The purpose of the Lymphoma Epidemiology of Outcomes Cohort Study (LEO) is to build a large and diverse cohort study to support research which addresses the current and long-term unmet health needs of lymphoma patients and survivors. Our goal is to enroll a total of 12,900 newly diagnosed non-Hodgkin lymphoma (NHL) patients at 8 centers (Mayo Clinic, University of Iowa, Emory University, UT MD Anderson Cancer Center, Washington University in St. Louis, Weill Cornell University, University of Rochester Medical Center New York, and University of Miami). We gather information about each participant to include in our database, as well as tissue and blood samples to create a tumor bank for future research.

At the end of Year One (July 2016), there were 1,421 participants enrolled across the 8 centers. We are proud to report that our total enrollment reached 3,269 by the end of Year Two (July 2017). The two most common subtypes among our participants are diffuse large B-cell lymphoma (31.5% of participants) and follicular lymphoma (21% of participants). Several other less-common subtypes are represented by the rest of the participants. As for participant demographics, approximately half of our participants are between the ages of 51 and 70 and about 56% are male. We’re happy to report that these statistics are on target with our planned enrollment.

At the end of Year Two, 65% of participants returned their baseline questionnaire and 50% returned their risk factor questionnaire. In addition, participants receive follow-up questionnaires from us every six months. Please keep an eye out for these questionnaires and return them back to our team as soon as possible – we appreciate your continued involvement to keep follow-up information as complete as possible! This information is critical to our understanding of how people do over time after a diagnosis of lymphoma. Over time we plan to use this information to design new approaches that are targeted to help people who were diagnosed with lymphoma in the ways that matter most.

Overall, we have an admirable number of diverse and involved participants for such a young study. We hope to increase our enrollment in Year Three to get even closer to reaching our overall goal. On behalf of our entire team from across the country, thank you again for your participation and interest in LEO. Please feel free to reach out to your local team with any questions, concerns, or comments about LEO. You can find contact information for each center on the back of this newsletter.

Thank you again for your contribution to this groundbreaking research!
What is epidemiology?

Epidemiology is the study of disease in groups of people. Although individual data is important for epidemiology, individuals are viewed collectively to find trends among the larger set of data. Epidemiology can help to identify characteristics of a disease such as risk factors associated with the onset or severity of the disease, prevention methods to control the frequency of the disease, and management methods to help those who already have the disease.
Q & A with Ben Haines, LEO Patient Advocate

1. What is a Patient Advocate?

A Patient Advocate is there to represent the best interests of the patients. It is not only about durable remissions and long term survival of lymphoma but also about the patient’s quality of life.

2. How does a Patient Advocate help in lymphoma research?

Patient Advocates help by listening and answering questions that the doctors or others may have about a specific patient population or situation. For example, we help by giving input on better treatments or on what data to capture to make sure that the patient is put first without compromise. Always striving forward, to make a lymphoma diagnosis less threatening.

3. Why did you become a Patient Advocate? What’s your “Lymphoma Story”?

I just hit the twenty year mark of my Patient Advocacy. It started for me on March 25, 1997. My wife and I were then 31 years old when she was diagnosed with ‘incurable’ Stage IV B lymphoma. I knew then what I had to do: educate myself, help us, then help others. In my profession, I have spent 30 years in Corporate America turning data into information so my work in LEO is professional as well as personal.

4. What is the most rewarding thing about being a Patient Advocate?

It is an honor to be a Patient Advocate for LEO. The most rewarding part for me has been to be able to be behind the scenes with some of the best minds in lymphoma in the world and a team that works together. I have never seen the amount of cooperation in Corporate America as I have with this lymphoma team. They are efficient, passionate, and focused.

In the early days of my advocacy, I was angry, confused, and frustrated. After years of advocacy, I am opposite. Yes, still angry and frustrated at times but enlightened. and there’s a big difference. I have learned a great deal from these Hematological specialists, Epidemiologists and their teams. The best are not threatened by second opinions or the challenging of their results.

Being LEO’s Patient Advocate is the pinnacle for me. My wife is alive thanks to the lymphoma specialists, which includes entire teams, and my greatest reward is to give back to try and help the hard working folks behind the scenes who work tirelessly to help save current and future lives - the lives of the people we call “our families.”

5. How can someone become a Patient Advocate?

Anyone can be a patient advocate. It seems there are a lot more advocates who are actually the patient themselves. I am simply a Patient Advocate from the caregiver perspective. I have never had chemo or been sidelined by crippling symptoms. I do, however, know the toll it takes financially, physically, spiritually, and mentally. Cancer is an insidious disease but I take great pride knowing that lymphoma research is leading the way for all of cancer’s demise. I am most proud of the lymphoma cancer community and the fine people working on LEO across the United States, expertly led by Dr. James Cerhan and Dr. Christopher Flowers. They have your backs and fronts and sides. I am grateful.
I believe that LEO (Lymphoma Epidemiology of Outcomes) is a critical research project that is helping us to improve our understanding of the clinical, epidemiologic, genetic and treatment factors influencing the clinical course and prognosis of non-Hodgkin lymphomas. After several years of reviewing lymphomas from hundreds of recently diagnosed lymphoma patients who are part of the LEO project and having seen the passion and commitment of the LEO investigators, I am very confident that this nation-wide effort will contribute to significant improvements of our understanding of lymphomas.

I would like to share with you one practical example of how the LEO project is helping us here at the University of Miami / Sylvester Comprehensive Cancer Center to answer some questions regarding lymphomagenesis, classification and prognostic significance.

Epstein-Barr Virus (EBV) -associated follicular lymphoma (FL) is only rarely reported and because EBV is not systematically assessed in these patients, the prevalence, underlying biology, clinicopathological features and prognostic significance of EBV-positive FL is unknown. In a preliminary study recently published (Mod Pathol 2017; 30:519-529) we reported the largest series to date of EBV-positive FL (10 cases) and provided an estimated prevalence of EBV-positive FL (~3% of all FL). Interestingly, we also found that all EBV-positive FL in this series demonstrated progression of disease to either a higher-grade FL or to diffuse large B-cell lymphoma. This finding may have therapeutic implications in low-grade FL in which EBV is identified and also affects how we conceptualize EBV-positive DLBCL, given that a subset of these lymphomas likely arise from EBV-positive FL. However, a larger series of FL cases with well-annotated clinical and follow-up information was needed in order to confirm whether the presence of EBV in FL is predictive of a more aggressive disease, thus justifying assessment in all cases of FL. Through LEO, we were able to study several hundred additional cases of clinically well-annotated FL for the presence of EBV infection. The data are being analyzed at this time, but we expect that the analysis will help us to understand the clinical and prognostic implication of EBV positivity in FL. Without LEO, it would be very difficult to address this question and therefore the potential prognostic and therapeutic implications would remain unknown.

**Timeline**

- **June 2015**: LEO Grant is funded by the NIH
- **July 2015**: Kick-Off Meeting Atlanta, Georgia
- **July-October 2015**: Accrual begins at 7 LEO Centers
- **December 2015**: 1st Annual Meeting Orlando, Florida
- **January 2016**: Accrual begins at final LEO Center
- **May 2016**: 1,000th patient consented
- **Spring Meeting Rochester, Minnesota** (May 2016)
- **September 2016**: First patient consented using electronic baseline questionnaire
- **October 2016**: 2,000th patient consented
- **December 2016**: 2nd Annual Meeting San Francisco, California
- **May 2017**: 3,000th patient consented
- **June 2017**: First electronic risk factor questionnaire completed
- **December 2017**: 3rd Annual Meeting Atlanta, Georgia

**Coming Soon**

- Go paperless
- Create a website
- Publish papers with data collected in LEO
- Find funding to continue our study
Dr. Christopher Flowers

**LEO Co-Principal Investigator, Emory University**

I am a Seattle native who migrated to Emory 14 years ago. At Emory, my clinic focuses on specialized care for patients with lymphoid malignancies. Through the lymphoma clinic, my team offers a variety of clinical trials and advanced treatment algorithms for patients with lymphoma. Working with dedicated nurses, coordinators, pharmacists, and other clinical research staff has been a great pleasure. It is incredible and inspiring to work with such dedicated people who are devoted to eradicating lymphoma and improving quality of life for patients and their caregivers. I am proud to say that the Emory Lymphoma Program has been a key contributor in several clinical trials that have led to FDA approval of new drugs for patients with lymphoma. I’ve also helped develop national guidelines for the management of cancer patients with the American Society of Clinical Oncology, the American College of Radiology, and the American Cancer Society. My current research projects span three major areas: 1) epidemiology, outcomes, translational research and clinical trials in lymphoma, 2) oncology informatics projects developing an information infrastructure to support cancer outcomes research, and 3) strategies to understand and overcome disparities in cancer outcomes. LEO has been extraordinarily rewarding for creating new opportunities for research, training young investigators in research methods to establish the next generation of lymphoma scientists, working with even more individuals across the country who are dedicated to understanding ways to improve the lives of people diagnosed with lymphoma.

I previously was a member of the Leukemia and Lymphoma Society Georgia Board of directors and currently am a member of the Lymphoma Research Foundation national Scientific Advisory Board. Through activities with the LRF, the American Society of Hematology, and the American Society of Clinical Oncology/American Association of Cancer Research, I have been very involved in the training of young investigators toward careers in cancer clinical research. LEO and these organizations have created tremendous opportunities to promote physician and patient education related to lymphoma. During my recreational time, I am an avid runner and can often be found on the roads in Atlanta and across the country running with my wife and children. The LEO collaboration is one of the highlights of my personal and professional life. It is a joy to work side-by-side with investigators dedicated to the care of patients with lymphoma and devoted to understanding new ways to cure and prevent complications from this disease. The team at Emory and I look forward to the future success of LEO and the new discoveries that LEO will bring.

Dr. Peter Martin

**Principal Investigator, Weill Cornell Medical College**

In New York City, home to over 8 million people and 800 languages, you can eat natto for breakfast, mofongo for lunch, and injera for dinner without ever leaving your block. If New Yorkers have figured out how to live and work together in this hotbed of diversity, anyone should be able to follow suit.

So, it was always a little uncomfortable when a New Yorker with lymphoma would ask me, “Are all you doctors working together?” “Of course we work together,” I would answer, highlighting national clinical trial networks. But I could see that they were not completely convinced.

For years, media savvy New Yorkers have been urging us to do better. They watch the news when the latest gene editing technology provides a door to the next generation of leukemia therapy. They read closely when a newspaper reports that someone with brain cancer has been cured by immunotherapy. They subscribe to newsfeeds to learn about the latest agents to receive an FDA Breakthrough Therapy Designation. New Yorkers see technology expanding around us at an exponential pace and wonder when their treatments will finally catch up. Evolving technologies have made the study of tumors, cells, genes and proteins more sophisticated than ever before. We have an unparalleled arsenal of tools to answer important questions, but unless we know which questions to ask, research proceeds at what feels like a snail’s pace. The Lymphoma Epidemiology of Outcomes (LEO) project is a gateway to improving the lives of people with lymphoma by providing infrastructure to help us identify the right questions.

The LEO is more than just an extension of existing databases and tissue banks kept at individual institutions; it is a concerted, cooperative effort to translate observation into action. With data and tissue from 12,000 people, we are in a position to ask meaningful questions and get groundbreaking answers. With the LEO, I feel a sense of pride when I explain to people who come through the clinic that the Weill Cornell lymphoma program is collaborating with some of the leading institutions and researchers in the country to better understand what it is like to live with lymphoma and how we can make it better.

**LEO Goals**

- Support research that finds new and better ways to improve the length and quality of life of people living with non-Hodgkin Lymphoma.
- Create a bank of blood and tissues specimens.
- Collect clinical and risk factor data from participants at enrollment and over time.
- Follow patients over time to determine possible causes, optimal treatment, and survivorship of NHL.
It is my distinct pleasure to represent Washington University in the LEO consortium. Wash U has a phenomenal lymphoma program, largely thanks to the efforts of Dr. Nancy Bartlett. Our program has recently added Dr. Neha Mehta-Shah, Memorial Sloan Kettering trained superstar with a special focus on T cell lymphomas. We also have two outstanding clinical investigators who specialize in lymphoma and bone marrow transplantation, Dr. Amanda Cashen and Dr. Armin Ghabadi. Lastly, we have an incredibly talented clinician-scientist, Dr. Todd Fehniger, with a strong laboratory program devoted to both lymphoma immunobiology and lymphoma genomics. Genomics is a major strength at Wash U. We have great hematopathology and I am extremely grateful to Dr. Kiran Vij for serving as our LEO pathologist. Katherine Eckert is our LEO data coordinator and is truly the glue that holds the whole thing together. Anne Fischer and Kati Kremer oversee our clinical research program. We could not thrive without them. Moving forward, our goals are to contribute robustly to LEO enrollment and meaningfully to the LEO scientific effort.

One of the best things about LEO is the opportunity to collaborate with colleagues at the other LEO centers. LEO would not be possible without the efforts of Dr. James Cerhan (Mayo) and Dr. Chris Flowers (Emory). I don’t think it would be possible to find a better LEO leadership team. Other collaborators include Dr. Brian Link (Iowa), Dr. Loretta Nastoupil (MD Anderson), Dr. Izidore Lossos (Miami), Dr. Peter Martin (Cornell), and Dr. Jonathan Friedberg (Rochester). An august group for sure. We have a common goal - to improve outcomes for lymphoma patients. LEO promises to facilitate that goal.

**LEO Annual Meeting**

In December 2016 the doctors, pathologists, statisticians and coordinators that work on the LEO consortium gathered in San Diego, California for the second annual LEO Conference. This meeting is a vital component to the development and growth of the LEO Study. Each year, contributing staff members have an opportunity to present the previous years’ work in a formal setting, receive feedback from colleagues and exchange ideas on how to better improve our research.

For two full days, over 50 staff members listened to and participated in the main conference and smaller, more focused breakout sessions intended for specialized learning and discussion. The main session included talks from some of the studies clinicians and pathologist and as well as a patient advocate. The smaller breakout sessions helped to develop more effective research practices for patient recruitment and the collection of data and research specimens.

This gathering is beneficial for all participating LEO centers as it allows us to become more effective and efficient at our work, while networking with colleagues from other institutions, meeting with the lymphoma experts, and inspiring us to grow.

[Image of Dr. Brad Khal]

**Dr. Brad Khal**
Principal Investigator, Washington University

It is my distinct pleasure to represent Washington University in the LEO consortium. Wash U has a phenomenal lymphoma program, largely thanks to the efforts of Dr. Nancy Bartlett. Our program has recently added Dr. Neha Mehta-Shah, Memorial Sloan Kettering trained superstar with a special focus on T cell lymphomas. We also have two outstanding clinical investigators who specialize in lymphoma and bone marrow transplantation, Dr. Amanda Cashen and Dr. Armin Ghabadi. Lastly, we have an incredibly talented clinician-scientist, Dr. Todd Fehniger, with a strong laboratory program devoted to both lymphoma immunobiology and lymphoma genomics. Genomics is a major strength at Wash U. We have great hematopathology and I am extremely grateful to Dr. Kiran Vij for serving as our LEO pathologist. Katherine Eckert is our LEO data coordinator and is truly the glue that holds the whole thing together. Anne Fischer and Kati Kremer oversee our clinical research program. We could not thrive without them. Moving forward, our goals are to contribute robustly to LEO enrollment and meaningfully to the LEO scientific effort.

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[Image of Dr. Lindsay Morton]

**Dr. Lindsay Morton**
Epidemiologist, National Cancer Institute

As an epidemiologist at the National Cancer Institute, I study the causes of lymphoma and the long-term health of people who develop lymphoma, otherwise known as survivorship. I have been very pleased to serve on the External Advisory Board for the LEO Cohort Study. The Board, established at the launch of the study, meets annually to hear updates from the study team and provide independent guidance and feedback on aspects ranging from the set-up of the study to the progress to date, types of scientific expertise needed, and scope of future plans. The Board will continue for the duration of the study to help ensure LEO investigators are poised to learn as much as possible so as to improve survival and quality of life following a diagnosis of lymphoma.

I am one of four members of the Board, serving along with Gilles Salles, MD (Professor of Hematology and Medicine, Chair Department of Hematology, Hospices Civils de Lyon, Centre Hospitalier Lyon-Sud), Dennis Weisenburger, MD (Chair, Department of Pathology, City of Hope National Medical Center), and Ben Haines (Patient Advocate) – Ben was featured in the November 2016 Newsletter. We come from diverse backgrounds, and our interests reflect the diversity of the LEO team of investigators and the broad scientific goals of the study.

We have been simply overwhelmed by the progress and promise of this study. These impressive achievements are due to your steadfast participation and the hard work of the LEO investigators! We are looking forward to our next update at the Board’s annual meeting in December 2017!

**Meet Our Investigators**

(continued)
Frequently Asked Questions

Who is the research team?
The LEO research team consists of investigators, study coordinators, lab technicians, pathologists, statisticians, clinicians, patient advocates and students who all work together to collect, store, and analyze data, and specimens. The research teams at all 8 centers work closely together to ensure the continued success of this cohort.

How will the LEO study benefit me?
While there is no direct benefit to you for participating in LEO, the information you provide will help us gain a better understanding of disorders of the blood and lymphatic system. Our goal is to have the information you provide help us find ways to improve patient care and quality of life for individuals diagnosed with lymphoma in the future.

How long is this study?
There is no end date for this study. Please know that you are able to leave this study at any point by contacting the study team at your medical facility.

Will participating in LEO affect my treatment?
No. Participation in the LEO study will not impact your treatment or affect your medical care in any way. You can still participate in this study if you are not being treated.

Will my ID and personal information be shared?
None of your identifying personal information will be shared.

Contact Your LEO Center

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