CHANGING MEDICINE.
CHANGING LIVES.®

SPORE

THE UNIVERSITY OF IOWA / MAYO CLINIC SPECIALIZED PROGRAMS OF RESEARCH EXCELLENCE

IN THIS ISSUE

Collaboration is at the core of the Iowa/Mayo lymphoma Specialized Program of Research Excellence (SPORE). For the past 17 years, the SPORE has been at the forefront of translational lymphoma research. Translational research takes scientific concepts and uses them to develop new approaches that can help patients. To do this, researchers from the University of Iowa and Mayo Clinic, with different backgrounds and areas of expertise, work with each other and with other researchers from around the world on a broad range of research projects. Patient volunteers and advocates have partnered with us and are central to this success.

SPORE research has made a number of important discoveries. It has shown that patients with various types of lymphoma and low Vitamin D levels have poorer outcomes than do patients with normal Vitamin D levels. The SPORE clinical trial is trying to learn if replacement helps patients with their lymphoma. SPORE research has shown that patients with various types of lymphoma and low Vitamin D levels have poorer outcomes than do patients with normal Vitamin D levels. Because of this research, lymphoma doctors now test lymphoma patients for Vitamin D, and replace it in patients who have low levels. The SPORE clinical trial is trying to learn if replacement helps patients with their lymphoma. Very recent studies have shown the importance of magnesium in Burkitt lymphoma and more studies are planned.

SPORE research helped identify genes that, when abnormal, can contribute to the development of lymphoma. Some of these genes are now serving as new targets for lymphoma therapy in SPORE clinical trials of new anti-lymphoma drugs and combinations. SPORE research has contributed to the understanding of the complex interactions between lymphoma and various branches of the immune system. This led to the design and testing of creative new ways of modifying the immune system so it can identify and reject the lymphoma. These include delivering the treatment as part of nanoparticles or even direct injection into the tumor.

Advances resulting from the SPORE are not limited to lymphoma. They are impacting our ability to treat other cancers and have even contributed to research into the COVID-19 virus. Indeed the SPORE is testing a beneficial virus and virus-like particles as treatments for lymphoma.

Since the SPORE was first envisioned nearly two decades ago, our scientific understanding of lymphoma has grown remarkably, and through translational research has expanded the options available to treat those with lymphoma. The result is a major reduction in the pain and suffering caused by lymphoma.

While we have made outstanding progress, we know we still have a long way to go. With our culture of collaboration, support from the National Cancer Institute, and the partnership of our patients, we are poised to make progress faster than ever before.

UNIVERSITY OF IOWA HOLDEN COMPREHENSIVE CANCER CENTER
University of Iowa Health Care

MAYO CLINIC Cancer Center

NCI CCC A Comprehensive Cancer Center Designated by the National Cancer Institute

Patient Story: Charles Herrmann

Charles Herrmann was a patient of Dr. Thomas Witzig at Mayo Clinic while he dealt with a diagnosis of relapsed refractory Hodgkin Lymphoma. Mr. Herrmann had the opportunity to participate in a clinical trial of immunotherapy this past winter (2019) that lasted through the spring (2020). This trial required that he go to Mayo Clinic once every three weeks for a 30-minute IV injection. Mr. Herrmann faithfully did the three-hour drive to participate and he is so thankful that he did! The result has been complete remission! There were no side effects for the first several months. Side effects did begin to be noticeable towards the end of the trial but remained manageable. The trial was a Phase 2 trial and was focused on patients who had failed other means of treatment.

Mr. Herrmann is married and has one teenage son. They currently reside in South Dakota. Mr. Herrmann grew up in Hawaii but military travel and his wife's family are what brought him to the northern United States. He enjoys being in the outdoors hunting and/or fishing. The stark contrast in climate between Hawaii and South Dakota doesn't scare him. He spent a significant amount of time visiting family in the cold weather in Buffalo, New York during the Christmas holidays as a child.

Patient Advocate Spotlight: Lorraine Dorfman

Lorraine sees her role as patient advocate primarily as helping to protect the health and welfare of patients who are involved in lymphoma research - so indirectly her role is in lymphoma research. This has been central for her since the inception of the grant nearly two decades ago.

She attends the monthly SPORE videoconferences with Mayo Clinic and also the yearly Advances in order to try to keep up to date on current lymphoma research.

Her personal interests include reading, music, yoga, long walks and gardening.

Thank you, Lorraine, for all you do in your role as a patient advocate!

Meet our Investigators

Alanna Maguire, PhD
Mayo Clinic Cancer Center

Born and raised in a small coastal town on the outskirts of Dublin Ireland, from early on Dr. Maguire had two competing passions in secondary school; biology and physics. At university, she completed her Bachelor of Science in Physics at the Dublin Institute of Technology (DIT), before embarking on her PhD studies in Radiation Biology, also at DIT, which marked a return to biological studies. It was during her PhD studies that Dr. Maguire's commitment to cancer research was set in motion. Upon completion of her PhD, and to enhance her transition into cancer research, Dr. Maguire undertook a Masters in Molecular Genetics at the University of Leicester in England before securing her first postdoctoral position in the DNA damage group within the Department of Oncology at Oxford University in England. Dr. Maguire then returned to her native Ireland for her second postdoctoral position at Dublin City University, which saw her move into translational cancer research for the first time. During this time, Dr. Maguire established a collaboration with Dr. Michael Barrett at Mayo Clinic Arizona, and secured funding that enabled her to visit Mayo Clinic Arizona for two months as a Visiting Research Scientist within the Barrett lab. So impressed with the collaborative, can-do attitude and facilities at Mayo Clinic, Dr. Maguire resolved to work at Mayo Clinic. In 2017 that became a reality when Dr. Maguire took a position under the mentorship of Dr. Lisa Rimsza, a hematopathologist and highly successful lymphoma researcher, at Mayo Clinic Arizona. Initially focused on HIV associated Lymphoma, Dr. Maguire's work at Mayo Clinic has expanded to encompass post-transplant lymphoproliferative disorders and the overarching role of immune suppression in lymphomagenesis. Both projects are aimed at delineating the genomic differences between lymphomas arising in immune compromised individuals and their immune competent counterparts. Her preliminary data has revealed intriguing genomic similarities between different types of immunodeficiency-associated lymphomas irrespective of how the immune system is compromised, in which the DNA damage response appears to play a prominent role. Dr. Maguire hopes to continue building the necessary momentum to contribute to, and become a leader in, lymphoma research.

Laura Rogers, PhD
Mayo Clinic Cancer Center

Laura Rogers is the first generation hybrid offspring of the University of Iowa/Mayo Clinic Lymphoma SPORE, having trained as a scientist at the University of Iowa before moving to Mayo Clinic as faculty in 2019. She developed expertise in cancer genomics and a solid foundation in basic research during her graduate studies at Iowa. In 2013, she joined Dr. George Weiner's (SPORE PI) translational immunotherapy research laboratory for her postdoctoral training. It was during these years that she began participating in the Iowa/Mayo Lymphoma SPORE, receiving both Developmental Project and Career Enhancement Awards to support her innovative research. "As a PhD, I have little contact with patients, so the perspectives offered by the Lymphoma SPORE clinician researchers and patient advocates was immensely informative. It is inspiring witnessing how experienced leaders in the SPORE work together to move scientific ideas into clinical trials to benefit lymphoma patients." Now an Assistant Professor of Immunology at Mayo Clinic, the Iowa native enjoys close ties with both institutions. Outside of research, Dr. Rogers' second job is as mother of two smart and sometimes sassy daughters (Audrey, age 7; and Hazel, age 5). The entire Rogers family-of-four enjoys camping and kayaking. Luckily, they also like sledding and ice skating, and have quickly adapted to life in Minnesota.

Umar Farooq, MD
Holden Comprehensive Cancer Center

Umar Farooq is a Hematologist and Clinical Associate Professor of Medicine. He joined the University of Iowa in 2014 after completing his training at Stanford Hospitals and Clinics in Blood and Marrow Transplant. He specializes in transplant and cellular therapies for lymphoma. He had the benefit of the University of Iowa/Mayo Clinic SPORE research infrastructure to advance his career interest in lymphoma research. He is co-investigator on a SPORE project to study a novel treatment agent called CMP001 that was developed at the University of Iowa. CMP001 is virus like particle that has shown the ability to engage our internal immune system and generate a tumor specific immune response. He is currently leading a clinical trial for lymphoma in which CMP001 is given in combination with another immunostimulant agent for cancer therapy called pembrolizumab. He is also co-investigator on another SPORE project that aims to enhance the anti-tumor effect of specific types of immune cells called macrophages. He received SPORE pilot project grant in collaboration with Dr. Reinhard Beichel in the College of Engineering at the University of Iowa. The goal of this project was to collect preliminary data to develop highly automated image analysis methods and machine learning approaches for disease assessment and outcome prediction in lymphoma. He has led the CAR-T cells clinical trials for lymphoma at the University of Iowa. CAR-T cells are genetically modified immune cells with the ability to target cancer cells and CAR-T cells have now been FDA approved to treat certain types of B-cell non-hodgkin lymphomas. He became the director of cellular immunotherapy at Holden Comprehensive Cancer Center in 2019. He finds the collaborative spirit of the University of Iowa/Mayo Clinic SPORE a key factor in supporting new investigators interested in lymphoma research. Umar is married to Fatima Toor who is a faculty member in the College of Engineering at the University of Iowa and has an eighteen months old son, Daniyal. He enjoys spending time with his family, biking and reading novels.

Project Overview

PROJECT 1: Activating Phagocytic Macrophages in non-Hodgkin Lymphoma

Dr. Stephen Ansell

Dr. Andrew Feldman

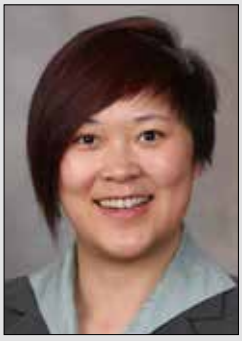
Project Leaders: Stephen Ansell, MD, PhD (Mayo) and Andrew Feldman, MD (Mayo)

Co-investigators: Grzegorz Nowakowski, MD (Mayo), Zhi Zhang Yang, MD (Mayo), Umar Farooq, MD (Iowa)

Macrophages are type of white blood cells with specialized immune function to fight infections as well as cancer. These cells work by ingesting and destroying cancer cells, a process called phagocytosis. The goal of our project is to enhance the ability of macrophages to kill lymphoma cells. We have specific interest in sub-types of macrophages labeled as CD14+SIRPαhigh macrophages and CD14-SIRPαlow macrophages. We have observed that lymphoma cells have high expression on their surface of a signaling receptor called CD47 with the goal of protecting lymphoma cells from macrophages. This CD47 molecule acts by interacting with SIRPα on surface of macrophages to inhibit their phagocytic function. We are working to enhance phagocytic function of macrophages by blocking the interaction of CD47 on surface of lymphoma cells with SIRPα on the surface of macrophages. We are testing a drug called TTI-621 that blocks the CD47 signal (do not phagocytose me signal) on lymphoma cells but also engages macrophages to enhance their phagocytosis and antitumor activity. We have found that TTI-621 has anti-lymphoma activity in humans in a phase 1 clinical trials of 164 treated patients. We continue to study CD14+SIRPαhigh and CD14-SIRPαlow macrophages, and to test whether the tumor-directed phagocytic function of these macrophages can be enhanced even further.

PROJECT 2: Microenvironment Modification and Anti-PD1 Immunotherapy of Lymphoma

Dr. George Weiner



Dr. Yi Lin

Project Leaders: George Weiner, MD, PhD (Iowa) and Yi Lin, MD, PhD (Mayo)

Co-Investigators: Brian Link, MD (Iowa), Jon Houtman, PhD (Iowa), Umar Farooq, MD (Iowa), Haidong Dong, MD, PhD (Mayo)

This project is based on the concept that modifying the lymphoma microenvironment can enhance the ability of the immune response to recognize the lymphoma and attack it throughout the body. We are making progress in doing this using two different strategies.

The first strategy, being led by Dr. Lin at Mayo, involves converting blood cells from the patient into highly specialized cells of the immune system known as dendritic cells. A lymphomatous node in the patient is frozen and the patient's own dendritic cells injected into that node to kick off the immune response. With support from the SPORE, this approach is being tested in a clinical trial (NCT03035331) that has completed Phase I and is currently accruing patients for Phase II. Ten patients have been treated to date. Clinical response appears encouraging.

For the second strategy, Dr. Weiner and his team at Iowa, are injecting the lymph node with a virus like particle that is not infectious but can stimulate the immune response by activating dendritic cells that are already in the node. Over the past year, they found that these particles are much more effective if they are first coated by antibodies made by the patient, a finding they published in the Journal of Immunology. They have now treated three patients on their Phase I/II trial (NCT03983668) using this approach.

State of the art profiling of the patients' immune system to assess the immune response to therapy is part of both trials. Both approaches appear to be safe, but we are not yet able to determine whether either is effective or whether there is value in combining these two approaches. We hope to have answers to those questions soon.

PROJECT 3: Targeting Tumor Metabolism in Lymphoma

Dr. Thomas Witzig

Dr. Gail Bishop

Project Leaders: Thomas Witzig, MD (Mayo) and Gail Bishop, PhD (Iowa)

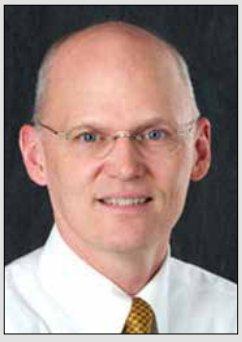
Co-Investigators: Laura Stunz, PhD (Iowa), Xiaosheng Wu, MD (Mayo), Daniel Billadeau, PhD (Mayo)

This project is focused on targeting the increased growth rate of lymphoma cells. Lymphomas utilize glucose as their fuel and tumors that use more glucoses do worse. The cells that lack a normal regulator called TRAF3 live better and are associate with a kinase enzyme called glucose-6-kinase (GSK). We are part of a national trial that is now testing whether inhibiting GSK3 can produce tumor responses. That trial has now accrued 11 patients at Mayo. Project 3 is also studying the relationship between an important "pump" that is located on the membrane that separates the nucleus from the cytoplasm of the cell. This pump, CRM1 moves proteins and nutrients in and out of the nucleus. Selinexor is the first drug to be approved by the FDA to inhibit CRM1. Project 3 investigators are launching a trial in September to test Selinexor with other drugs to improve the tumor responses with less toxicity. The results of these studies in the lab suggest that this can be accomplished. P3 investigators are also studying a cell line made from a patient with resistant mantle cell lymphoma to learn why it is resistant. These studies are informing us how to potentially overcome the resistance.

PROJECT 4: Genomic Predictors of Early Relapse in Immunochemotherapy-treated Follicular Lymphoma

Dr. James Cerhan

Dr. Anne Novak



Dr. Brian Link

Project Leaders: James Cerhan, MD, PhD (Mayo), Anne Novak, PhD (Mayo), Brian Link, MD (Iowa)

Co-investigator: Lisa Rimsza, MD (Mayo)

Follicular lymphoma (FL) is the most common indolent non-Hodgkin lymphoma and has a highly variable clinical course. Some patients can initially be managed by observation or rituximab-monotherapy while others require immunochemotherapy (IC). We have shown that IC-treated FL patients who remain event-free (i.e., no disease progression or re-treatment) at 24 months after diagnosis (EFS24) have life expectancy similar to the general population, while those who fail to achieve EFS24 have poor outcomes. Understanding the underlying biology, prognostic and predictive markers, and ultimately developing new therapeutic approaches for patients with early events in FL is of high priority. In this project, we seek to generate useful clinical predictors based on clinical, tumor and host genetic biomarkers in FL patients with early events.

Based on this goal, we are evaluating germline genetic biomarkers (Aim 1), somatic tumor genomic biomarkers (Aim 2), and gene expression signatures (Aim 3) in IC-treated FL patients who fail to achieve EFS24 and using this information to develop a novel integrative model (Aim 4) that combines clinical prognostic factors with the biomarkers identified from Aims 1-3.

We are making progress on many fronts: We have assembled an outstanding team that leverages collaborations with groups from the US, Europe, the UK, and Australia resulting in the world's largest collaborative FL database. Tumor biopsies from hundreds of patients have undergone genetic analysis using the latest technology. The SPORE investigative team is actively organizing clinical and genetic data that will be vital as we gain new understandings of lymphoma biology that can lead to new and better treatments.

Cores

ADMINISTRATIVE CORE

The Administrative Core is the organizational hub of the SPORE. Drs. George Weiner and Thomas Witzig lead the Administrative Core. They are Co-Principal Investigators of the SPORE and cooperate to coordinate and provide direction for all SPORE activities. The Administrative Core supplies the organizational structure to coordinate the activities of the research projects, scientific cores and developmental programs at both institutions. The framework for collaboration, financial management, review of research projects, project growth and effective communication between Iowa and Mayo, patient advocates and the NCI is maintained through this Core. The Administrative Core also coordinates the publicity and the selection process for the Developmental Research and Career Enhancement programs. The Administrative Core has maintained its efforts throughout the COVID-19 pandemic including supporting virtual monthly meetings of SPORE researchers.

Dr. George Weiner

Dr. Thomas Witzig

BIOSPECIMENS CORE

Dr. Andrew Feldman

Dr. Anne Novak

Dr. Lisa Rimsza

The Biospecimens Core coordinates all specimen-related research for projects in the Lymphoma SPORE. Most recently, this Core has developed new innovations in Biospecimens Core sampling through gut microbiome analysis (stool microbiome) and novel techniques (CyTOF) that will enable investigators to expand lymphoma research. The SPORE is studying the stool microbiome in over 400 patients with new lymphoma. The results should be finalized by the end of 2020. We anticipate that these results will further inform our diets.

The Core offers specialized expertise in working with lymphoma biospecimens and is closely aligned with institutional research cores and shared resources. They also provide biospecimens expertise and biobank resources for innovative Developmental Research.

The Biospecimen Core is unique in that it has directors at University of Iowa, Mayo Clinic Rochester and Mayo Clinic Arizona. This leadership structure allows for the Core to share best practices between all institutions and assure uniformity in sample collection.

Name	Institution	Role
Andrew Feldman, MD	Mayo Clinic – Rochester	Core Director
Sergei Syrbu, MD	University of Iowa	Core Co-Director
Lisa Rimsza, MD	Mayo Clinic – Arizona	Core Co-Director
Anne Novak, PhD	Mayo Clinic – Rochester	Core Co-Director
Miles DelBusso	Mayo Clinic – Rochester	Lab Technician
Janice Cook-Granroth	University of Iowa	Lab Technician
Sara Borgschatz	Mayo Clinic Rochester	Lead Pathology Coordinator
Angela Merriss	University of Iowa	Lead Pathology Coordinator
Julianne Lunde	Mayo Clinic Rochester	Program Manager

BIOSTATISTICS/BIOINFORMATICS CORE

Dr. Yan Asman

Matthew Maurer

Dr. Brian Smith

The Biostatistics and Bioinformatics Core (BBC) works closely with SPORE investigators on their research. The BBC helps on the design of studies, such as determining how many patients are needed for the study and what the endpoint of the study should be. The BBC develops and maintains the infrastructure needed to capture and store the data on studies. Finally, members of the BBC analyze the study data and work with the investigators to develop reports and prepare results for abstracts and manuscripts. The BBC works with many investigators across the SPORE research group and on many types of studies and data, ranging from small projects to large genomic sequencing projects with massive datasets. To meet the needs of the SPORE, members of the BBC have a wide range of expertise, including database design, data management, and a broad skillset in analytical techniques. BBC members typically have backgrounds in statistics, mathematics, computer science, and biology; many have interdisciplinary training or experience across these varied fields.

CLINICAL RESEARCH CORE (CRC)

Dr. Thomas Haberman

Dr. Brian Link

The Clinical Research Core (CRC), co-chaired by Drs. Thomas Habermann and Brian Link, coordinates the clinical trials conducted through the SPORE. It also has the critical task of supporting the Molecular Epidemiology Research (MER) which follows patients for outcomes. There are now 7,605 patients enrolled and in follow-up in the MER. Collaborations through the CRC continue building on previous collaborations with the Dana Farber Cancer Institute and The Broad Institute. International collaborations continue with researchers in France, Sweden, and Italy.

The MER continues to define outcomes of patients with different lymphoma subtypes such as late relapses in diffuse large B-cell lymphoma and the long-term survival rates and cause of death in patients with follicular lymphoma in the immunochemotherapy era because of the opportunity to continually follow patients. The MER has contributed to other international efforts such as genome wide association studies through other study groups such as InterLymph which include institutions world-wide. A unique aspect of the MER is that patients are followed after their initial clinical evaluation and consent to provide a peripheral blood sample, to allow researchers to utilize tissue for research and provide responses to multiple questions related to their health, quality of life, risk factors, and physical activity. The combination of genetic information obtained from the blood and tissue, as well as clinical and outcomes information on a large number of patients collected over many years is extremely valuable for lymphoma research. Multiple genetic studies have helped advance the science of lymphoma in Hodgkin lymphoma, diffuse large B-cell lymphoma (DLBCL), chronic lymphocytic leukemia, and other lymphoproliferative disorders. Variations in genes in several pathways in lymphoma have been identified and are under further evaluation. The CRC's extensive patient data base has allowed for new and unique clinical observations and a number of studies not otherwise possible, which directly helps patients. The CRC continues to innovate. It has expanded the MER to six additional centers by obtaining NCI Cancer Epidemiology Cohort infrastructure funding for the Lymphoma Epidemiology of Outcomes (LEO) cohort study. The MER collaborated with the Biospecimens Core to collect and store repeat blood samples for some patients so we can evaluate changes over time. Electronic consent and electronic data collection with the participants has been incorporated. New clinical trials in relapsed lymphoma have included a high dose vitamin C trial in relapsed refractory lymphoma and a nanoparticle clinical trial.

SPORE Registry (MER) Update

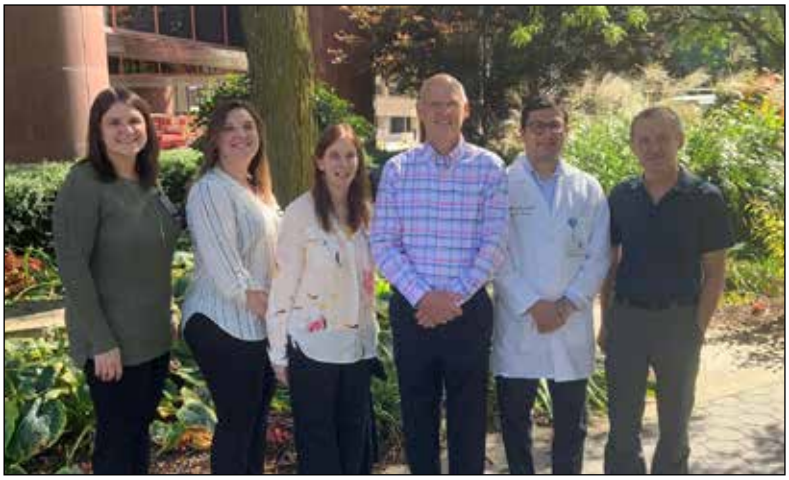
WHAT IS MER?

MER stands for Molecular Epidemiology Resource and is the registry that collects all information on participants who consent to the SPORE. Data collected in the MER is used to describe lymphomas and answer questions about outcomes and new treatments.

THE RESEARCH TEAM

The lymphoma SPORE/MER 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 University of Iowa and Mayo Clinic research teams work closely together to assure the continued success of the MER.

2020 UIHC MER/LEO MEMBERS



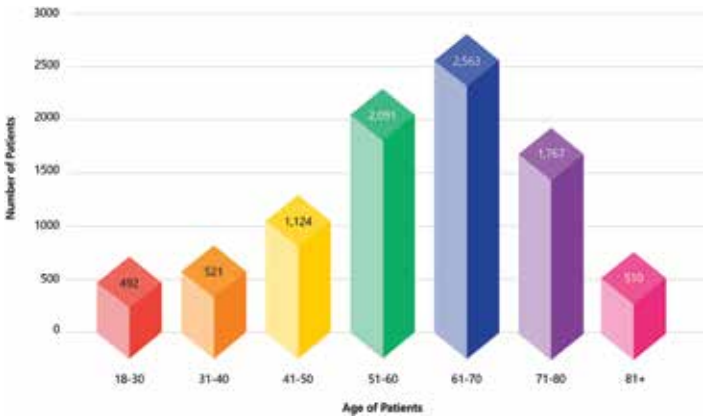
L-R: Ashley McCarthy, Angela Merriss, Janice Cook-Granroth, Dr. Brian Link, Dr. Umar Farooq, Dr. Sergei Syrbu

2020 MAYO MER/LEO MEMBERS

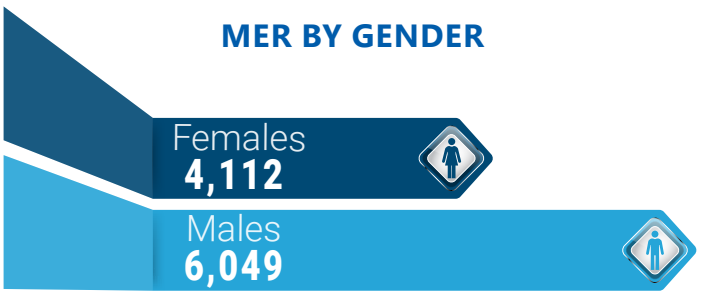
Front Row L-R: Dr. James Cerhan, Dr. Thomas Habermann, Shaun Riska, Dr. Carrie Thompson, Devin Copley
Second Row L-R: Melissa Larson, Tanner Reicks, Julianne Lunde, Sara Borgschatz, Rachel Benson, Matthew Holets
Third Row L-R: Lindsey En, McKenzie Kline, Aymen Murdos, Christina Stenzel, Emma Chadbourn

We want to express our sincere appreciation to you for participating in this study, and for being willing to share your information and samples. We realize that at the time we approach you in the clinic/hospital to participate in the study, you have many decisions to make and a lot of information coming at you. It is only through your participation and generosity that we are able to study new aspects of these diseases and publish our results, such as in the examples below. If you have questions related to this research project, please feel free to contact us at: Mayo Clinic 800-610-7093 or University of Iowa 800-237-1225.

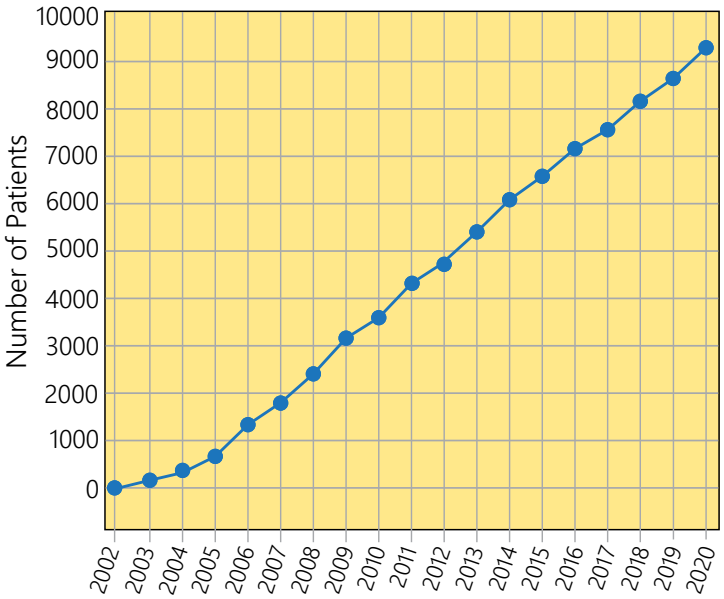
MER BY AGE



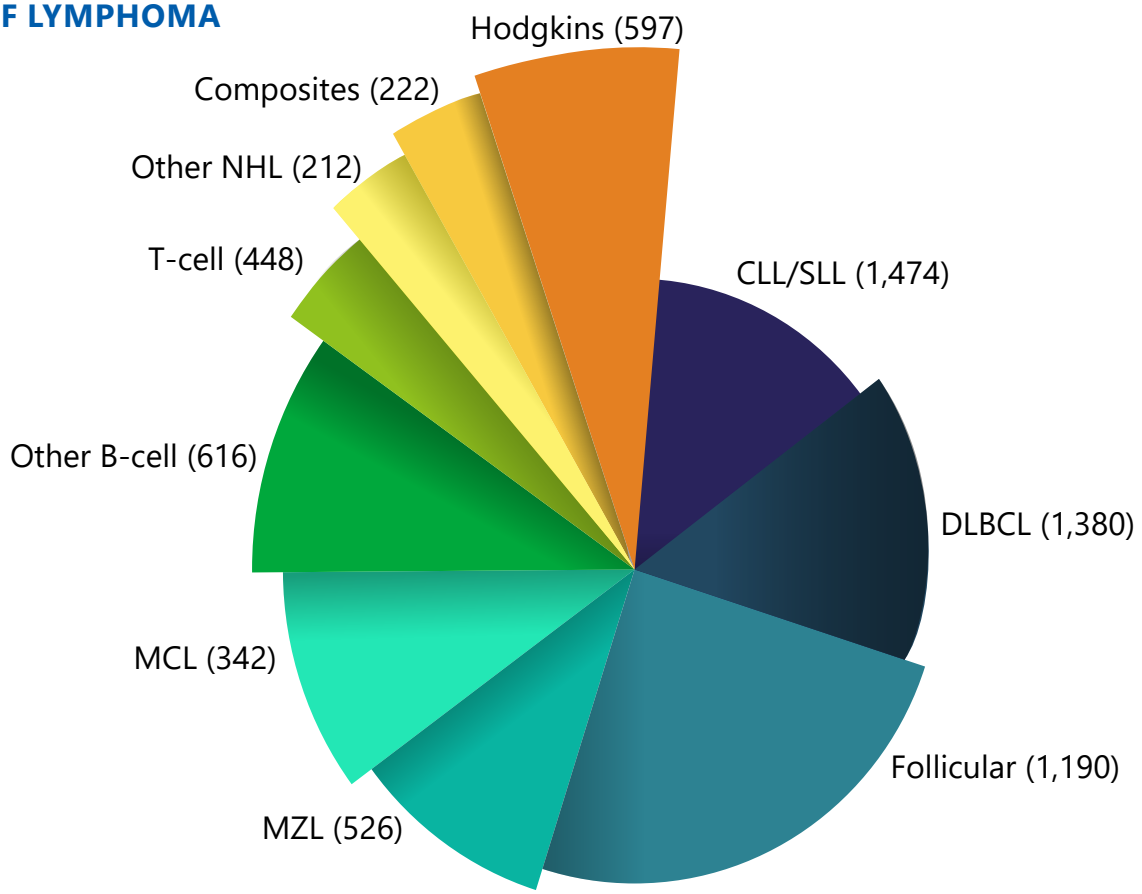
MER BY GENDER



CUMULATIVE PATIENT ENROLLMENT



TYPE OF LYMPHOMA



Recent Publications

The effect of CRM1 inhibition on human non-Hodgkin lymphoma cells
Abeykoon JP, Paludo J, Nowakowski KE, Stenson MJ, King RL, Wellik LE, Wu X, Witzig TE

Reproducing the molecular subclassification of peripheral T-cell lymphoma-NOS by immunohistochemistry
Amador C, Greiner TC, Heavican TB, Smith LM, Galvis KT, Lone W, Bouska A, D'Amore F, Pedersen MB, Pileri S, Agostinelli C, Feldman AL, Rosenwald A, Ott G, Mottok A, Savage KJ, de Leval L, Gaulard P, Lim ST, Ong CK, Ondrejka SL, Song J, Campo E, Jaffe ES, Staudt LM, Rimsza LM, Vose J, Weisenburger DD, Chan WC, Iqbal J

Blood transfusion history and risk of non-Hodgkin lymphoma: an InterLymph pooled analysis
Cerhan JR, Kane E, Vajdic CM, Linet MS, Monnereau A, Bernstein L, de Sanjose S, Chiu BC, Spinelli JJ, Maso LD, Zhang Y, Larrabee BR, Cozen W, Smith AG, Clavel J, Serraino D, Zheng T, Holly EA, Weisenberger DD, Slager SL, Bracci PM

SIRPalpha expression delineates subsets of intratumoral monocyte/macrophages with different functional and prognostic impact in follicular lymphoma
Chen YP, Kim HJ, Wu H, Price-Troska T, Villasboas JC, Jalali S, Feldman AL, Novak AJ, Yang ZZ, Ansell SM

Pretreatment Hemoglobin Adds Prognostic Information To The NCCN-IPI In Patients With Diffuse Large B-Cell Lymphoma Treated With Anthracycline-Containing Chemotherapy
Clausen MR, Maurer MJ, Ulrichsen SP, Larsen TS, Himmelstrup B, Ronnov-Jessen D, Link BK, Feldman AL, Slager SL, Nowakowski GS, Thompson CA, Pedersen PT, Madsen J, Pedersen RS, Gorlov JS, Cerhan JR, Norgaard M, D'Amore F

Association of elevated serumfree light chains with chronic lymphocytic leukemia and monoclonal B-cell lymphocytosis
Clay-Gilmour AI, Rishi AR, Goldin LR, Greenberg-Worisek AJ, Achenbach SJ, Rabe KG, Maurer MJ, Kay NE, Shanafelt TD, Call TG, Brice Weinberg J, Camp NJ, Cerhan JR, Leis J, Norman A, Murray DL, Vincent Rajkumar S, Caporaso NE, Landgren O, McMaster ML, Slager SL, Vachon CM

Genetic overlap between autoimmune diseases and non-Hodgkin lymphoma subtypes
Din L, Sheikh M, Kosaraju N, Smedby KE, Bernatsky S, Berndt SI, Skibola CF, Nieters A, Wang S, McKay JD, Cocco P, Maynadie M, Foretova L, Staines A, Mack TM, de Sanjose S, Vyse TJ, Padyukov L, Monnereau A, Arslan AA, Moore A, Brooks-Wilson AR, Novak AJ, Glimelius B, Birmann BM, Link BK, Stewart C, Vajdic CM, Haioun C, Magnani C, Conti DV, Cox DG, Casabonne D, Albanes D, Kane E, Roman E, Muzi G, Salles G, Giles GG, Adami HO, Ghesquieres H, De Vivo I, Clavel J, Cerhan JR, Spinelli JJ, Hofmann J, Vijai J, Curtin K, Costenbader KH, Onel K, Offit K, Teras LR, Morton L, Conde L, Miligi L, Melbye M, Ennas MG, Liebow M, Purdue MP, Glenn M, Southey MC, Din M, Rothman N, Camp NJ, Wong Doo N, Becker N, Pradhan N, Bracci PM, Boffetta P, Vineis P, Brennan P, Kraft P, Lan Q, Severson RK, Vermeulen RCH, Milne RL, Kaaks R, Travis RC, Weinstein SJ, Chanock SJ, Ansell SM, Slager SL, Zheng T, Zhang Y, Benavente Y, Taub Z, Madireddy L, Gourraud PA, Oksenberg JR, Cozen W, Hjalgrim H, Khankhanian P

Glycogen Synthase Kinase-3 Inhibition Sensitizes Pancreatic Cancer Cells to Chemotherapy by Abrogating the TopBP1/ATR-Mediated DNA Damage Response
Ding L, Madamsetty VS, Kiers S, Alekhina O, Ugolkov A, Dube J, Zhang Y, Zhang JS, Wang E, Dutta SK, Schmitt DM, Giles FJ, Kozikowski AP, Mazar AP, Mukhopadhyay D, Billadeau DD

Comparison of the NCCN-IPI, the IPI and PIT scores as prognostic tools in peripheral T-cell lymphomas
Ellin F, Maurer MJ, Srour L, Farooq
U, Jerkeman M, Connors JM, Smedby KE, Bennani NN, Ansell SM, Slack GW, Cerhan JR, Relander T, Feldman AL, Savage KJ

Human Pegivirus Infection and Lymphoma Risk: A Systematic Review and Meta-analysis
Fama A, Larson MC, Link BK, Habermann TM, Feldman AL, Call TG, Ansell SM, Liebow M, Xiang J, Maurer MJ, Slager SL, Nowakowski GS, Stapleton JT, Cerhan JR

Identification and Characterization of Tumor-Initiating Cells in Multiple Myeloma
Gao M, Bai H, Jethava Y, Wu Y, Zhu Y, Yang Y, Xia J, Cao H, Franqui-Machin R, Nadiminti K, Thomas GS, Salama ME, Altevogt P, Bishop G, Tomasson M, Janz S, Shi J, Chen L, Frech I, Tricot G, Zhan F.

Bone marrow findings in Erdheim-Chester disease: increased prevalence of chronic myeloid neoplasms
Goyal G, Ravindran A, Liu Y, He R, Shah MV, Bennani NN, Patnaik MM, Rech KL, Go RS

Gene Expression Profiling Reveals Aberrant T-cell Marker Expression on Tumor Cells of Waldenstrom's Macroglobulinemia
Hao M, Barlogie B, Tricot G, Liu L, Qiu L, Shaughnessy JD, Jr., Zhan F

Targetability of STAT3-JAK2 fusions: implications for T-cell lymphoproliferative disorders of the gastrointestinal tract
Hu G, Phillips JL, Dasari S, Jacobs HK, Luchtel RA, Oishi N, Hundal T, Ahmed NH, Satou A, Epstein AL, Bennani NN, Nowakowski GS, Murray JA, Feldman AL

Reverse signaling via PD-L1 supports malignant cell growth and survival in classical Hodgkin lymphoma
Jalali S, Price-Troska T, Bothun C, Villasboas J, Kim HJ, Yang ZZ, Novak AJ, Dong H, Ansell SM

Inherited variants at 3q13.33 and 3p24.1 are associated with risk of diffuse large B-cell lymphoma and implicate immune pathways
Kleinstern G, Yan H, Hildebrandt MAT, Vijai J, Berndt SI, Ghesquieres H, McKay J, Wang SS, Nieters A, Ye Y, Monnereau A, Brooks-Wilson AR, Lan Q, Melbye M, Jackson RD, Teras LR, Purdue MP, Vajdic CM, Vermeulen RCH, Giles GG, Cocco PL, Birmann BM, Kraft P, Albanes D, Zeleniuch-Jacquotte A, Crouch S, Zhang Y, Sarangi V, Asmann Y, Offit K, Salles G, Wu X, Smedby KE, Skibola CF, Slager SL, Rothman N, Chanock SJ, Cerhan JR

Antibody Opsonization of a TLR9 Agonist-Containing Virus-like Particle Enhances In Situ Immunization
Lemke-Miltner CD, Blackwell SE, Yin C, Krug AE, Morris AJ, Krieg AM, Weiner GJ

Recurrent MSC (E116K) mutations in ALK-negative anaplastic large cell lymphoma
Luchtel RA, Zimmermann MT, Hu G, Dasari S, Jiang M, Oishi N, Jacobs HK, Zeng Y, Hundal T, Rech KL, Ketterling RP, Lee JH, Eckloff BW, Yan H, Gaonkar KS, Tian S, Ye Z, Kadin ME, Sidhu J, Jiang L, Voss J, Link BK, Syrbu SI, Facchetti F, Bennani NN, Slager SL, Ordog T, Kocher JP, Cerhan JR, Ansell SM, Feldman AL

Targeting CD38 Enhances the Antileukemic Activity of Ibrutinib in Chronic Lymphocytic Leukemia
Manna A, Aulakh S, Jani P, Ahmed S, Akhtar S, Coignet M, Heckman M, Meghji Z, Bhatia K, Sharma A, Sher T, Alegria V, Malavasi F, Chini EN, Chanan-Khan A, Ailawadhi S, Paulus A

Compliance with cancer screening and influenza vaccination guidelines in non-Hodgkin lymphoma survivors
Pophali PA, Larson MC, Allmer C, Farooq U, Link BK, Maurer MJ, Cerhan JR, Thompson CA

Upregulation of TET activity with ascorbic acid induces epigenetic modulation of lymphoma cells
Shenoy N, Bhagat T, Nieves E, Stenson M, Lawson J, Choudhary GS, Habermann T, Nowakowski G, Singh R, Wu X, Verma A, Witzig TE

Ascorbic acid-induced TET activation mitigates adverse hydroxymethylcytosine loss in renal cell carcinoma
Shenoy N, Bhagat TD, Cheville J, Lohse C, Bhattacharyya S, Tischer A, Machha V, Gordon-Mitchell S, Choudhary G, Wong LF, Gross L, Ressigue E, Leibovich B, Boorjian SA, Steidl U, Wu X, Pradhan K, Gartrell B, Agarwal B, Pagliaro L, Suzuki M, Greally JM, Rakheja D, Thompson RH, Susztak K, Witzig T, Zou Y, Verma A

Determination of human gammadelta T cell-mediated cytotoxicity using a non-radioactive assay system
Tagod MSO, Mizuta S, Sakai Y, Iwasaki M, Shiraishi K, Senju H, Mukae H, Morita CT, Tanaka Y

The utility of prognostic indices, early events, and histological subtypes on predicting outcomes in non-follicular indolent B-cell lymphomas
Tracy SI, Larson MC, Feldman AL, Maurer MJ, Novak AJ, Slager SL, Villasboas JC, Allmer C, Habermann TM, Farooq U, Syrbu S, Cerhan JR, Link BK

An RNA Aptamer-Based Biomarker Platform Demonstrates High Soluble CD25 Occupancy by IL2 in the Serum of Follicular Lymphoma Patients
Veeramani S, Blackwell SE, Thiel WH, Yang ZZ, Ansell SM, Giangrande PH, Weiner GJ

Late Relapses in Patients With Diffuse Large B-Cell Lymphoma Treated With Immunochemotherapy
Wang Y, Farooq U, Link BK, Larson MC, King RL, Maurer MJ, Allmer C, Hefazi M, Thompson CA, Micallef IN, Johnston PB, Habermann TM, Witzig TE, Ansell SM, Cerhan JR, Nowakowski GS

Host genetic variation in tumor necrosis factor and nuclear factor-kappaB pathways and overall survival in mantle cell lymphoma: A discovery and replication study
Wang Y, Habermann TM, Wang SS, Maurer MJ, Sarangi V, Link BK, Feldman AL, Inwards DJ, Witzig TE, Cozen W, Rothman N, Asmann Y, Slager SL, Cerhan JR

Impact of concurrent indolent lymphoma on the clinical outcome of newly diagnosed diffuse large B-cell lymphoma
Wang Y, Link BK, Witzig TE, Maurer MJ, Allmer C, King RL, Feldman AL, Habermann TM, Ansell SM, Slager SL, Cerhan JR, Nowakowski GS

Impact of metformin use on the outcomes of newly diagnosed diffuse large B-cell lymphoma and follicular lymphoma
Wang Y, Maurer MJ, Larson MC, Allmer C, Feldman AL, Bennani NN, Thompson CA, Porrata LF, Habermann TM, Witzig TE, Ansell SM, Slager SL, Nowakowski GS, Cerhan JR

Amplification of 9p24.1 in diffuse large B-cell lymphoma identifies a unique subset of cases that resemble primary mediastinal large B-cell lymphoma
Wang Y, Wenzl K, Manske MK, Asmann YW, Sarangi V, Greipp PT, Krull JE, Hartert K, He R, Feldman AL, Maurer MJ, Slager SL, Nowakowski GS, Habermann TM, Witzig TE, Link BK, Ansell SM, Cerhan JR, Novak AJ

TRAF3 regulates the oncogenic proteins Pim2 and c-Myc to restrain survival in normal and malignant B cells
Whillock AL, Mambetsariev N, Lin WW, Stunz LL, Bishop GA

Targeting glycogen synthase kinase 3 for therapeutic benefit in lymphoma
Wu X, Stenson M, Abeykoon J, Nowakowski K, Zhang L, Lawson J, Wellik L, Li Y, Krull J, Wenzl K, Novak AJ, Ansell SM, Bishop GA, Billadeau DD, Peng KW, Giles F, Schmitt DM, Witzig TE

Coactivation of NF-kappaB and Notch signaling is sufficient to induce B-cell transformation and enables B-myeloid conversion
Xiu Y, Dong Q, Fu L, Bossler A, Tang X, Boyce B, Borcherding N, Leidinger M, Sardina JL, Xue HH, Li Q, Feldman A, Aifantis I, Boccalatte F, Wang L, Jin M, Khoury J, Wang W, Hu S, Yuan Y, Wang E, Yuan J, Janz S, Colgan J, Habelhah H, Waldschmidt T, Muschen M, Bagg A, Darbro B, Zhao C

CONTACT US

MAYO CLINIC 800-610-7093

UNIVERSITY OF IOWA 800-237-1225