Background

In 2016 the IDF Board of Trustees decided to allocate a portion of the funds raised from the successful IDF Walks Program to an IDF Research Grant Program designed to encourage and support patient-oriented research on primary immunodeficiency diseases (PI). The idea is to award seed grants that will support well-defined research projects that have a specific benefit for improving the treatment, health, disease management or diagnosis of persons with PI. The program is open to applicants based in the U.S. and consists of one-year grants. Award values are from $25,000 - $50,000, and a somewhat higher level of support is available for exceptional proposals.

IDF Research Committee

The program is competitive with a formal committee to read and score grants. The committee is composed of clinicians, community member representatives and IDF staff. The committee considers each application individually and scores each individually on the following metrics:

- Significance
- Approach
- Qualifications
- Facilities

Those applications that scored the highest received detailed discussion among the committee members for consideration for funding. IDF was fortunate in that we received many high quality grant proposals. Unfortunately, IDF was not able to fund all applications.

Committee Members

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<tr>
<th>Clinicians</th>
<th>Community Representatives</th>
<th>IDF Staff</th>
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<tr>
<td>Mike Blaise, MD</td>
<td>Richard Low</td>
<td>Katey Antilla</td>
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<td>Mark Ballow, MD</td>
<td>Felicia Morton</td>
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<td>Brian Rath</td>
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<td>Elena Perez, MD PhD</td>
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Deliverables

Each grantee is required to submit to IDF an interim progress report covering the first 6 months of the grant. At the end of the grant period, the grantee must submit to IDF a final report and scientific summary of accomplishments. Ultimately, grantees are required to produce a final work product that may be one of the following:

- A manuscript for publication in a peer reviewed journal
- A book chapter
- A new molecular basis for X-linked immunodeficiency with Magnesium deficiency
- Epstein-Barr virus (EBV) infection and neoplasia (XENM) disease, which is caused by genetic mutations in the gene encoding magnesium transporter 1 (MAGT1)
- A study that examines the role of MAGT1 and magnesium as a regulator of the innate immune response to bacteria, viruses and tumor cells
- A new insight into the pathobiological basis of XMN immunodeficiency could be therapeutically beneficial for the treatment of XMN disease, as XMN patients may benefit from anti-bacterial, anti-viral or interferon-based therapies to treat their early immune deficiency
- A new pathobiological basis for the treatment of XMN primary immunodeficiency
- A study that examines the role of MAGT1 and magnesium as a regulator of the innate immune response to bacteria, viruses and tumor cells
- A new insight into the pathobiological basis of XMN immunodeficiency could be therapeutically beneficial for the treatment of XMN disease, as XMN patients may benefit from anti-bacterial, anti-viral or interferon-based therapies to treat their early immune deficiency
- Common variable immune deficiency is the most common, treatable primary immune deficiency. Treatment is usually focused on replacement of dysfunctional immunoglobulin, although an increasing number of cases with common variable immunodeficiency exhibit autoimmune disease or hypersensitivity disease and this further dictates therapy with an emphasis on immune suppression or anti-inflammatory treatment.

By the past 10 years, it has been revealed that 10-20% of patients with common variable immune deficiency have single gene defects that contribute to the evolution of their disease. The disease is called IKAROS deficiency and is one of the most recently described single gene defects. The goal of this proposal is to understand how IKAROS deficiency impacts the patients’ DNA and to pilot treatments that would uniquely be able to treat IKAROS deficiency.

The Immune Deficiency Foundation 2017 Research Grant Program

The program is a competitive process with a formal committee to read and score grants. The committee is composed of clinicians, community member representatives and IDF staff. The committee considers each application individually and scores each individually on the following metrics:

- Significance
- Approach
- Qualifications
- Facilities

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Grants Awarded

Identification of T-cell receptor clonotypes important in the pathogenesis of CVID

Sara Barrettille, MD
Atlantic Immunology Fellow
Department of Allergy and Immunology
Massachusetts General Hospital

We are interested in looking at the T-cells in patients with CVID to try to determine if there are differences between the T-cells of CVID patients compared to healthy controls. We also want to investigate if there are specific T-cells that are causing disease in these patients. Some patients with CVID have gastrointestinal complications, including problems with absorbing nutrients, diarrhea, and weight loss. We will evaluate patients who have gastrointestinal complications with CVID (called CVID associated enteropathy) to see if we can isolate these T-cells to better understand why this disease occurs. We will also compare the T-cells in the gastrointestinal (GI) system to the T-cells in the blood. We will also be evaluating the T-cells in patients with the GI complications in CVID to those without GI complications. Our hope is that if we could identify specific T-cells that are causing this disease then we could potentially target these T-cells to protect patients. We would try to prevent the disease from occurring or getting worse if we can identify them early on in the course of the disease.

Prevalence of Fatigue in Common Variable Immunodeficiency

Joud Hajjar, MD
Assistant Professor
Pediatrics and Allergy
Baylor College of Medicine

This research project was born in our clinic, where our patients with CVID often reported having fatigue. Fatigue is not often directly treated by providers. We believe that understanding fatigue in CVID is important because researchers have shown that patients who have fatigue report lower quality of life compared to patients who do not have fatigue. This is especially relevant to patients with CVID, in which studies have shown that having a poor quality of life predicted shorter life span compared to patients who reported a good quality of life. Persons with CVID have more fatigue compared to the general population and that some of the complications that result from having CVID such as lung or gastrointestinal damage were associated with having fatigue. Our goal is to determine the prevalence of fatigue in CVID, who is at risk to develop fatigue, and what are the effects of immunoglobulin therapy on fatigue. The results from this proposed research project have the potential to significantly alter how doctors evaluate fatigue in subjects with CVID, and how they prescribe immunoglobulin therapy in a way that notably decreases fatigue, improves the quality of life and potentially survival in the CVID population. Importantly, identifying the risk factors to develop fatigue will allow health care providers to recommend specific therapies to treat it.

Characterizing T-cell lymphopenic infants identified on routine newborn screening

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Assistant Professor
Pediatrics and Medicine
Allergy & Immunology
Feinberg Institute for Medical Research

Severe combined immunodeficiency (SCID), a life threatening but curable PI, belongs to a category of conditions where early detection and treatment can significantly improve morbidity and mortality.

SCID patients have decreased number and function of T cells, which play a crucial role in the immune system, such as fighting viruses and fungi. All but three states in the US screen or plan to screen for SCID. All these programs rely on quantifying T cell receptor excision circles (TRECs), circular pieces of DNA that are produced during normal T cell development and maturation. Individuals with absence the T cell development resulting in low T cell numbers, will have low TREC counts. These programs identify infants with SCID. SCID Pi that generally affect T cells, such as DiGeorge Syndrome. They also detect infants with low T cell counts (known as T cell lymphopenia (TCL) for whom the underlying cause is unknown and evidence-based management guidelines are lacking.

A better understanding of TCL is desirable because it will improve our knowledge and facilitate the development of evidence-based guidelines for diagnosis and management of this condition. Thus, these studies can guide the development of best practices to maximize patient outcomes in a cost-effective manner.

Selecting IgA deficiency patients suffer from increased incidences of respiratory diseases and are at greater risk of anaphylactic shock during blood transfusions. Our data shows that expression of a noncoding RNA, miR-6891-5p is elevated in selective IgA deficiency patient cells. Suppression of miR-6891-5p increased IgA secretion. We propose to confirm these observations in primary B-cells obtained from blood of selective IgA deficiency patients. We will decrease the expression of miR-6891-5p in patient cells and determine whether IgA secretion can be restored. Many therapies targeting microRNAs are already in clinical trials. This research may uncover microRNAs that are involved in the pathogenesis of anaphylactic shock in blood transfusions. Our data shows that expression of a noncoding RNA, miR-6891-5p is elevated in selective IgA deficiency patient cells. Suppression of miR-6891-5p increased IgA secretion. We propose to confirm these observations in primary B-cells obtained from blood of selective IgA deficiency patients. We will decrease the expression of miR-6891-5p in patient cells and determine whether IgA secretion can be restored. Many therapies targeting microRNAs are already in clinical trials.