists at the center have developed numerous unique small-animal models of NF1 and NF2, which continue to be used to design personalized therapies, some of which have been successfully translated into novel clinical trials for affected individuals.

More information about ongoing research can be found on the Washington University NF Center website (nfcenter.wustl.edu) or the Gutmann Laboratory website (gutmannlab.wustl.edu).

Integrating Research and Care: The NF Center

The mission of the Washington University NF Center is to translate groundbreaking research into exceptional patient care. Using an integrated approach, we combine innovative laboratory science with multidisciplinary clinical care and novel complementary care programs. The collective focus of these researchers and clinicians is directed toward developing and optimizing treatments for children and adults with NF.

Cutting Edge Research: The Treatments of Tomorrow

Through research at the Washington University NF Center, we aim to achieve three major goals critical to improving the lives of people living with NF:

1. Discover the factors that contribute to the clinical variability seen in individuals with NF
2. Determine which medical problems are likely to occur and require therapy in each person with NF
3. Identify new therapies that specifically treat NF-related medical problems

Research performed in the Washington University NF Center is multifaceted, and involves the collective talents of over twenty researchers representing different clinical specialties and research disciplines. To this regard, we are focused on:

“To improve the lives of people with NF, research should be focused on improving our ability to predict what medical problems might arise in a particular individual, and then treating patients with therapies tailored to their specific condition.”



Patient Care: A Multidisciplinary Approach

The Washington University NF Clinical Program at St. Louis Children's Hospital and Barnes-Jewish Hospital is an internationally-renowned program specifically designed to provide multidisciplinary care for children and adults with NF, bringing together dedicated specialists with extensive experience in NF. With experts in fields as diverse as dermatology, neurology, neurosurgery, orthopedics, oncology, neuropsychology, and endocrinology, these healthcare professionals are able to provide cutting-edge treatments for every facet of NF.

Children and young adults with NF1 and NF2 are seen at St. Louis Children's Hospital by a core NF care team composed of two neurologists, a pediatric nurse, a pediatric physical therapist, and a clinical research coordinator. During the clinic visit, a thorough evaluation is performed, which includes assessment for developmental delays, behavior and learning issues, and NF-related neurological problems. Additionally, families are given a personalized health organization binder and relevant educational brochures. Clinical appointments with other subspecialists are typically coordinated for the same day.

Families are approached to participate in NF Center clinical research studies to increase our understanding of NF and to improve risk assessment and find targeted therapies. When appropriate, children and adults are enrolled in clinical trials using promising new agents targeted to the molecular and cellular abnormalities seen in tumors arising in people with NF1 and NF2.

Complementary Care Programs: Extending Patient Care Beyond the Clinic Walls

The three complementary care programs offered by the NF Center are designed to address the myriad of developmental and behavioral issues that affect children with NF1.

Beat NF is a jazz music motor therapy program which integrates jazz music and physical therapy approaches to promote socialization and gross motor development in preschool-aged children with NF1.

Utilizing a number of organized play-based group events, **Club NF** offers structured physical and occupational therapy to target motor, behavioral and social impairments seen in school-aged children with NF1. Club NF engages children in a wide variety of activities, ranging from chess and gardening to ice skating and acting classes.

Designed and directed by St. Louis Children's Hospital clinical neuropsychologists, **Teen NF** focuses exclusively on improving the social and behavioral skills of teens. The program includes parallel discussions for parents, helping them to deal with the challenges specific to raising a teenager with NF1.

These complementary care programs are offered at no charge to families due to the generosity of the Doris and Donald Schnuck Fund for Children in Need and the St. Louis Children's Hospital Foundation.



David H. Gutmann, MD, PhD
Donald O. Schnuck Family Professor
Department of Neurology
Washington University School of Medicine
St. Louis, Missouri, USA

Dr. David Gutmann is one of the world's leading laboratory scientists and clinical experts in neurofibromatosis (NF). He currently is the Donald O. Schnuck Family Professor and Director of the Washington University NF Center, while also serving as Donald O. Schnuck Family Professor in the Department of Neurology. Dr. Gutmann obtained his Ph.D. in Microbiology and Immunology in 1984, followed by his M.D. with distinction in 1986 from the University of Michigan. After completing his Neurology residency at the University of Pennsylvania, Dr. Gutmann joined the laboratory of Francis S. Collins, M.D., Ph.D., a world-renowned physician-geneticist. During his postdoctoral research fellowship with Dr. Collins, Dr. Gutmann identified the protein encoded by the Neurofibromatosis type 1 (NF1) gene and defined its function as a tumor suppressor.

In 1993, Dr. Gutmann was recruited as faculty to the Washington University School of Medicine, where he established the NF Clinical Program at St. Louis Children's Hospital. Recognizing the need to accelerate the pace of scientific discovery and its application to the care of individuals with NF, he founded the Washington University NF Center in 2004.

Dr. Gutmann's research laboratory has been highly productive, generating many small-animal models of NF, which have provided critical insights into the pathogenesis of brain and nerve tumors, as well as normal brain development. Importantly, these studies have led to the discovery and evaluation of several new treatments for NF-related tumors and medical problems, some of which are currently being studied in human clinical trials.

Dr. Gutmann has published over 400 peer-reviewed manuscripts, and served on many national and international advisory boards, including the National Institute of Neurological Disorders and Stroke Advisory Council. He has been recognized for his achievements with numerous prestigious honors, such as the 2012 Frederich von Recklinghausen Award, 2013 Washington University Distinguished Faculty Research Award, 2016 Research Program Award from the National Institute of Neurological Disorders and Stroke, and 2017 Alexander von Humboldt Research Award.

Leading the Charge

Over the last decade, The Washington University NF Center has grown to become one of the largest and most comprehensive NF centers in the world. From research excellence to outstanding multidisciplinary patient care to integrative complementary care approaches, the NF Center is pushing the boundaries of what is possible for people affected with NF.

Today, the Washington University NF Center is internationally recognized as one of the premier clinical and research programs focused entirely on NF.

Partner with the Washington University NF Center

The Washington University NF Center receives funding from many sources, including the National Institute of Health; however, the NF Center also relies heavily on private funding which is essential for advancing research goals and providing resources and complementary care programs to families affected by NF.

There are many ways to support the Washington University NF Center in their mission to provide exceptional care through groundbreaking research.

To learn how you can get involved, please visit nfcenter.wustl.edu/give/

CONTACT

Email: NF@neuro.wustl.edu

For more information regarding the Washington University NF Center, please visit nfcenter.wustl.edu

To learn more about the groundbreaking research being conducted in the Gutmann Laboratory, please visit gutmannlab.wustl.edu

Follow the Washington University NF Center on Facebook: facebook.com/WashingtonUniversityNFCenter

