



JOHNS HOPKINS
MEDICINE

Lyme Disease Research Center

TRANSFORMING THE FUTURE OF LYME DISEASE

IMPACT REPORT 2021



www.HopkinsLyme.org

Our mission is to understand and urgently address the varied manifestations of Lyme disease and translate our pioneering multidisciplinary research into improved patient care, education, and health outcomes.

RESEARCH IS
KNOWLEDGE
KNOWLEDGE
IS HOPE

Patient Care
Research
Education

Letter from Director, John Aucott, MD

The Johns Hopkins Medicine Lyme Disease Research Center continues to advance an understanding of Lyme disease on multiple fronts. I am excited to tell you of two new programs that we are launching. We are grateful that the Steven and Alexandra Cohen Foundation recently supported us, along with Columbia University and Children's National Hospital, to begin a clinical trials network. Through this program, pilot clinical trials of new therapies for patients with persistent symptoms associated with Lyme disease will begin at our Center in 2022. Our Center is also in the process of establishing the first Lyme disease fellowship program in Internal Medicine in the nation to provide education and training in tickborne diseases for the next generation of doctors.

This report highlights several important insights from our research program that are helping to connect the dots in Lyme disease.

We thank our donors for making our leading-edge research possible and for supporting this new fellowship program. We are urgently working towards improving Lyme disease education and patient care.

May you and yours stay safe and well.

Warm regards,

John Aucott, MD
Associate Professor of Medicine
Johns Hopkins University School of Medicine
Director, Lyme Disease Research Center

RESEARCH CENTER MILESTONES

66,800

blood and tissue
samples in
biorepository

285

"longhaul" Lyme
SLICE study
participants

53

published
peer-reviewed
studies

1st

Lyme disease
fellowship
program being
established

New

Lyme arthritis
program adds
biorepository &
joint imaging

LYME DISEASE CLINICAL TRIALS NETWORK

Treatment Pilot Studies to Begin in 2022

In March 2021, the Steven and Alexandra Cohen Foundation, the largest private funders of Lyme and tickborne disease research in the country and a major funder of our Center, announced they are establishing a national clinical trials network (CTN) to identify more effective treatments for patients with acute and chronic manifestations of Lyme and tickborne diseases.

The Johns Hopkins Medicine Lyme Disease Research Center in Baltimore MD is pleased to have been selected as one of three initial CTN sites. Center Director, John Aucott, MD, is a Principal Investigator and Executive

Committee Member for the new clinical trials network. Columbia University Irving Medical Center in NYC, under the direction of Brian Fallon, MD, MPH, is the CTN coordinating center, and the third CTN investigation node is Children's National Hospital in Washington DC. Small initial pilot studies will begin in 2022.

Results of CTN pilot studies – if favorable – will lead to consideration for larger randomized controlled clinical trials and hope for increased treatment options that lead to improved patient health outcomes.



To stay abreast of our pilot study and other research news please sign up for our newsletter at HopkinsLyme.org/subscribe.

OUR PATIENT-BASED CLINICAL RESEARCH PROGRAM CONTINUES TO ADVANCE LYME DISEASE UNDERSTANDING

*SLICE Studies • Biorepository • Advanced Imaging • Early Diagnosis Research
Collaborations • Publications • Data • Insights • Education • Patient Care*



- Studies of
- Lyme disease
- Immunology &
- Clinical
- Events

We listen carefully to our patients and meticulously characterize their symptom illness experience.

685

Participants Enrolled
in SLICE Studies

2,175

Participant
Visits

82%

1 Year Retention Rate
among study participants

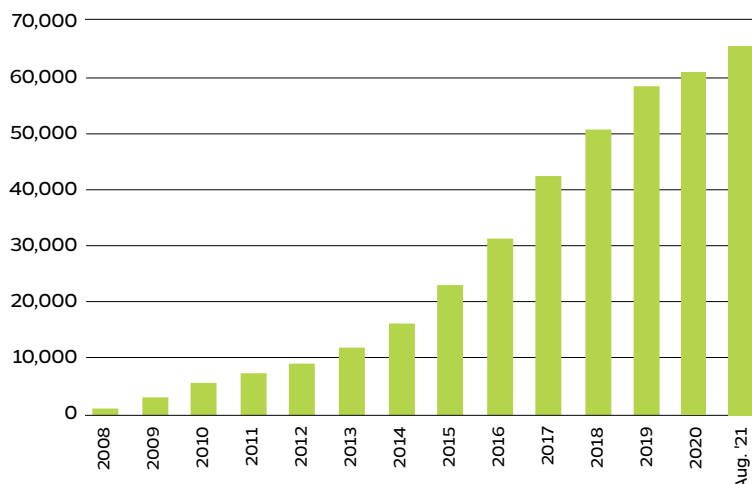


We are grateful to all the patients who participate in our studies.
Our dedicated team is urgently working on your behalf towards solutions.

SLICE BIOREPOSITORY

We see patients with all manifestations of Lyme disease at our clinic. Acute as well as chronic patients may enroll as participants in the SLICE studies and donate their well-characterized and validated blood and tissue samples to our clinical research program. Our robust clinical and epidemiologic data and gold-standard biorepository samples are a valuable cornerstone to many of our scientific research collaborations.

Cumulative Numbers of Blood and Tissue Samples



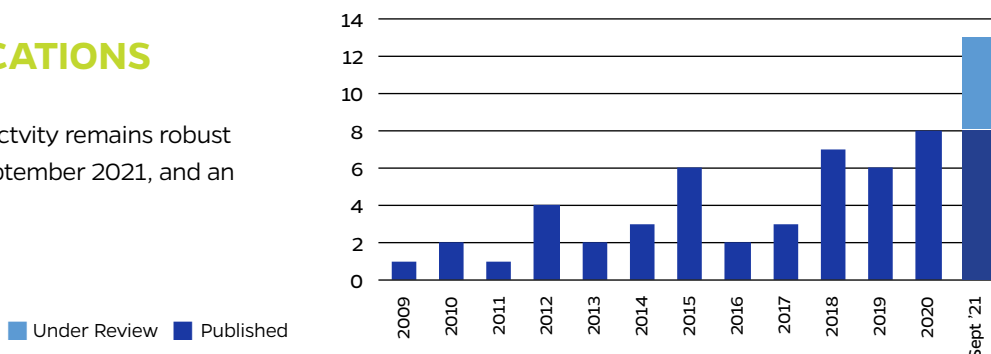
RESEARCH COLLABORATIONS

Over 8200 samples from our biorepository have been sent to 35 different academic, scientific and medical collaborators from 25 different institutions. Using multiple advanced scientific methods including immune profiling, transcriptomics, proteomics, metabolomics, microbiomics, and direct detection, our multidisciplinary SLICE collaborations have produced numerous findings published in peer-reviewed studies. These novel insights are helping us to better understand Lyme disease's multi-system complexities. Our research is enabling the discovery of diagnostic biomarkers and potential treatments to improve health outcomes for Lyme disease patients.

RESEARCH PUBLICATIONS

Our research publication productivity remains robust with 8 publications through September 2021, and an additional 5 under review.

Peer-Reviewed Publications by Year



INSIGHTS FROM OUR RESEARCH

Helping To Connect the Dots In Lyme Disease

SLICE STUDIES

Our rigorous scientific SLICE studies demonstrate that post treatment Lyme disease is a real clinical disease with objective biologic findings.

The SLICE studies show *Borrelia burgdorferi* infection combined with genetic susceptibility to autoimmune diseases may contribute to dysregulated immunity and autoimmune illness in Lyme arthritis and potentially other persistent symptoms of Lyme disease.



Causes of symptom persistence in Lyme disease can be multifactorial and may include persistence of infection or antigenic debris, aberrant immune dysregulation and inflammation, neural network activation, or some combination of these factors.

IMAGING RESEARCH

Our advanced research imaging studies of the brain and joints are objectively finding abnormal tissue inflammation in Lyme disease patients.

IMAGING RESEARCH Brain and Joint

Persistent inflammation revealed using joint ultrasound

White matter functional and structural brain abnormalities found using fMRI and DTI

Elevated central nervous system glial immune activation shown in PET imaging

EARLY DIAGNOSIS RESEARCH Improving Rash Detection and Patient Outcomes

Delays in treatment shown to significantly impact patient outcomes

Artificial intelligence can improve early detection of LD rash

Rash shown to vary by age, sex, duration, and body location

Bulls eye rash is NOT the most common rash presentation

EARLY DIAGNOSIS RESEARCH

Our research shows that rash identification is crucial for early Lyme disease diagnosis and treatment, and early treatment is key for improving patient health outcomes.

Initiating First Fellowship Program

EDUCATION

Our education program informs health practitioners and the public on a range of Lyme disease topics throughout the year, including rash identification, early diagnosis, acute and chronic manifestations, multifactorial disease drivers, treatments, and the relevance of Lyme disease to autoimmune illness and Long COVID.

LYME DISEASE EDUCATION RESOURCES

Website
HopkinsLyme.org

May LD Awareness Month Program

Webinars
Education Videos
Newsletter

Physician Education



To sign up for our newsletter and stay abreast of the latest educational information from our Center please go to HopkinsLyme.org/subscribe.

NEW FELLOWSHIP PROGRAM

TRAINING THE NEXT GENERATION OF LYME AND TICKBORNE DISEASE DOCTORS



Under the direction of Center Director, John Aucott, MD, the Center’s fellows will develop the ability to meet the unique care needs of Lyme disease patients.

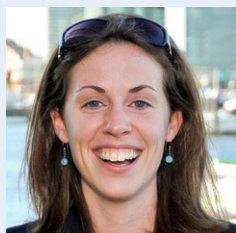
The Center is embarking on an ambitious fundraising campaign to establish an inaugural fellowship training program at the Johns Hopkins University School of Medicine to meet the growing need for a highly skilled clinical and research physician workforce in Lyme and other tickborne diseases. **The Center’s initiative will be the world’s first Internal Medicine Lyme Disease**

Fellowship Program. A distinct feature of the physician-scientist training program is our collaboration with the Johns Hopkins Bloomberg School of Public Health which will enable fellows to pursue a fully funded Master’s degree or certificate in Epidemiology and Clinical Research.

Fellowships are rigorous and intensive educational experiences in the advanced training phase of a physician specialist. Since its founding, the Johns Hopkins University School of Medicine has attracted national and international candidates to its array of specialty and advanced fellowship programs. Among the benefits of these immersive training experiences is the ability to strengthen a field, bring novel and “out of the box” ideas to scientific inquiry, and offer greater access to specialists for patients.

Candidates for the fellowship have completed a residency training program and will be board eligible in internal medicine. Fellows will be charged with developing ground-breaking research projects that will ultimately improve Lyme and tickborne disease understanding and the care of patients. Once Lyme Disease Research Center fellows have successfully completed the two year training period, they will have the ability to synergize leading-edge Lyme disease research with the practice of evidence-based, compassionate patient care and successfully transition into leadership positions in medicine.

Interested candidates may contact the Lyme Disease Research Center at 410-616-7596.



Nora Kenney, Fellowship Campaign Chair, believes “A Lyme disease fellowship program is long overdue to provide more extensive education and training for doctors. Support for this initiative has been overwhelmingly positive as we work towards the \$2 million funding goal to bring forth this important change.”

Donations may be directed to [HopkinsLymeDonate](https://hopkinslymedonate.org).



TRANSFORMING THE FUTURE OF LYME DISEASE THROUGH RESEARCH AND EDUCATION

WHY WE GIVE

Edward St. John, Founder and Chairman of St. John Properties, and **Sharon Akers**, President of Edward St. John Foundation, both serve on the Advisory Board of the Lyme Disease Research Center and have generously and consistently supported Dr. Aucott's clinical research program since its beginning for over a decade. The Edward St. John Foundation recognizes that "education has the power to transform lives and provide the foundation for success", and the ESJ Foundation, St. John Properties, and Mr. St. John have awarded over \$65 million to more than 750 local educational and non-profit organizations over the years. Their mission aligns with the Center's goal of advancing Lyme disease knowledge and patient care through research and education, and we appreciate their ongoing support. **In 2021, we are especially grateful for the Edward St. John Foundation's role in launching the campaign for the fellowship training program by making the first major gift to this effort.**



Sharon Akers shares, "We are enthusiastic about the Center's fellowship program because we recognize that Lyme disease is a large and growing health crisis, and there is an urgent need for improved Lyme disease and tickborne disease medical education. We understand the value of establishing a fellowship program in the esteemed School of Medicine at Johns Hopkins University and believe there is no better mentor and leader of this program than Center Director, Dr. John Aucott. **We hope our gift will help inspire others to support this important initiative.**"

RESEARCH CENTER TEAM

CLINICAL RESEARCH TEAM

John Aucott, MD
Associate Professor of Medicine
Director, Lyme Disease
Research Center

Alison Rebman, MPH
Instructor in Medicine
Director for Clinical and
Epidemiological Research

John Miller, MD
Assistant Professor of Medicine
Lyme Arthritis Program

Ting Yang, PhD
Senior Biostatistician

Erica Mihm, BS, CCRP
Senior Research Program Coordinator

Cheryl Novak, MSN, CRNP
Certified Registered Family
Nurse Practitioner

Susan Joseph, BSN, RN
Senior Research Nurse

Cindi Crews
Senior Medical Office
Coordinator

Verna Scheeler, BSHA, MA
Clinical Research Program
Manager

Natalia Isabella Brothers, BS
Research Program Coordinator

LABORATORY RESEARCH TEAM

Erika Darrah, PhD
Associate Professor of Medicine
Director for the Basic Science Laboratory

Mark Soloski, PhD
Professor of Medicine
Senior Advisor

Daniela Villegas de Flores, MEd
Research Specialist II

Sara Flores, BS
Research Specialist

ADVISORY BOARD

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Robert Mills
Ryan Perdue
George Roche
Edward St. John
Isaac Yoon, MD
Tanya Bentley Young

EDUCATION AND COMMUNICATIONS LIAISON

Nancy Dougherty
NVantage Consulting, LLC

Philanthropic support makes a difference.

Philanthropy provides the Johns Hopkins Medicine Lyme Disease Research Center with the ability to pursue groundbreaking research that is critical to improving diagnostics, treatments, education, and health outcomes for Lyme disease patients. We remain focused on advancing knowledge to inform and improve patient care. As we work to establish the first Fellowship Program for Lyme Disease in internal medicine we are more grateful than ever for our philanthropic partners who support and believe in our mission.

Our Research Center is grateful for the support of:

- Steven & Alexandra Cohen Foundation
- Brennan Family
- Global Lyme Alliance
- Bay Area Lyme Foundation
- Department of Defense
- Individual donors, family foundations and collaborators
- Our Advisory Board

HELP US ESTABLISH A LYME DISEASE FELLOWSHIP PROGRAM

**YOUR GIFT ADVANCES
KNOWLEDGE TOWARDS
A CURE**

If you would like to contribute to this important work, please contact:

Anne Kennan Taylor
Johns Hopkins University and Medicine
Attn: Department of Medicine/Lyme Disease Research Center
PO Box 49143
Baltimore, MD 21297-9143
Email: akennan1@jhmi.edu
Phone: 410-550-3417

**You may also make a donation
by visiting our website at
HopkinsLymeDonate.org.**

Johns Hopkins Medicine Lyme Disease Research Center at Greenspring Station

Joppa Concourse
2360 W. Joppa Road, Suite 320
Lutherville, MD 21093
Provider Office: 410-616-7596
Fax: 410-616-7595

Johns Hopkins Medicine Lyme Disease Research Center at Bayview Medical Center

5501 Hopkins Bayview Circle
JHAAC, Room 1B.7
Baltimore, Maryland 21224

If you prefer not to receive fundraising communications from Johns Hopkins Medicine, please contact us at 1-877-600-7783 or FJHMOptOut@jhmi.edu. Please include your name and address so that we may honor and acknowledge your request.

**We appreciate your support
which is vital to our program.**



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