ANNUAL REPORT

2022 - 2023

Our Mission

To provide initial research funding to brilliant, investigative scientists with new ideas to cure arthritis and related autoimmune diseases.

Table of Contents

- Message from the CEO 4
- The ANRF Effect 5
- Our Leadership 6
- 2022-2023 Scholar Cohort 8
- Financial Report 12
- Symposium 13
- Supporter Spotlights 14
- News to Note 16
- Message from the Board Chair 19

Celebrating 50 Years of Impact

As we reflect on the last year at the Arthritis National Research Foundation (ANRF), I am thrilled to share with you some exciting developments ahead, and milestones that define our commitment to progress, inclusivity, and innovation.

In 2023, ANRF awarded over $2.1 million in grants to an exceptional cohort of researchers dedicated to unraveling the complexities of arthritis and related autoimmune diseases. These grants signify our unwavering commitment to supporting groundbreaking discoveries that pave the way for better patient outcomes. This financial commitment is a testament to the potential impact of the work being undertaken by our dedicated grantees.

This year, we celebrate 50 years of grantmaking, and take pride in our rich history of supporting early-career researchers who have become trailblazers in the field. Over the years, ANRF has awarded grants to over 240 scholars, investing more than $27 million. Our legacy includes transformative contributions to the understanding and treatment of these diseases, from the earliest stages of diagnosis to groundbreaking discoveries.

In the last six months, as part of our five-year strategic plan, ANRF has taken decisive steps to fortify our commitment to Diversity, Equity, and Inclusion (DEI). Recognizing the importance of best-in-class practices, we engaged a DEI consultant to guide us in integrating these principles across our organization. We have prioritized DEI in our grant application process, recruitment efforts, and communication strategies. Through comprehensive training for both staff and board members, a thorough review of our grant process, and a strategic reorientation of our communication approach, we are proud to say that DEI is now at the heart of everything we do.

This remarkable journey would not be possible without the steadfast support of our incredible community. To our individual supporters, foundations, and partners, I extend my deepest gratitude. Your unwavering commitment fuels our mission and inspires us to reach greater heights. Without you, we could not do this critical work, and we are profoundly grateful for your continued support.

As we look forward, I am confident that together, we will continue to make strides toward more treatments for the patients who need them, a better understanding of these complex diseases, and a future where a cure is possible.

Thank you for your dedication,

Emily Boyd Stormoen

Emily Boyd Stormoen
CEO

The ANRF Effect

91% Of ANRF Scholars continue to work in research

98% Stay in science or medicine,

$27,400,000+

Awarded in grant funding.

ANRF empowers early-career researchers to conduct in-depth studies that may lead to innovative breakthroughs and improved treatments for arthritis-related conditions. ANRF provides substantial support for emerging scientists and enables them to contribute to research advancements throughout their careers, making a lasting impact.

In addition to sustained careers in the field, ANRF grant recipients have excelled in leveraging their awards. For each dollar awarded by ANRF, researchers have secured over $20 in government grant funding. This multiplier effect amplifies the effect of ANRF grants.

105 Institutions Supported

360+
Grants Awarded

Citations of papers produced from ANRF-funded research

36,000+

Our Leadership

ANRF is led by a visionary and diverse team of professionals providing their guidance and years of expertise. The Board of Directors provides leadership supervision and oversight to the organization, ensuring financial accountability, policy compliance and assurance strategy are set, and goals are met.

The Scientific Advisory Board is comprised of experienced and respected researchers in the field of arthritis and autoimmune disease. Each year, these leaders of our industry sit down together to comb through every grant application. It requires hours and hours of careful study and intense discussion to move the most promising ideas forward.

Board of Directors

- Chair - Richard Salter, Jr.
- Vice Chair - Kelli Matthews
- Secretary - Theresa Hansen
- Treasurer - Vespaan Vafadari
- Directors
    - Jeffrey Bates, J.D.
    - Angela Boyd
    - Douglas A. Granger, Ph.D.
    - Jean Liew, M.D., M.S.
    - Rich Narido
    - Brian Souza
    - Staci Stringer
    - Craig Walsh, Ph.D.

Scientific Advisory Board

- Chair - Craig Walsh, Ph.D.
- Members
  - Iannis Adamopoulos, D.Phil.
  - Robert A. Colbert, M.D., Ph.D.
  - Mary K. Crow, M.D.
  - Betty Diamond, M.D.
  - Steve Granger, Ph.D.
  - Bevra Hahn, M.D.
  - Hal Hoffman, M.D.
  - J. Michelle Kahlenberg, M.D., Ph.D.
  - Martin K. Lotz, M.D.
  - Anne-Marie Malfait, M.D., Ph.D.
  - Elizabeth Mellins, M.D.
  - Peter Nigrovic, M.D.
  - Christopher T. Ritchlin, M.D., M.P.H.
  - Paul J. Utz, M.D.
  - Carl F. Ware, Ph.D.

2022 - 2023 Scholar Cohort

During the grant review process, ANRF receives proposals from early-career researchers looking to make groundbreaking discoveries in arthritis and autoimmune diseases. After careful consideration, the Scientific Advisory Board selects the most promising projects and recommends them to the Board of Directors to be awarded a grant.

The ANRF grant program is designed to support early career researchers in their pursuit of groundbreaking discoveries, and we are proud to say that 91% of researchers awarded ANRF grants continue to work in the field, making a lasting impact.

In 2022, ANRF affirmed it's commitment to growth by offering the eight first-year grantees $100,000 and for the first time, second year grantees were awarded an increased amount of $125,000 each.

In addition, the organization announced that starting in 2023, grants would be awarded for two years and a total of $250,000.

Ramadan Ali,

University of Michigan

Research: Scleroderma
"The Role of Neutrophils and NETs in the Pathogenesis of Scleroderma"

Shabana Amanda Ali, Ph.D.

Henry Ford Health System

Research: Osteoarthritis
"Elucidating the Role of miR-126-3p in Osteoarthritis"

Sanja Arandjelovic, Ph.D.

Gale "Morrie" Granger Fellow

University of Virginia

Research: Arthritis
"Removal of Apoptotic Cells in Inflammatory Arthritis"

Jonathan Brunger, Ph.D.

Judy E. Green Valiant Women Fellow

Vanderbilt University

Research: Arthritis
"Synthetically regulated cell-based therapeutics for targeted articular cartilage regenerative medicine"

Susan Canny, M.D., Ph.D.

Kelly Rouba-Boyd Fellow

University of Washington

Research: Arthritis
"The Role of Cytokines in Monocytes During Macrophage Activation Syndrome"

Isidoro Cobo, Ph.D.

University of California, San Diego

Research: Gout
"Epigenetic Mechanisms of Macrophages during Gouty Inflammation"

Roxane Darbousset, Ph.D.

Boston Children's Hospital

Research: Scleroderma
"Platelets as neutrophil amplifiers in systemic sclerosis"

Heather Faust, Ph.D.

Brigham and Women's Hospital

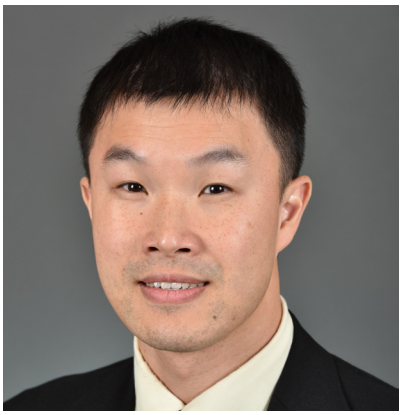
Research: Rheumatoid Arthritis
"Adipose Tissue as a Memory T Cell Storage Site in Inflammatory Arthritis"

Maria Gutierrez-Arcelus, Ph.D.

Vic Braden Family Fellow

Boston Children's Hospital

Research: Lupus
"Splicing Disruption in Systemic Lupus Erythematosus"



Pui Y. Lee, M.D., Ph.D.

Boston Children's Hospital

Research: Juvenile Idiopathic Arthritis
"mTORC1 in the pathogenesis of systemic juvenile idiopathic arthritis"

Ruth Napier, Ph.D.

Oregon Health & Science University

Research: Ankylosing Spondylitis
"Understanding how the CARD9-neutrophil-Th17 axis controls ankylosing spondylitis"

Michael Paley M.D., Ph.D.

Washington University in St. Louis

Research: Spondyloarthritis
"Mechanistic Insights into Organ-Specific Manifestations of Spondyloarthritis"

Anna Patrick, M.D., Ph.D.

Carl F. Ware, Ph.D. Fellow

Vanderbilt University Medical Center

Research: Juvenile Idiopathic Arthritis
"Mechanisms of Th1.17 Cell Development in Polyarticular Juvenile Idiopathic Arthritis"

Bahram Razani, M.D., Ph.D.

Janssen Immunology Psoriatic Arthritis Fellow

University of California, San Francisco

Research: Psoriatic Arthritis
"Role of A20 in Restricting Psoriatic Skin and Joint Disease"

Nisarg J. Shah, Ph.D.

The Sontag Foundation Fellow

University of California, San Diego

Research: Rheumatoid Arthritis
"Microparticle-assisted modulation of regulatory T cells in rheumatoid arthritis"

Anil Kumar Singh, Ph.D.

Washington State University

Research: Rheumatoid Arthritis
"Molecular reprogramming of Rheumatoid arthritis synovial fibroblasts by interleukin 6"

Theresa Wampler Muskardin, M.D.

Kathryn Suzanne Ferris Fellow

Hospital for Special Surgery

Research: Rheumatoid Arthritis
"Type I Interferon Pathway Activity Informs TNF-inhibitor Treatment Response in Rheumatoid Arthritis"

Shouan Zhu, Ph.D.

Ohio University

Research: Osteoarthritis
"Metabolic regulation of chondrocytes by Sirt5 and protein malonylation in osteoarthritis development"

Yu Ray Zuo, M.D.

The University of Michigan

Research: Autoimmune
"Mechanisms of infection-induced autoimmunity in COVID-19 and beyond"

Financials

	2021	2022	2023
Total Unrestricted Assets*	$9,828,563	$10,480,441	$**8,998,411**
Total Restricted Assets*	$326,104	$226,104	$ 101,154
Total Assets	$10,154,667	$10,956,545	$ 9,349,565
Total Liabilities	$78,521	$84,948	$ 256,175
NET ASSETS AT END OF YEAR	**$10,154,667**	**$10,956,545**	**$ 9,349,565**

Revenue and Expenses

PUBLIC SUPPORT AND REVENUE	2021	2022	2023
Contributions and Bequests	$1,446,537	$2,969,125	$ 2,344,273
Investment Income Net	$123,323	$114,558	$ 153,861
Unrealized Gain (loss) on Investments	$2,924,126	$454,966	($593,378)
TOTAL SUPPORT AND REVENUE	**$4,493,986**	**$3,674,799**	**$ 2,014,392**

EXPENSES	2021	2022	2023
Program Services			
Research	$1,567,125	$ 1 ,977,394	$ 2 ,642,847
Education	$254,691	$ 413,343	$ 406,209
Total Program Services	$1,821,816	$ 2 ,390,737	$ 3 ,049,056
Supporting Services			
Management and General	$273,643	$ 233,079	$ 268,149
Fund Development	$84,287	$ 249,105	$ 304,167
Total Supporting Services	$357,930	$ 482,184	$ 572,316
TOTAL EXPENSES	**$2,179,746**	**$ 2 ,872,921**	**$ 3 ,621,372**
Change in Net Assets	$2,314,240	$ 801,878	($1,606,980)
Net Assets at Beginning of Year	$7,840,427	$10,154,667	$ 1 0,956,545
NET ASSETS AT END OF YEAR	**$10,154,667**	**$10,956,545**	**$ 9,349,565**

*Beginning in 2019, new accounting regulations require reporting restricted and unrestricted assets as seen above.

2023 Annual Symposium

The Second Annual Research Scholar Symposium took place in Boston, MA on March 11, 2023.

Attendees enjoyed a full day of programming around the latest innovations and research in arthritis and autoimmune disease from onset to therapy to treatments on the horizon.

SEVEN SESSIONS

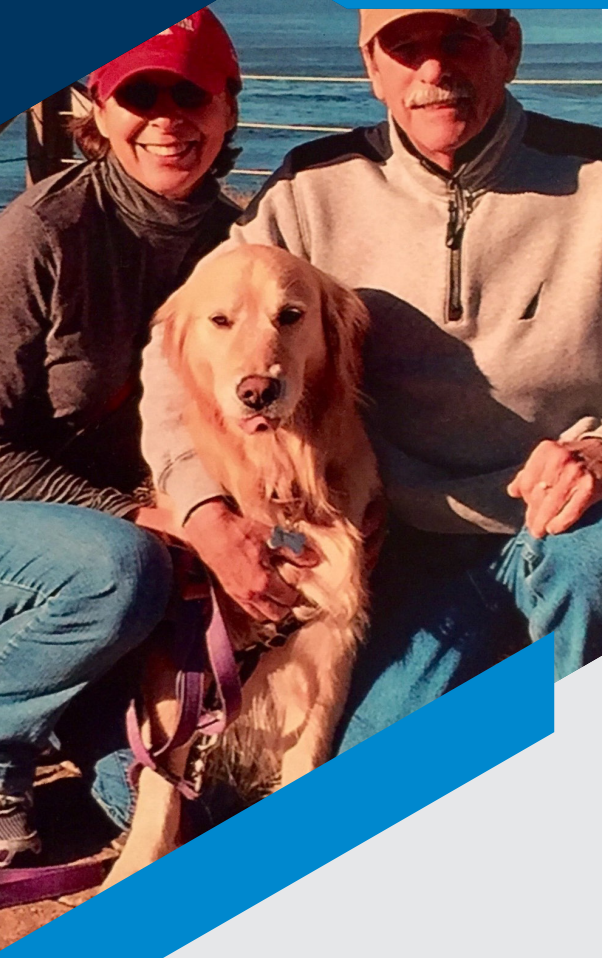
Sessions covered the latest discoveries in arthritis and autoimmune disease research. Focuses included Rheumatoid Arthritis, Lupus, Inflammatory Arthritis, Psoriatic Arthritis, Juvenile Idiopathic Arthritis, Osteoarthritis, Spondylitis, Scleroderma, and Gout.

PANEL & SPEAKERS

Our special sessions shared insights on the journey from research to industry, an overview of the FcRn and Nipocalimab Research Program at Janssen Pharmaceuticals, and a Keynote presentation from Vijay K. Kuchroo, DVM, Ph.D. on Th17 Cells and Induction of Tissue Inflammation.

SPONSOR FOCUS

Many thanks to our sponsors AbbVie and Pfizer, special guests Mike Vincent, Lenny Dragone, Soumya Chakravarty, keynote speaker Vijay K. Kuchroo, our Scientific Advisory Board, Board of Directors, and all the speakers who shared their work!



A message from long-time supporters, Bob and Christine Blachford

The reason we are so fond of this charitable organization is based a few factors:

1. Our deep friendship with Morrie and Barb Granger. We met them when we lived in Laguna Beach and instantly became friends. As we came to know them, they introduced to us the work they did for the organization and invited us to attend many of the "meet the inventor" meetings. We saw the profound effect the research had on so many people and it moved us to want to be involved.

2. Chris has been dealing with autoimmune issues for many years/decades and this provided us a way to help and be involved.

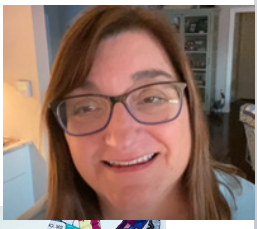
3. We strongly believe in the method being used in that innovation starts well before significant funding is available and this provides a pathway to that funding.

Supporter Spotlights

Individual Donors: The Power to Conquer Arthritis

The Arthritis National Research Foundation is on a mission to conquer arthritis, and our success is fueled by the collective power of our individual donors.

Founded as a vehicle for innovation in arthritis and autoimmune research, the Arthritis National Research Foundation has funded game-changing discoveries that were only made possible through the generosity of our individual donors. In 2022, individual donors raised an impressive $2,261,317, which allowed us to fund $2,375,000 in grants.



Individual donors are the heart and soul of the Arthritis National Research Foundation. Supporters like Cathy Habermann (pictured) and her sister Karen who created a fundraiser selling unique aprons in honor of their sister, Cindy, who was diagnosed with Rheumatoid Arthritis at seven years old and passed away suddenly in 2022.

Every contribution we receive, whether $5 or $5,000, gives us the support needed to fund scientists changing the future of medicine and treatments. Your collective giving power is essential to our mission to find a cure for arthritis. Thank you for being a critical part of our work.

THE SONTAG FOUNDATION

The Sontag Foundation Legacy

ANRF is delighted to recognize our long-standing partnership with the Sontag Foundation. For over 20 years the Sontag Foundation has funded innovative researchers that have made new discoveries, advanced their careers in research, and continue to pave the way to improve the lives of those living with Rheumatoid Arthritis. In 2011, the Sontag Foundation gifted ANRF a $1million grant – the first of its kind for the Foundation – that was a pivotal turning point for researchers studying Rheumatoid Arthritis. We are so grateful for the leadership and dedication of the Sontag Foundation and thank them for their continued partnership through the years.

2022-2023 Sontag Foundation Fellow Nisarg Shah, Ph.D.


Soumya Chakravarty, MD, PhD, FACP , FACR

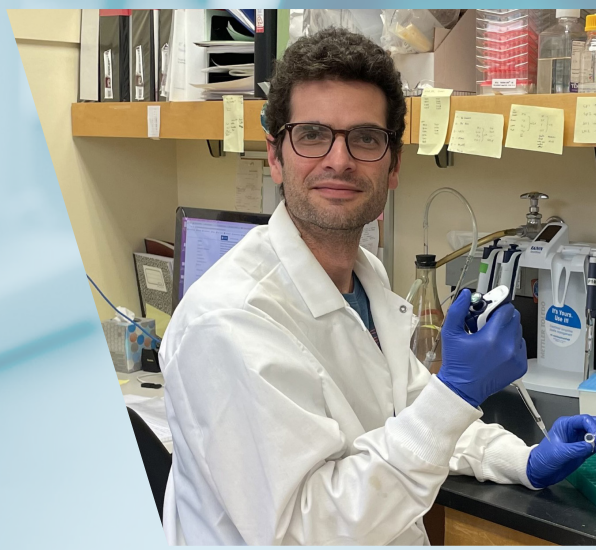
A Partnership with Impact

Janssen, the Pharmaceutical Company of Johnson & Johnson, is a pioneer in the development of inflammatory arthritis and autoimmune disease therapies. Their approach focuses on areas of unmet need where they can make the biggest impact, fighting sickness with science, improving access with ingenuity, and healing hopelessness with heart. They are driven by the fact that patients are waiting for breakthroughs, and dedicated to collaboration with experts at every stage to truly make a difference.

Their long-held commitment to a future with better treatments for those in need has inspired a partnership that advances psoriatic arthritis (PsA) discoveries and treatments. For three years, Janssen has funded the Psoriatic Arthritis Fellow at the Arthritis National Research Foundation. This Fellowship offers an early-career PsA researcher a two-year, $250,000 grant to delve deep into the intricacies of the disease. Soumya Chakravarty, MD, PhD, FACP, FACR, Senior Director, Strategic Lead Rheumatology Therapeutic Area at Johnson & Johnson Innovative Medicine, has been a champion of this program. “The ANRF fellowship is exactly what we hope for when investing in our partners. A fantastic researcher studying a crucial disease target and leveraging their grant to create a lasting impact,” he affirmed.

This year, Bahram Razani, MD, PhD of the University of California, San Francisco, received the Janssen Immunology Psoriatic Arthritis Fellow award. His work highlights the role of keratinocytes in driving psoriasis and PsA, and identifies immune pathways not currently targeted by therapies that may be important for driving arthritis. Dr. Razani is hopeful that his study will reveal biomarkers that can identify Psoriasis patients at risk for developing PsA and uncover new therapeutic opportunities for the disease. “Beyond providing the resources to conduct our studies, Johnson & Johnson Innovative Medicine’s investment shows that focusing my research on the pathogenesis of PsA is tackling an important question,” Dr. Razani says. “It also serves as a vote of confidence in me as a scientist, which is truly helpful during the early career stage. Science requires enormous effort and long hours. Knowing that a large institution cares about what I’m doing definitely makes me more excited to work on these questions.”

ANRF is grateful to partner with a respected and innovative organization that is creating a future where disease is a thing of the past.


Bahram Razani, MD, PhD

2022 - 2023 News to Note

ANRF Scholars are continually making discoveries with the power to change the future of arthritis understanding, diagnosis, and care. Here are just a few notable points of progress from scholars and alums this year.

Lauren Henderson, M.D., MMSc

ANRF Scholar 2020 - 2022

Disordered T cell-B cell interactions in autoantibody-positive inflammatory arthritis

This research has revealed significant insights into the immune system's role in specific forms of arthritis. The study identified a group of immune cells known as T peripheral helper (Tph) cells, which contribute to producing problematic antibodies in the joints of adults who have rheumatoid arthritis. The researchers set out to investigate whether a similar issue exists in children with a different type of arthritis called juvenile oligoarthritis.

The research team found that in the joint fluid of children with juvenile oligoarthritis who possess certain antibodies in their blood, there is a higher presence of Tph cells responsible for antibody production. This phenomenon is less common in children without these antibodies.

By examining the genes of these Tph cells, the researchers identified that in children with the antibodies, these cells express more genes related to antibody production. Additionally, the researchers discovered a subset of T cells that display characteristics of both Tph cells and cells that regulate the immune response, potentially contributing to a balanced immune system in the joints.

These findings hold significant importance as they enhance our understanding of how T cells impact individuals with arthritis, across different age groups.

Deborah Winter, Ph.D.

ANRF Scholar 2017 - 2019

Distinct Transcriptional Profiles of Monocytes Associate with Disease Activity in Scleroderma Patients

This research aimed to find a way to better understand and classify patients with a complex condition called systemic sclerosis (SSc). SSc affects various parts of the body, making it challenging to diagnose and manage. The study focused on specific types of immune cells in the blood, called monocytes, and their genetic patterns as potential markers for disease severity in SSc.

Patients with SSc were compared to healthy individuals, and their monocytes were analyzed using RNA sequencing. By studying the gene activity in these cells, researchers identified three groups of SSc patients (A, B, and C) based on the genetic patterns in their monocytes. These groups also showed similar genetic patterns in another type of immune cell, called macrophages, found in the skin.

Patients in groups B and C had more severe lung problems than those in group A, even though their skin disease was similar at the beginning. This suggests that the genetic patterns in the monocytes could help predict disease outcomes.

This research provides a new way to categorize and predict disease severity in SSc, which could lead to more personalized and effective treatments for patients. It also demonstrates the potential of using genetic information from specific immune cells to better understand and manage complex diseases like SSc.

Lam (Alex) Tsoi, Ph.D.

ANRF Scholar 2016 - 2018

Single cell and spatial sequencing define processes by which keratinocytes and fibroblasts amplify inflammatory responses in psoriasis

This study aimed to better understand how psoriasis develops. Researchers used advanced techniques to examine individual cells and their spatial distribution in psoriatic skin.

They discovered that in psoriasis, there is a specific process driven by a molecule called IL-36. This process amplifies the inflammatory responses involving molecules like IL-17A and TNF, even without certain enzymes typically involved in inflammation. These heightened responses mainly occur in a specific layer of the skin called the supraspinous layer.

The researchers also found a group of fibroblast cells marked by the SFRP2 molecule that play a crucial role in driving the inflammatory network. These fibroblasts communicate with other immune cells and keratinocytes (skin cells) by producing molecules like CCL13, CCL19, and CXCL12. This communication network helps intensify the immune response in psoriasis. Moreover, the SFRP2+ fibroblasts also produce an enzyme called cathepsin S, which further enhances the inflammatory response by activating IL-36G in keratinocytes.

This research provides a deeper understanding of how psoriasis develops and identifies previously unrecognized participants in the disease process, including these inflammatory fibroblasts. These discoveries could lead to new strategies for managing and treating psoriasis, ultimately benefiting individuals affected by this chronic skin condition.

2022 - 2023 News to Note

Ruth Napier, Ph.D.

ANRF Scholar 2021 - 2023

Neutrophil-to-Lymphocyte Ratio and Platelet-to-Lymphocyte Ratio as Biomarkers in Axial Spondyloarthritis: Observational Studies From the Program to Understand the Longterm Outcomes in Spondyloarthritis Registry

This research aimed to investigate the usefulness of two blood test ratios, the neutrophil-to-lymphocyte ratio (NLR) and the platelet-to-lymphocyte ratio (PLR), in predicting certain aspects of axial spondyloarthritis (SpA), a type of inflammatory joint disease. The study also explored the connection between the use of a medication called a tumor necrosis factor inhibitor (TNFi) and these blood test ratios compared to traditional markers of inflammation.

The study analyzed data from the “Program to Understand the Long-term Outcomes in Spondyloarthritis (PULSAR)” registry, which included 354 participants, mainly White, male, and HLA–B27 positive. The results showed that NLR and PLR, along with traditional markers like erythrocyte sedimentation rate and C-reactive protein level, were good predictors of radiographic sacroiliitis, a condition involving inflammation in the lower back. Models that included PLR and traditional markers performed better than those with traditional markers alone.

In addition, NLR and C-reactive protein were linked to active disease, and the model using both NLR and C-reactive protein was more effective in predicting active disease than C-reactive protein alone. Furthermore, the use of TNFi medication reduced the levels of NLR, PLR, and traditional markers, with models combining NLR or PLR and traditional markers being the most informative.

In conclusion, this study suggests that NLR and PLR are associated with sacroiliitis and disease activity in axial SpA. Additionally, these ratios respond positively to TNFi treatment and provide valuable clinical information alongside traditional markers, which could aid in the management of axial SpA.

Purpose-Driven Outcomes

It is with great pleasure and a profound sense of purpose that I reach out to you as the Board Chair of the Arthritis National Research Foundation. Today, I want to share a personal journey, celebrate our achievements, and outline the exciting path ahead.

My connection to the field of arthritis research has always been rooted in an investment in science and outcomes. My commitment took on an even greater dimension when my beloved wife, Sally, was diagnosed with rheumatoid arthritis. Her courageous battle and the countless stories of patients like her have ignited my passion. Together, we face the challenges of arthritis head-on, determined to make a difference.

In light of this dedication, I am thrilled by the strides we are taking as an organization. Our current strategic plan, spanning from 2023 to 2027, charts a visionary course toward brighter outcomes and increased funding. We are also expanding our staff, aligning our capabilities with our programmatic goals, and ushering in an era of transformative research and support.

One of the most exciting developments this year is the shift in our grant funding practices. As an organization, we share a collective commitment to continually improve our support for groundbreaking research. It gives me immense pleasure to announce that this year, we are offering a two-year funding cycle. This extended support will enable scientists to delve deeper into their work, fostering a better understanding of the complex nature of arthritis and autoimmune diseases. Ultimately, this investment will take us closer to our shared goal: new and improved treatments for those who need them most.

Our journey is fueled by the dedication of our board members, our Scientific Advisory Board, our staff, the generosity of our donors, and the passion of our grantees. Together, we form a community of change-makers, committed to making a real difference in the lives of millions who are affected by arthritis.

Thank you for your unwavering support, and for joining us on this journey. Together, we are shaping a future where arthritis is understood, prevented, and treated more effectively. Our shared commitment to this cause gives me hope for tomorrow.

With gratitude,

Richard Salter
ANRF Board of Directors, Chair

Platinum Transparency 2023

Candid.

Charity Navigator

FOUR-STAR

BEST IN AMERICA

CERTIFIED BY AMERICA'S BEST CHARITIES

800.588.2873
19200 Von Karman Ave.
Suite 350
Irvine, CA 92612