IWMF-LLS ENHANCED RESEARCH ROADMAP INITIATIVE

2023 Request for Proposals

The International Waldenstrom's Macroglobulinemia Foundation (IWMF) is proud to announce new and larger funding for a grant proposal that requires more effort, time, or resources than the previous two (2)-year IWMF-LLS Strategic Research Roadmap Initiative grants. This proposal will be funded at an aggregate of up to $1.5 million (including indirect costs) and can be up to four (4) years duration.

Proposals can address any of the five key domains of the IWMF-LLS Strategic Research Roadmap Initiative (see below):

- Genomics and Epigenomics:

Mutations in signaling pathways that drive cancer provide an opportunity to develop targeted therapies to treat Waldenstrom's macroglobulinemia. Whole genome sequencing has revealed mutations in MYD88 and CXCR4 in 95-97% and 30-40% of WM patients, respectively. Other mutations, including those in ARID1A, CD79, and TP53 as well as copy number alterations such

as 6q deletions, have been found that impact genes that modulate NFKB, BCL2, Bruton tyrosine kinase (BTK), and apoptosis. Among MYD88 wild-type patients, recurring mutations in TBLXR1, canonical and non-canonical NFKB pathway genes, and genes involved in DNA repair have been identified. The discovery of mutations in MYD88 and CXCR4 enabled the development of targeted inhibitors for WM, including BTK inhibitors and CXCR4 antagonists. While long-term disease control has been achieved in MYD88 mutated patients, complete responses are lacking, and patients with CXCR4 mutations, particularly nonsense variants, show fewer deep responses and earlier progression.

WM is an ideal disease model for a multi-omic approach given highly recurring somatic activating mutations in MYD88 and CXCR4. Moreover, MYD88 and CXCR4 activating mutations are clinically relevant as they associate with important disease-presenting features and have prognostic and/or predictive treatment roles. Recent evidence supports that transcriptional regulation of WM is impacted by the epigenome. The methylome stratified WM patients into two camps: one with similar profiling to healthy donor memory B cells and the other with profiling similar to healthy donor plasma cells. Those WM patients with MBC-like profiling showed DNA methylation changes that targeted functional domains related to transcriptional activation, while among those with PC-like profiling, broader losses in methylation that impacted repressed, heterochromatic, as well as intergenic regions were observed.

While the above studies have provided critical insights into WM, the pathophysiological, diagnostic, and clinical implications for these as well as other genomic, transcriptomic-including splicing variations, and epigenomic alterations associated with WM remain to be more clearly defined. Such revelations may further advance targeted treatments for WM patients, provide personalized approaches for treatment, and enable improved diagnostic, prognostic, and treatment predictive tools for WM.

- Signaling:

Much of the knowledge for the signaling apparatus of MYD88 has been generated for mutated MYD88. Key discoveries have included the importance of BTK, IRAK1/IRAK4, HCK, and SYK as critical downstream mediators of mutated MYD88 signaling. Other nodal components critical to mutated MYD88 signaling remain to be clarified. Knowledge of mutated Myddosome assembly and identification of other signaling components of mutated MYD88 signaling beyond BTK and IRAK, including scaffold and kinase components, are needed for advancing medicinal chemistry campaigns. The creation of 3D-crystal structures of the mutated Myddosome, MYD88/IRAK complex, and MYD88/BTK complex may provide critical information for medicinal chemistry campaigns aimed at disrupting Myddosome assembly and signaling.

The functional consequences of CXCR4 mutations are not well understood. While MYD88 mutations are found in other B cell cancers, CXCR4 mutations are relatively unique to WM. Both AKT and ERK are hyperactivated in response to the CXCR4 ligand CXCL12. CXCR4 mutations, including nonsense and frameshift, have been found to affect response rates and progression-free survival in Waldenstrom's patients treated with current BTK inhibitors. Differences in the impact of nonsense versus frameshift CXCR4 mutations, association with homozygous versus heterozygous mutated MYD88, and clonality of CXCR4 mutations have been recognized with BTK inhibitors, though the underlying pathophysiology for these observations remains to be clarified. Detailed signaling studies aimed at clarifying mutated CXCR4 dysregulated signaling, including G-protein receptor transactivation, beta-arrestin and GRK recruitment, and impact on downstream growth and survival signaling may help advance our understanding of the relevant biology and therapeutic exploitation in WM. Studies leading to the development and study of CXCR4 inhibitors, as well as novel and improved means for routine detection of CXCR4 mutations, are needed to enable targeted approaches for WM.

While BTK inhibitors are highly active in WM patients, disease progression can occur due to acquired mutations in BTK, the target of ibrutinib, and other covalent BTK inhibitors. Mutations in BTKCys481 lead to activation of ERK, enabling release of IL-6, IL-10, and other cytokines that can propagate bystander tumor resistance. However, not all resistant patients harbor mutations in BTK. Further understanding of the mechanisms that enable resistance against BTK inhibitors may enable novel treatment approaches for the prevention and treatment of resistance to BTK inhibitors.

- Immunology/Immunotherapy:

There is little published data on the anti-tumor immune response or lack thereof in WM and on the potential impact of current therapeutics, including BTK inhibitors, on the immune response. Such studies may lead to new clinical approaches to enhancing anti-tumor responses in WM. Studies characterizing the immune microenvironment in WM and an improved understanding of the immune cell repertoire are needed. Specific knowledge gaps include understanding T-effector cell exhaustion, determining the effect of immune checkpoint inhibitors, and defining the role of other immune cells, including NK cells and mast cells. Studies which may identify high-risk WM patients who would most benefit from immune therapies, such as CAR T cell therapy or immune checkpoint therapy, are needed. Discovery of neoantigens for development of novel immunotherapies are also needed.

- Bone Marrow/Tumor Microenvironment:

The role of the bone marrow and tumor microenvironment in supporting malignant cell growth

and promoting resistance to therapy in WM requires additional focused research. Studies are required to better characterize the components of the bone marrow/tumor microenvironment in WM, including mast cell and macrophage/monocyte interactions. A better understanding of the contribution of the microenvironment to disease progression (such as progression from IgM MGUS to WM) and resistance to treatment remains an important goal, as does an evaluation of the nature of the crosstalk between WM tumor cells and the associated microenvironment, including the effects of the stroma on immune cells. The development of a better model system of the bone marrow microenvironment to understand interactions between WM cells and the microenvironment is also needed.

- IgM Monoclonal Gammopathy of Undetermined Significance (MGUS):

IgM MGUS involves a clone of lymphoplasmacytic B cells that produces an overabundance of IgM and is usually found in the bone marrow. Normally benign, the clone can evolve into Waldenstrom's macroglobulinemia at the rate of two percent (2%) per year. While many patients with IgM MGUS harbor MYD88 mutations, the presence of mutated MYD88 alone is unlikely to explain progression, given findings from transgenic animal models. An understanding of changes in the genome, transcriptome, and epigenome that accompany IgM MGUS progression to WM may identify patients at risk of progression and interventions that may prevent or suppress progression.

The International Waldenstrom's Macroglobulinemia Foundation (IWMF)

The IWMF is a patient-founded and volunteer-driven, nonprofit organization that is dedicated to a simple but compelling vision: A world without Waldenstrom's macroglobulinemia (WM). Our mission is to support and educate everyone affected by Waldenstrom's macroglobulinemia (WM) to improve patient outcomes while advancing the search for a cure.

The IWMF currently has a worldwide membership, with Support Groups and affiliate organizations on virtually every continent.

To accomplish this vision and mission, the IWMF offers patients with WM, caregivers, family members, and friends six invaluable services:

- **Information** from our website and our publications written in a patient-friendly way to promote understanding of our rare disease.
- **Education** at our annual Educational Forum and periodic webinars to help patients and caregivers learn about our disease from WM researchers and clinicians.

- **On-going updates** about WM and the IWMF sent through our **quarterly *IWMF Torch*** magazine and our **NEWS releases.**
- Peer **support** from others who've been where you are.
- **Information** for medical professionals who may have limited experience with our rare disease.
- **Research** directed to better treatments while we search for a cure.

The IWMF has invested $23 Million dollars on WM basic science research since 1999. Additionally, we currently have 24 active projects that will receive $4.6 Million dollars between now and their completion.

For more information, visit the IWMF website at http://www.iwmf.com

The Leukemia & Lymphoma Society (LLS)

LLS is a US-based foundation focused on developing, and providing access to, therapies to cure or control leukemia, lymphoma, Hodgkin's disease, and myeloma as well as improve the quality of life of patients and their families. The organization has funded blood cancer research for the past 60 years to strive toward these goals.

For more information, visit the LLS website at http://www.lls.org

IWMF Research and the Strategic Enhanced Research Roadmap

The IWMF supports research to understand the biology of WM, with the goals of improving quality of life for WM patients, discovering new treatments, and ultimately, finding a cure.

IWMF funding for research has helped to provide insight into understanding the basic biology and genetics of WM. This research in turn has played a significant role in the development of treatments and treatment guidelines in current use, as well as potential new drugs still in the pipeline.

On May 16-17, 2015, distinguished WM researchers and officers from the IWMF and the LLS met for a Strategic Research Roadmap Summit in New York City to determine the next phase of research priorities focused on improving our understanding of WM. Based on discussions during the meeting, the Scientific Co-Chairs, Dr. Stephen Ansell of Mayo Clinic in Rochester and Dr. Steven Treon of Dana-Farber Cancer Institute, defined in more detail the priority areas where additional research is needed to advance our knowledge of WM. Subsequently four Summits have reaffirmed and added to these priorities, and additional Summits are planned annually to assess the progress of the Roadmap Initiative.

Under the Enhanced Roadmap Initiative, the IWMF will award Roadmap grants for one (1) new research project each year, depending on funding availability. Each project shall be two (2) to four (4) years in length, at an award of up to $1,500,000 per year. This includes $1,250,000 for the project and $250,000 for indirect costs.

How to Apply for a Research Grant

The grant application process for the Strategic Research Roadmap Initiative will follow standards that already exist for previous IWMF-funded research grants, as well as NIH review guidelines:

Submissions: An application for a research project can be submitted within the Enhanced Strategic Research Roadmap Initiative via email (timelines and addresses listed below). The project description, significance, Aims, six-month timelines and scientific approach should not exceed 12 pages in length and follow the guidelines noted below and also located on the IWMF website at www.iwmf.com/research/applying-research-grant. Additional pages should include references, biographical sketches, detailed budget with justification, list of other projects, and appendices as necessary. Following a review process that may take up to four to six months, awards will be made to successful applicants.

Who Can Apply: Applicants must hold an MD, PhD, or equivalent degree and work in domestic or foreign non-profit organizations, such as universities, colleges, hospitals, or laboratories. Applicants should have an independent research or academic position. Applicants need not be US citizens, and there are no restrictions on applicant age, race, gender, or creed. Applications from non-academic facilities, postdoctoral positions, and the National Institutes of Health are not eligible.

Multi-institutional Collaborations: Multi-institutional or multi-disciplinary applications are encouraged. This can be in the form of a single application with Co-Principal Investigators or collaborators from different institutions or different sections within one institution. In these types of collaborations, the project contract will go to only one Principal Investigator and their facility. That Principal Investigator be in charge of obtaining letters of collaboration, sending intermittent reports, receiving IWMF payments and disbursing it to collaborators, and other contract needs.

Alternatively, two (or more) institutions can submit separate stand-alone applications and indicate that the applications are linked, in the event that they are both selected for funding.

Review Process: Research proposals are reviewed by an independent committee composed of selected members of the IWMF Research Committee, the IWMF Scientific Advisory Committee

(SAC), and other experts in the field. This committee may in turn respond to the research proposal applicant(s) with questions and/or request clarification regarding certain aspects of the proposal itself. The proposals are ranked according to NIH review criteria. The final decision for funding is made by the IWMF Board of Trustees. Generally speaking, at this stage a decision to fund a proposal is based on funding availability. Applicants will be notified by the IWMF as soon as a decision is made.

Payment Policy: The IWMF Treasurer will pay a pro rata amount for six months at the start of the project. Future payments will be made at designated six-month intervals after each Interim or Final Progress Report and accompanying Lay Summary has been received, and the IWMF Research Committee has reviewed it for satisfactorily meeting the IWMF reporting guidelines (see below). Payments will be made after all guidelines have been met.

Reporting Requirements: Progress Reports are required to be submitted to the IWMF by the Principal Investigator every six (6) months for the duration of the project. Interim Progress Reports must be submitted no later than 30 days after the six-month period ends. Such Progress Reports will describe the activities and results with respect to each specific Aim that has occurred during the preceding six-month period. Each Progress Report will include a proposed path forward over the next six-month period. Project Aims should not be changed during the research process without prior notification, justification, and agreement of the IWMF Research Committee. The Principal Investigator must show in the reports that he or she is performing the obligations stated in the submitted and approved research proposal for each reporting period. Deviations from the six-month timelines need to be explained to ensure that the project is on track. A webinar is required yearly where the researcher will give a scientific presentation with slides to the IWMF Research Committee and selected members of our Scientific Advisory Committee (SAC), then there will be a live Q & A. The webinar will be 4-6 weeks after the due date of the yearly progress reports. A Final Progress Report which describes the results and findings as they relate to the stated goals of the project for the full term of the project is required no later than 45 days after the project ending date. There will be a last webinar at this time. The Principal Investigator should expect on occasion to receive requests for clarification of Progress Reports. A Lay Summary must accompany each Interim Progress Report and the Final Progress Report. The reports must be submitted in Microsoft Word or PDF file format. A final detailed expenditure report must also be sent no later than 90 days after the project ending date.

Budget

The total grant will be up to $1.5 million in aggregate. The maximum total direct costs may be up to $1.25 million, and indirect costs may be up to $250,000. The granting period must be specified by the Principal Investigator, and, at the Investigator's discretion, can be two (2) to

four (4) years. This gives the Investigator the flexibility to apply for a shorter grant (e.g., two years) to test a hypothesis, with funding of $625,000/year (direct costs), or a longer-term project (e.g., four years), with funding of $312,500/year (direct costs).

A detailed budget and budget justification should provide itemized detail for each major category for all the years of the program. This budget can be summarized for year one and extrapolated for the remaining years. All totals and subtotals should be included.

Permissible direct costs include the following with the specified limitations:

- Personnel expenses including salary, wage, or stipend with fringe benefits.
- In total, no more than forty percent (40%) of the direct costs may be requested for the salary and fringe benefit expenses of professional staff with a post-graduate degree (i.e., MD, PhD, DVM) regardless of function or role. This restriction does not apply to technical staff (lab assistants, nurses, etc.).
- Supplies and materials requests should be itemized by category.
- Equipment purchase requests must identify each item of equipment with an acquisition cost of more than $500.

Permissible indirect costs (often referred to as institutional overhead, IDC, M&A, G&A, or pooled costs) are those costs incurred for common or joint objectives that cannot be readily identified with a particular project (general maintenance, utilities, library, etc.). Indirect costs are limited to twenty percent (20%) above the total direct costs. For sponsoring institutions that do not need to use all of these funds for indirect costs, the funds can be applied to the Grantee's/Principal Investigator's stipend, fringe benefits cost, or to only request their true indirect costs.

Impermissible costs include membership dues, tuition, books, journals, and publication costs.

Review Criteria

An application will be judged on these criteria:

- As an Enhanced Roadmap proposal, the application must clearly demonstrate that the project exceeds the scope of the traditional Roadmap grants, including greater scientific impact and greater resources required to carry out the research.
- The probability of an advance in prevention, diagnosis, or treatment in the near-term.
- The conceptual basis upon which the proposal rests.

- The novelty of the concept and strategy.
- Preliminary data to indicate the likelihood of project success
- Thoughtful and clear presentation.
- The overall plan for bringing the research findings to clinical application.
- Experience, background, and qualifications of investigator(s).
- Adequacy of resources and environment (facilities, data management, data analysis, etc.).
- Access to sufficient patient samples (if appropriate to the project), either from the investigator's own institution or from documented collaborations must be adequate. If an investigator does not have access to sufficient samples, the IWMF encourages the investigator to collaborate with another researcher or bone marrows banks who will share samples with them pre-proposal. You may contact the IWMF before submitting the proposal to discuss ways to obtain samples. Failure to have adequate samples and therefore lack of scientific levels may result in a cancellation of the project.

Timeline

Email Call for Proposals	August 16, 2023
Application Deadline	March 29, 2024, 5:00 PM US ET (**No exceptions**)
Review of Submitted Applications Completed	Late May 2024
Notification of Awards	Late June 2024
Anticipated Funding Start Date	Fall 2024

Submit All Correspondence to

All proposals and other correspondence regarding the Roadmap should be sent to the following two individuals:

- Dr. Tom Hoffmann, IWMF Research Committee, thoffmann@iwmf.com
- Robin Tucker, IWMF Finance Manager, rtucker@iwmf.com

The IWMF Office will acknowledge receipt of each proposal within one business day via email. If you do not receive such an acknowledgment, please contact Robin Tucker, IWMF Finance Manager, at rtucker@iwmf.com or call the IWMF Office at 941-927-4963. (updated 12/23)