

SCIENCE IS VITAL

afar

american federation for
AGING RESEARCH

40th Anniversary
Vision Report



DEDICATION

On the occasion of our Fortieth Anniversary, the American Federation for Aging Research dedicates this report to Paul F. Glenn, David W. Gore, and the scientific community whose work in the biology of aging has advanced our understanding of how we may reach a healthier older age.

SCIENCE HOLDS THE KEY TO A BETTER FUTURE

The development of highly effective COVID-19 vaccines in less than one year in 2020 saved hundreds of thousands of lives in the United States alone, and represents one of the truly remarkable success stories in the annals of science. But scientists didn't just stumble upon the mRNA vaccines. The reason the vaccines could be developed and tested so quickly is because of decades of behind-the-scenes basic biomedical research.

The mRNA vaccines help bring to the fore the vital role that science plays in today's world. They also illuminate how the need for basic biomedical research remains as critical today as it was in 1981 — the year that the American Federation for Aging Research (AFAR) was founded.

Scientific breakthroughs resulting from the rigorous biomedical research into the underlying processes of aging that AFAR has supported during its first 40 years have brought us to an inflection point. As you will read in this special 40th anniversary report, insights gleaned over the past four decades are ready to be translated into interventions that could change how we age.

Numerous potential therapies showing the promise of extending lifespan as well as healthspan — the number of years we live in good health — have already begun moving into human clinical trials. It's an exciting time, but much work remains to be done. The next 40 years could change how we age in transformative ways, if we have the vision and the will.

While it's true that the need for biomedical research has never been more critical, it's also true that public and private funding will largely determine how soon potential therapies move from the lab into our lives. The past year clearly showed us that **AFAR's mission — *To Support and Advance Healthy Aging through Biomedical Research* — is more vital than ever.**

In this report, we outline some of the major breakthroughs made during our first 40 years and the steps we believe will move these promising breakthroughs into life-changing interventions. Then, we ask AFAR experts to look ahead to 2061 and predict how aging research will transform our lives in the next 40 years. We discuss the impact of our core grant programs and leadership for several NIA initiatives, and we also pay tribute to the Philanthropic Pioneers who made the advances and breakthroughs of AFAR's first decades possible.

We hope this report informs and inspires you to engage with AFAR in the vital work that awaits in the coming years and decades. Together, we can build a future of vitality and longevity that AFAR's experts envision.



ANN M. CONNOLLY

Chair, AFAR Board of Directors

AFAR PIONEERS

The scientific breakthroughs detailed in this report did not occur in a vacuum. Funding is the lifeblood of all scientific research, from the basic biomedical research needed to understand the underlying mechanisms of aging to the transformative translations that will result in life-changing interventions.

Behind every scientific breakthrough, there are people and organizations, true risk takers, that invest in the early stages, with no guarantee of success. Without their support, and the support of everyone who makes a donation of any amount to support scientific research, many potential breakthroughs would never make it out of the lab, much less into our lives.

Here, we honor the legacies of just a few of the earliest philanthropic trailblazers whose names grace important AFAR programs and grants. They have helped drive the breakthroughs of AFAR's first 40 years and continue to have a significant impact on the breakthroughs of today and tomorrow.

We hope you will be inspired by these Philanthropic Pioneers' vision and dedication, as we look forward to engaging with all those who will make the breakthroughs of the next 40 years possible.

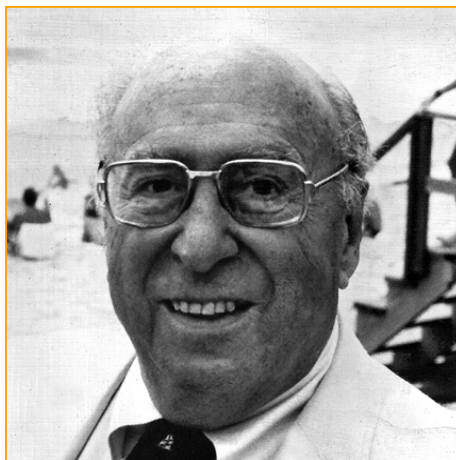


STEPHANIE LEDERMAN, EDM
AFAR Executive Director

IRVING S. WRIGHT, MD

VISION

In 1981, Irving S. Wright, MD, brought together a group of far-sighted scientists and lay people at the annual meeting of the American College of Physicians in New Orleans to build what became the American Federation for Aging Research (AFAR). The new organization, with support from the corporate and foundation sectors, set out to find, fund, and nurture talented scientists and encourage them to pursue lifelong careers in research focused on the aging process and age-related diseases.



Dr. Wright was a visionary physician and geriatrician who was among the first to look ahead to the medical needs of the nation's growing population of older people. Forty years ago, in the first newsletter of the new organization that he had founded, Dr. Wright succinctly summed up AFAR's mission with words that have only grown more relevant with each passing decade: "We are tackling the greatest health problem of today and the coming years — the innumerable and complex disabilities of the aging population."

He also was world renowned for his research and leadership in the field of cardiovascular disease. In the 1930s, he became the first physician to use an anticoagulant to treat the blood clots that can cause heart attacks and strokes.

In 1960, he received the prestigious Albert Lasker Award from the American Heart Association for his study of the use of anticoagulants in 800 heart attack victims.

Over the years, Dr. Wright served as president of the American Heart Association, the American College of Physicians, and the American Geriatrics Society. In his later years, he worked to establish the Irving Sherwood Wright Center for Aging in New York, which continues today as part of Weill-Cornell Medicine. Dr. Wright died in 1997 at age 96.

LEGACY

The Irving S. Wright Award of Distinction, named in honor of AFAR's founder, recognizes exceptional contributions to basic or clinical research in the field of aging by a member of the scientific community. In addition to a cash prize, the recipient each year delivers a lecture at the Annual Scientific Meeting of the Gerontological Society of America. AFAR also established the Irving S. Wright Society to recognize and thank individuals who make a planned gift to AFAR.

"We are tackling the greatest health problem of today and the coming years — the innumerable and complex disabilities of the aging population."

- Irving S. Wright, MD, in a 1981 AFAR newsletter



PAUL F. GLENN



VISION

As an only grandson of aging grandparents, a young Paul F. Glenn saw the challenges of aging and age-related diseases first-hand. The experience left an imprint that formed the basis of his future philanthropic focus through the Glenn Foundation for Medical Research, which has funded more than \$100 million in basic research on aging since its founding in 1965.

AFAR-supported scientists are among the many from around the world who have benefitted greatly from Glenn's generosity and commitment, through several grant programs developed in cooperation with AFAR and funded by the Glenn Foundation. He was a founding member of AFAR and remained a steadfast supporter of the organization's work over the years.

"Paul F. Glenn epitomized the altruistic passion that drives philanthropy and the visionary mind that advances medical research," K. Leonard Judson, CEO, Glenn Foundation for Medical Research, said upon Mr. Glenn's death in September 2020. "His generous support of the Glenn Centers and numerous other initiatives—most notably with the American Federation for Aging Research—launched and sustained the careers of scientists working to understand the biological processes of aging and advance therapies to extend health as we grow older."

In addition to the grant programs with AFAR, the Glenn Foundation funded the creation of the Paul F. Glenn Centers for the Biology of Aging Research at Harvard, Stanford, MIT, the Salk Institute, the Mayo Clinic, Princeton, Einstein College of Medicine, University of Michigan, and the Buck Institute. At his passing, Glenn endowed the Glenn Foundation for Medical Research in perpetuity.

LEGACY

The Glenn Foundation for Medical Research sponsors three grant programs in collaboration with AFAR:

- **The Glenn Foundation for Medical Research and AFAR Grants for Junior Faculty** are designed to assist in the development of the careers of junior investigators committed to pursuing careers in the field of aging research. These investigators study a broad range of biomedical and clinical topics related to aging.
- **The Glenn Foundation for Medical Research Breakthroughs in Gerontology (BIG) Awards** provide timely support to a small number of research projects that, if successful, offer significant promise of yielding transforming discoveries in the fundamental biology of aging. Projects that build on early discoveries that show translational potential for clinically relevant strategies, treatments and therapeutics, addressing human aging and healthspan are also considered.
- **The Glenn Foundation for Medical Research Postdoctoral Fellowships in Aging Research** are intended to provide significant research and training support to permit postdoctoral fellows who are conducting research in the basic biology of aging, as well as translating advances in basic research from the laboratory to the clinic, to become established in the field of aging.

The Foundation also sponsors the Glenn Workshop on the Biology of Aging, held in conjunction with AFAR's annual scientific meeting, which is named after Paul F. Glenn.

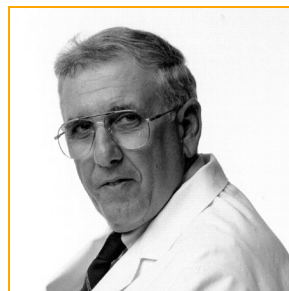
GLENN FOUNDATION
FOR MEDICAL RESEARCH



VINCENT J. CRISTOFALO, PHD

VISION

Vincent J. Cristofalo, PhD, a founding member of AFAR's board of directors and past president of AFAR, was an internationally known leader in aging research and a pioneer in the field, who was instrumental in AFAR's growth and development. He also inspired the countless scientists he mentored and who continue to build on his groundbreaking research.



Dr. Cristofalo was president of AFAR from 1996 to 1998, and was the recipient of AFAR's 1989 Irving S. Wright Award of Distinction. The author of more than 200 publications, he was editor of the *Journal of Gerontology: Biological Sciences* from 1988 to 1990 and president of the Gerontological Society of America (GSA) from 1990 to 1991. His research on the dynamics and regulation of cell replication in the aging process was recognized by his designation as a fellow of the American Association for the Advancement of Science, by election to the Academy of Science and Arts of Volterra, Italy, and through awards from GSA, the Samuel Roberts Noble Foundation, the University of Pisa, and the American Aging Association. By elucidating how cell replication is impaired in older adults, Dr. Cristofalo's research may allow scientists to interrupt the degenerative effects of aging.

Dr. Cristofalo served as president and CEO of the Lankenau Institute for Medical Research and was the founding director of the Institute on Aging at the University of Pennsylvania.

In a tribute published in the *Journal of Gerontology* following his death in 2006, two colleagues hailed Dr. Cristofalo as "one of gerontology's scientific giants" and wrote that there was "a special place in Vince's heart for the mentoring and guidance of others."

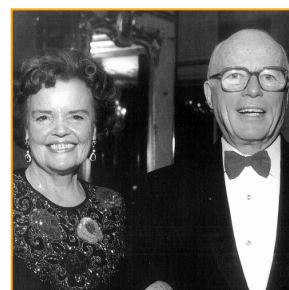
LEGACY

Dr. Cristofalo devoted his professional career equally to two pursuits: advancing aging research, and encouraging younger scientists to investigate important problems in the biology of aging. So it is only fitting that AFAR's Vincent Cristofalo Rising Star Award in Aging Research is named in his honor. The award is intended for research scientists in early or mid-career who have already made major discoveries in the fundamental biology of aging and whose work is deemed likely to be highly influential for decades to come.

GEORGE E. DOTY, SR.

VISION

As a partner at Goldman Sachs, George E. Doty, Sr., almost single-handedly developed and nurtured AFAR's relationship with other partners at the Wall Street giant during the organization's early years. In AFAR's first two decades, Goldman Sachs partners contributed more than \$200,000 annually and sponsored more than 70 AFAR grantees. As AFAR's second board of directors chair from 1987 to 1993, Doty was a catalyst for creating an initial endowment for the organization. He also served on AFAR's executive committee, and along with his wife, Marie, launched the research path of many investigators. The Dotys' advice, counsel, and leadership helped AFAR grow significantly as an organization.



LEGACY

The George E. and Marie J. Doty Award of Distinction was named in honor of the Dotys and their shared commitment and support to AFAR. The award recognizes lay visionaries who, through their generosity and compassion, help advance AFAR's mission and populate the field with more scientists focused on aging research and clinicians trained in geriatric care.

DOROTHY DILLON EWESON



VISION

Dorothy Dillon Eweson, a lifelong supporter of education and medical research, was first elected to AFAR’s board of directors in 1983, just two years after its founding, and served for more than 20 years. She was an early advocate for research on aging, supporting programs that enabled scientists to pursue careers in the field and contribute to discoveries that impact the onset and progression of many age-related diseases. During her two decades on AFAR’s board, Ms. Eweson served on the executive committee and as vice president for many years.

She graduated *magna cum laude* from Barnard College in New York and served on the college’s board for many years. Eweson also served on the boards of numerous historical and cultural organizations in New Jersey, where she lived. Through her foundation, she supported education at all levels, as well as medical research at Harvard University, the Massachusetts Institute of Technology, and the Massachusetts General Hospital in Boston.

LEGACY

The Dorothy Dillon Eweson Lecture Series on Advances in Aging Research was established in 1997 by Ms. Eweson in an effort to bring the issues of aging and age-related diseases and conditions to the forefront of medical association conferences. The Eweson Lecturers strive to increase awareness of aging issues within specialty areas by presenting “cutting edge” papers and research on topics directly relating to specific disciplines.

DIANE A. NIXON



VISION

AFAR Vice Chair Emerita Diane A. Nixon joined AFAR’s board of directors in 1989 as a result of her long-time friendship with founder Irving S. Wright, MD, and her deep interest in medicine. She served on the executive committee and as vice president during her two decades on AFAR’s board. In 2007, Diane received the AFAR Award, presented to lay individuals who have demonstrated a commitment to the advancement of aging research. Diane Nixon is president of the Deeds Foundation, whose principal interests include medical research, education, and the arts.

LEGACY

In 1997, Ms. Nixon named an AFAR grant in memory of her mother, Nan Allen Nixon, who was a great supporter of AFAR. She also is a major funder of the Glenn Foundation for Medical Research and AFAR Grants for Junior Faculty.

AFAR is grateful to our donors who continue
the vision of these pioneers through their support.
Join us at www.afar.org/give

JOHN W. “JACK” ROWE, MD



VISION

In May 1981, when he served as director of Harvard Medical School’s Division of Aging, John W. “Jack” Rowe, MD, was invited to become a founding member of the AFAR board of directors. Over the years that followed, Dr. Rowe served as president and chief executive officer of Mount Sinai NYU Health, one of the nation’s largest academic health care organizations. And from 2000 to 2006, he served as chairman and CEO of Aetna, Inc, one of the nation’s leading health care and related benefits organizations. As his professional responsibilities increased, Dr. Rowe showed unwavering dedication and loyalty to AFAR, serving as chair of the program committee, as board president, and as a member of the executive committee over the years. In 2008, Dr. Rowe was the recipient of AFAR’s Honorary Leadership Award, which recognizes the achievements of individuals and organizations whose work has impacted the field of aging research and improved public health.

Dr. Rowe was elected a member of the Institute of Medicine of the National Academy of Sciences and a fellow of the American Academy of Arts and Sciences. He is co-author of the groundbreaking book *Successful Aging* (Pantheon, 1998).

LEGACY

Dr. Rowe’s early support of and guidance to AFAR played an important role in the organization’s growth and development. His impact on the field of aging research continues today. In 2021, he completed a four-year term as president of the International Association of Gerontology and Geriatrics (IAGG). The IAGG’s annual World Congress of Gerontology and Geriatrics is the largest and leading worldwide conference on aging and the premier meeting for professionals in gerontology and geriatrics. Dr. Rowe also is the Julius B. Richmond Professor of Health Policy and Aging in the Department of Health Policy and Management at the Columbia University Mailman School of Public Health.

FRED S. THOMPSON



VISION

Fred S. Thompson, who started out selling subscriptions to *Reader’s Digest* and rose to vice president of advertising for *The New York Times* and later the assistant to the president of the Times Company, was a founding member and the first chair of AFAR’s board of directors. Mr. Thompson joined the effort to build and launch AFAR at the personal request of AFAR founder Irving S. Wright, MD. A passionate lay advocate for medical research, he had served as general campaign chairman of the American Red Cross of Greater New York in the early 1970s. He also served on the organization’s board of trustees, and on the board of the New York Blood Center. As AFAR board chair for eight years and as a member of the executive committee, Mr. Thompson championed reaching out to lay communities to better understand the importance of medical research and the need to support it. He passed along his strong support for medical research to his son, Geoffrey, who served as AFAR’s vice chairman of the board’s audit committee and served on AFAR’s board from 1988 to 2004.

LEGACY

The Fred S. Thompson Award of Distinction is named in honor of the founding chairman of AFAR’s board of directors and presented to lay individuals who have demonstrated an outstanding commitment to furthering medical research. The unwavering support of Mr. Thompson and his namesake awardees for science and scientists has helped advance the field of aging research and serves as a model for public engagement.

PIONEERING BOARD CHAIRS

In addition to the exceptional foundation built by our Philanthropic Pioneers, AFAR is grateful for all our past board chairs. Thanks to their unique insight and leadership, AFAR has been able to expand upon their vision and advance the field of aging research. Here, we highlight our past chairs and AFAR's key accomplishments during their tenure.

HADLEY C. FORD (1993–2003)

Hadley C. Ford is an independent management consultant who served as chair for ten years. He is a retired senior vice-president and director of Booz, Allen & Hamilton, Inc., and currently serves as a senior advisor to Andersen Consulting. He also has served on the boards of several organizations across sectors in various capacities, including Gryphon Holdings, Inc., U.S. Home-care, AMPlus, Helen Keller International, and more.

Throughout Mr. Ford's tenure as chair, AFAR formed several key relationships with grant partners who we still collaborate with today, including The Glenn Foundation for Medical Research, the John A. Hartford Foundation, and the William Randolph Hearst Foundation. Mr. Ford also oversaw AFAR's organizational growth, developing a website, and launching our postdoctoral fellowship program in partnership with the Glenn Foundation. By the end of his term, AFAR had expanded upon its initial affiliate program to include a branch in upstate New York.

DIANA JACOBS KALMAN (2004–2009)

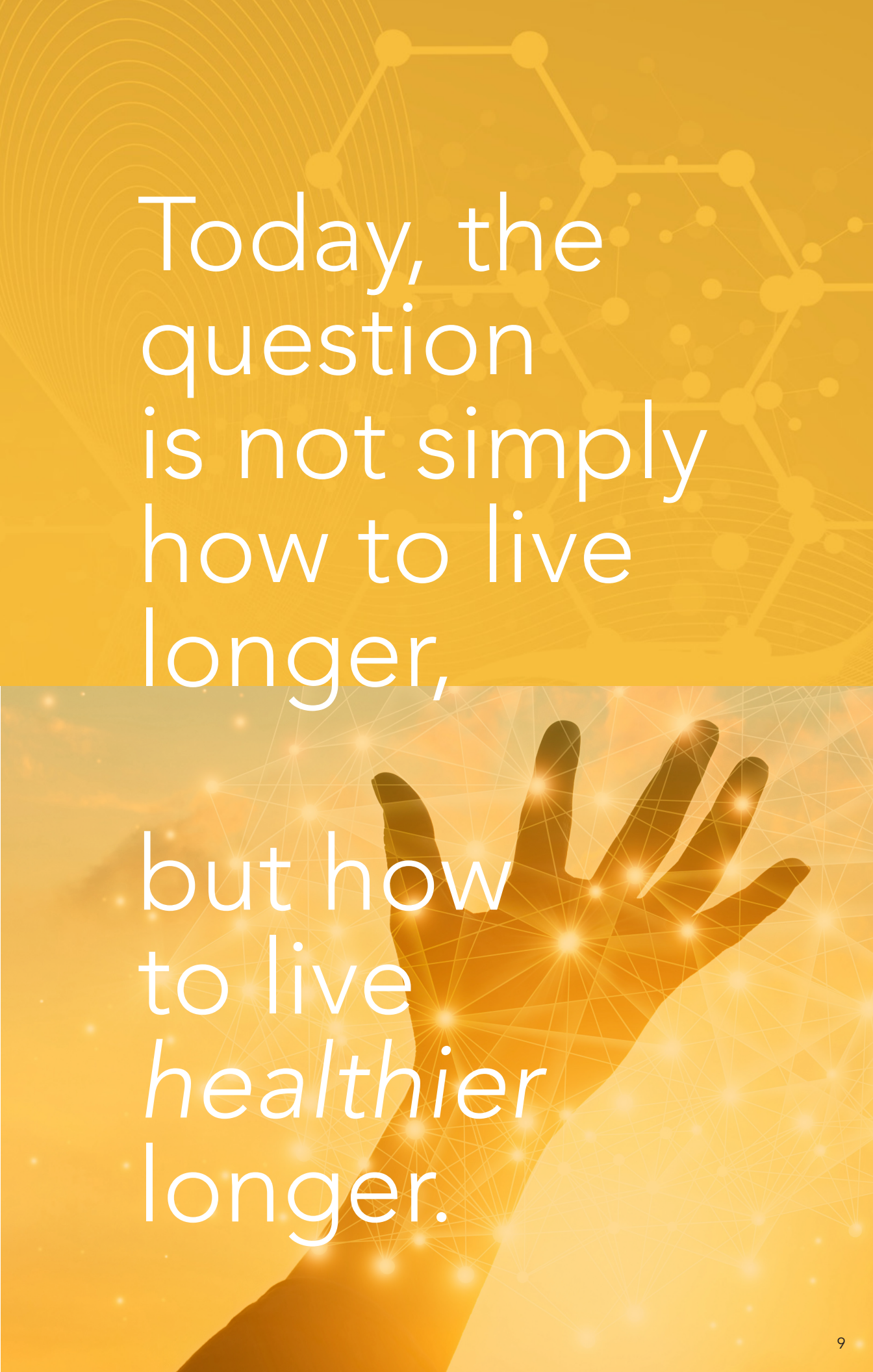
Throughout her impressive career, Diana Jacobs Kalman has polished her expertise in public relations through a variety of roles, including publicist, writer, corporate executive, and teacher. She is an adjunct professor of public relations at Marymount Manhattan College and has served on the boards of The Foundation of Women Executives in Public Relations and Cathedral High School of the Archdiocese of New York.

Her six-year term as chair was marked by key milestones for AFAR, celebrating both our 25th Anniversary and the 10th Anniversary of the Beeson Program. She created the template for AFAR's annual dinner and scientific symposium and developed public relations initiatives. AFAR also experienced widespread expansion as affiliate branches continued to form and key funders increased their contributions to our grant programs. This growth allowed AFAR to create several new annual awards and programs, such as the Glenn/AFAR Breakthroughs in Gerontology (BIG) Award, the Medical Student Training in Aging Research (MSTAR) Program, and the Vincent Cristofalo Rising Star in Aging Research Award, all of which are still crucial to our programming and mission today. Ms. Kalman is a member of our Irving S. Wright Society and has underwritten the Diana Jacobs Kalman/AFAR Scholarships for Research in the Biology of Aging.

WILLIAM J. LIPTON (2010–2019)

William J. Lipton is formerly the Americas vice chair of tax services and the longest-standing member of the executive board at Ernst & Young, LLP, where he was also the managing partner of the firm's Connecticut area practice. Mr. Lipton has lectured at a number of professional conferences, taught various internal training programs, and published articles in an array of journals.

AFAR continued to expand all programs during Mr. Lipton's tenure, including public-private partnerships as well as receiving our first federal grants. AFAR also increased communications efforts significantly, holding several large-scale events and being featured in major publications such as *The New York Times* and *The Wall Street Journal* and television specials on *National Geographic* and *PBS*. It was also announced during this time that AFAR would facilitate the Targeting Aging with Metformin (TAME) Trial.

The background of the slide is a warm, golden-yellow color. It features a network of glowing nodes connected by thin lines, resembling a molecular structure or a digital network. A hand is visible in the lower half of the image, reaching upwards with fingers spread. The text is overlaid on the upper half of the image.

Today, the
question
is not simply
how to live
longer,

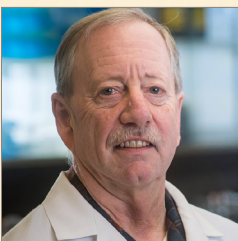
but how
to live
healthier
longer.

BIGGEST BREAKTHROUGHS IN AGING RESEARCH

Since its founding in 1981, AFAR's dedicated focus on basic biomedical research has supported science that helps us understand fundamental mechanisms of the aging process that underlie virtually all major chronic diseases, including Alzheimer's, heart disease, cancer, stroke, diabetes, and others. This understanding of the relationship between the biology of aging and age-related diseases has led to an accelerating rate of discoveries bringing us closer to the therapies that will delay or prevent virtually all diseases of aging, thus extending our years of health and vitality.

AFAR continues to champion the research needed to translate this scientific knowledge into new interventions to help us all live healthier longer. During the past 40 years, AFAR-supported researchers have driven — and continue to drive — scientific breakthroughs. These range from senolytics drugs that target damaged, dysfunctional cells that poison healthy tissues as we age, to cell reprogramming technologies, to healthier dietary habits, to the identification of biomarkers that reliably reveal biological age.

On the pages that follow, we'll look at nine of the top scientific breakthroughs driven by AFAR experts during our first four decades.



STEVEN N. AUSTAD, PHD

AFAR Senior Scientific Director

University of Alabama at Birmingham

AFAR EXPERT DRIVING
BREAKTHROUGH

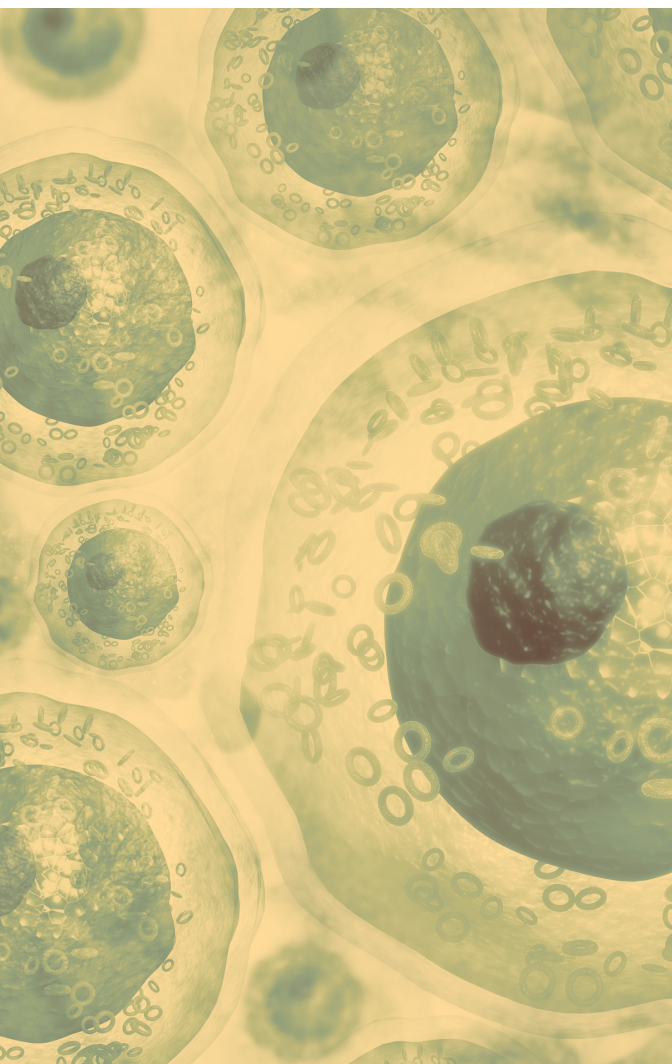
**JUDY
CAMPISI, PHD**

- 1990 Grantee
- 2002 Irving S. Wright Award of Distinction
- Buck Institute



BREAKTHROUGH
**SENESCENT
CELLS DO
HAVE A
DAMAGING
IMPACT AS
WE AGE —
BUT CAN BE
REMOVED.**

These are cells that could once replicate to repair aging tissue but have now lost that capacity due to internal damage. It turns out that they degrade surrounding tissue by secreting harmful molecules. A long-time controversy has been whether senescent cells really had any damaging impact on us. We now know that they do — and why. We also know that accumulated senescent cells can be removed.



BREAKTHROUGH EXERCISE HAS CELLULAR AND COGNITIVE BENEFITS.

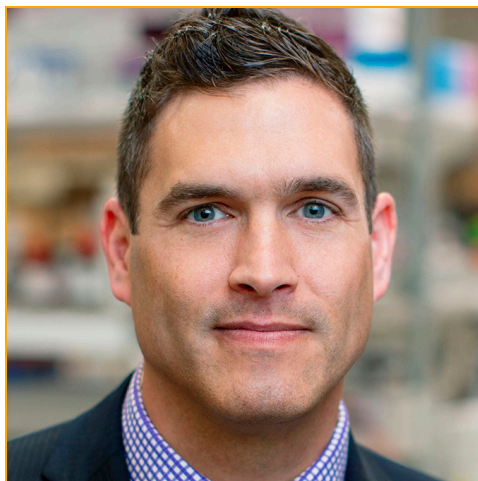
In addition to the established benefits of preserving cardiovascular health, reducing body fat, and lowering blood sugar, we now also know that exercise slows age-related processes within our cells, which can benefit the brain.



AFAR EXPERT DRIVING
BREAKTHROUGH

**NATHAN
LeBRASSEUR, PHD**

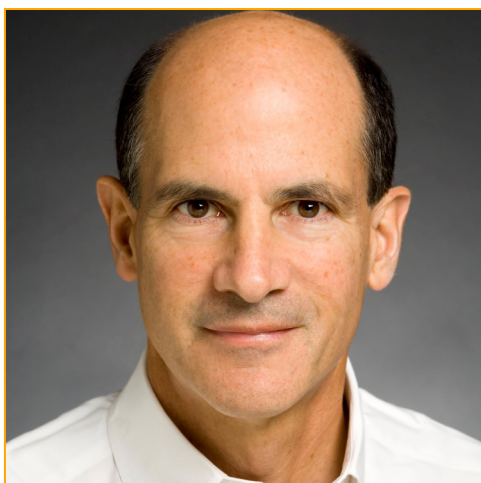
- 2002 Grantee
- 2019 Vincent Cristofalo Rising Star Award in Aging Research
- Mayo Clinic



AFAR EXPERT DRIVING
BREAKTHROUGH

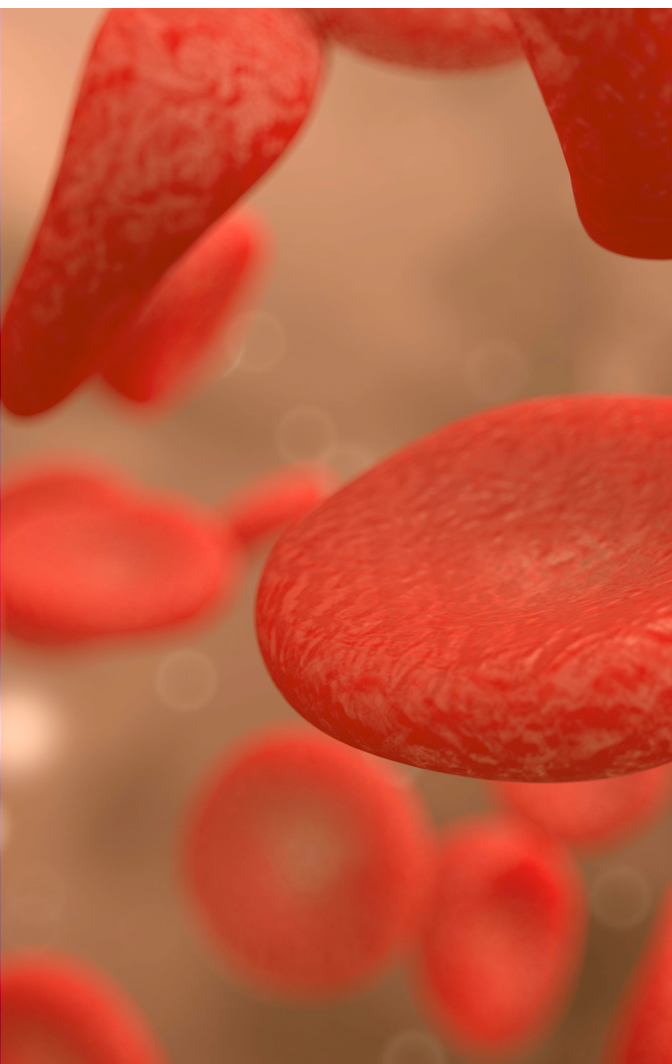
**TOM
RANDO, MD, PHD**

- Two-time Grantee
- AFAR President-Elect
- Stanford University



BREAKTHROUGH
**YOUNG
BLOOD
MAY
REJUVENATE
MOLECULES.**

Blood of young animals contains molecules that can actually rejuvenate damaged heart, brain, and muscle in older adult animals. Although the identity of these molecules is still uncertain, researchers are curious to learn if humans have similar molecular rejuvenation patterns, which could help prevent or delay disorders like dementia and heart failure.



BREAKTHROUGH RESTRICTING CERTAIN FOODS – WITHOUT RESTRICTING CALORIES – CAN INCREASE HEALTHSPAN.

Research shows that the restriction of certain food components, such as protein, or even just foods containing a certain amino acid, methionine, may preserve health without restricting calories themselves. Recently new approaches to dietary restriction display both promise and practicality. Dietary timing in coordination with our biological or circadian clocks may extend health.



AFAR EXPERT DRIVING
BREAKTHROUGH

**SATCHIN
PANDA, PHD**

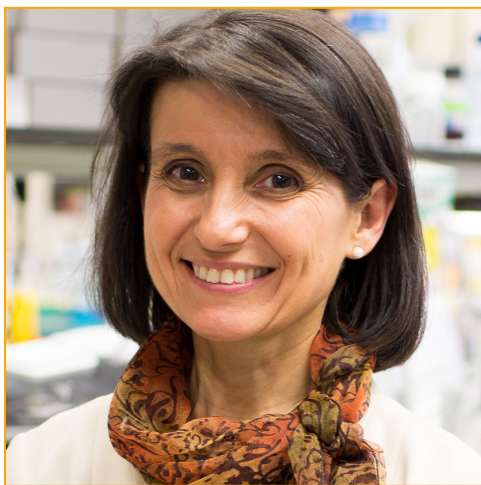
- 2014 Grantee
- Author, *The Circadian Code*
- Salk Institute



AFAR EXPERT DRIVING
BREAKTHROUGH

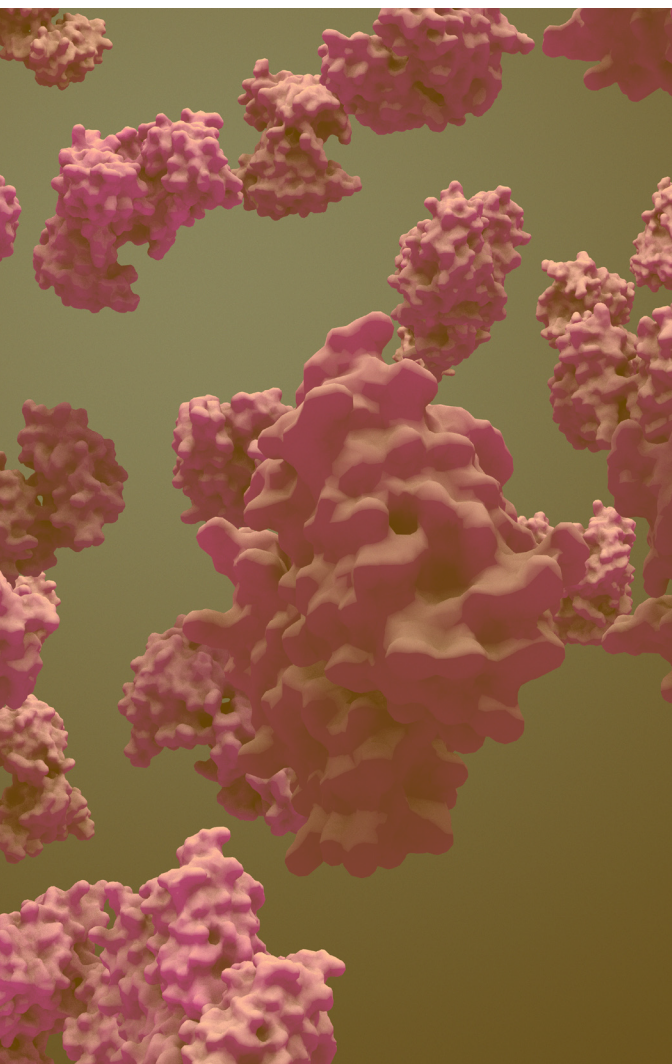
**ANA MARIA
CUERVO, MD, PHD**

- 2000 Grantee and 2018 Vincent Cristofalo Rising Star Award in Aging Research
- AFAR Board Member
- Albert Einstein College of Medicine



BREAKTHROUGH
**PREVENTING
PROTEIN
AGGREGATION
CAN PRESERVE
HEALTH.**

Aggregation of misfolded proteins has long been assumed to be involved in neurological diseases such as Alzheimer's disease, where these aggregates form the classic plaques and tangles. We now know that preventing such protein misfolding and aggregation generally helps preserve health.



BREAKTHROUGH
**MULTIPLE
DRUGS HAVE
BEEN
DISCOVERED
TO EXTEND
LIFE IN MICE.
ONE OF THEM,
RAPAMYCIN,
HAS SHOWN
REMARKABLE
AGE-
RETARDING
EFFECTS.**

Already, there are more than 30 drugs that affect fundamental aging processes in studies in mice and other animals. Since aging processes in mice and humans are similar, this suggests that these drugs may be formulated to prevent or alleviate multiple diseases and disabilities in humans.



AFAR EXPERT DRIVING
BREAKTHROUGH

**MATT
KAEBERLEIN, PHD**

- Two-time Grantee
- University of Washington School of Medicine



AFAR EXPERT DRIVING
BREAKTHROUGH

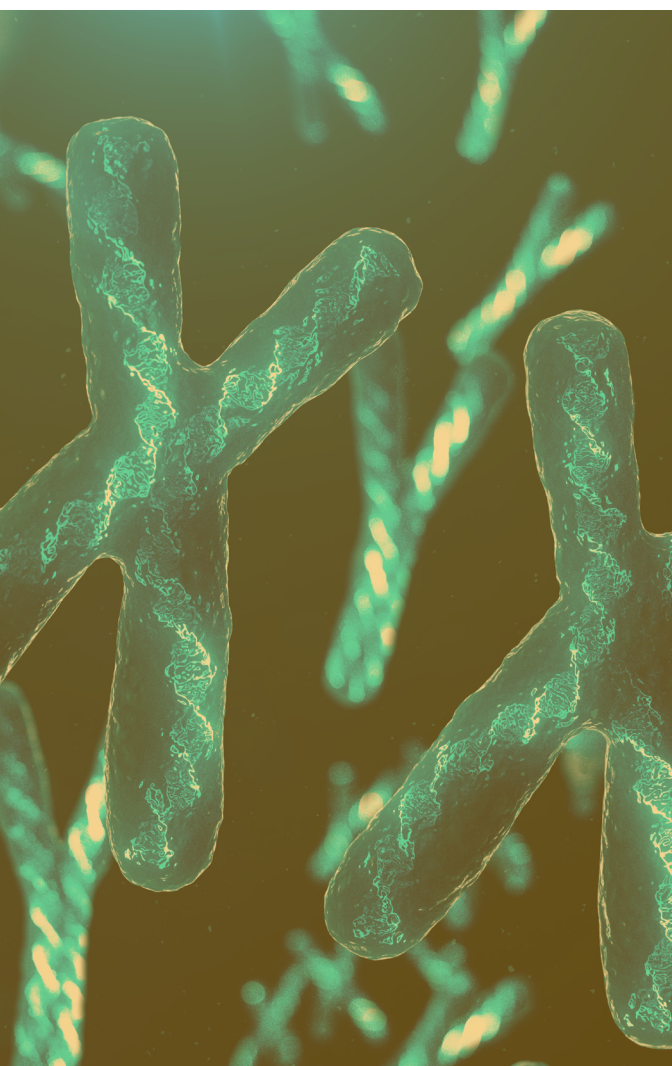
**DENA
DUBAL, MD, PHD**

- Two-time Grantee
- University of California,
San Francisco



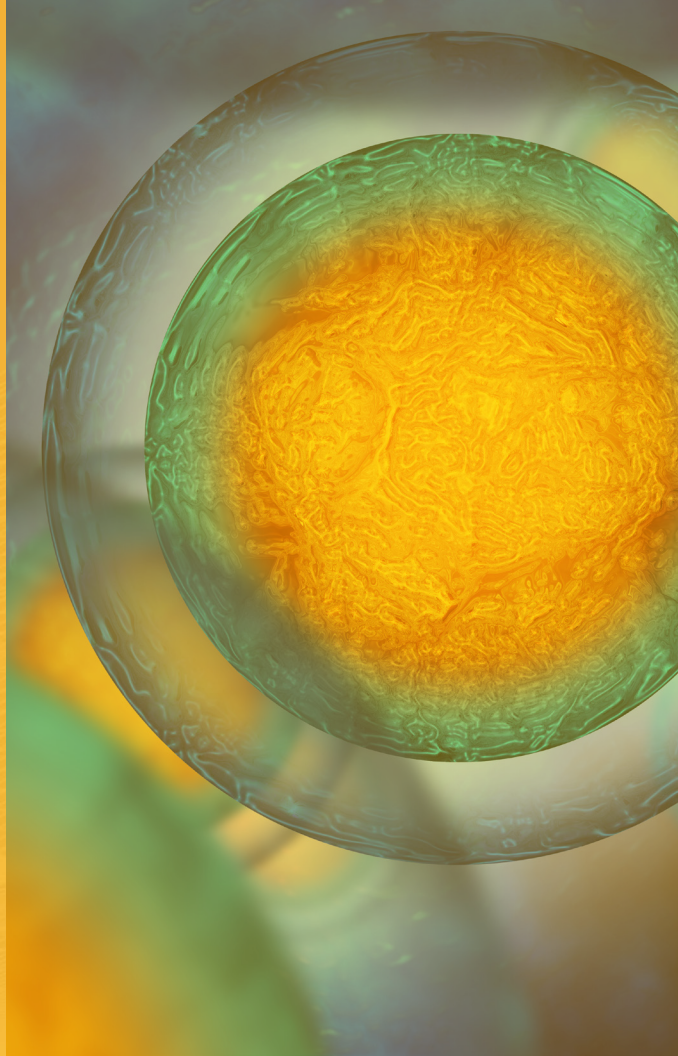
BREAKTHROUGH
**BIOLOGICAL
PROCESSES
OF AGING
MAY DIFFER
BETWEEN
SEXES.**

Therapies that have proven successful at preserving health in mice are effective only in one sex: might human treatments to preserve health differ for men and women? Differences in longevity and healthspan between the sexes should be explored to help understand mechanisms underlying variation in longevity within a species.



BREAKTHROUGH CELLS CAN BE REPROGRAMMED TO RESTORE FUNCTION.

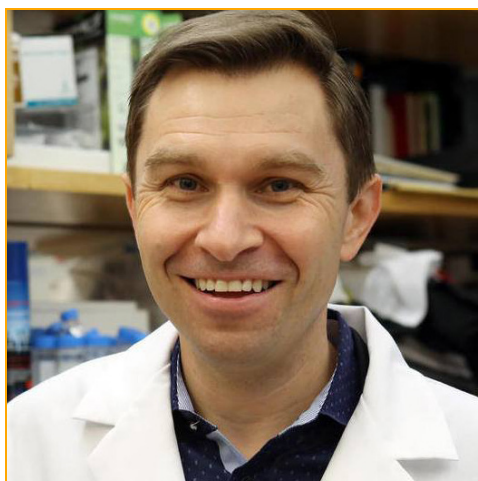
An exciting discovery is that by turning on a handful of genes, virtually any cell type in our body — liver cell, skin cell, lung cell, brain cell — can be reprogrammed in a dish to resemble the type of stem cell from which all of our cells originated during embryonic life. That reprogramming also may restore many aspects of youthful cell function. Recent studies in mice show that genes can be turned on and off at will, and that mice show rejuvenation of numerous bodily functions when the genes are turned on briefly. Muscles, metabolism, and even optic nerves of old mice have been restored to youthful function. The human implications, of course, are stunning.



AFAR EXPERT DRIVING
BREAKTHROUGH

**DAVID
SINCLAIR, PHD**

- 2000 Grantee
- 2019 Irving S. Wright Award
- AFAR Board Member
- Harvard Medical School



AFAR EXPERT DRIVING
BREAKTHROUGH

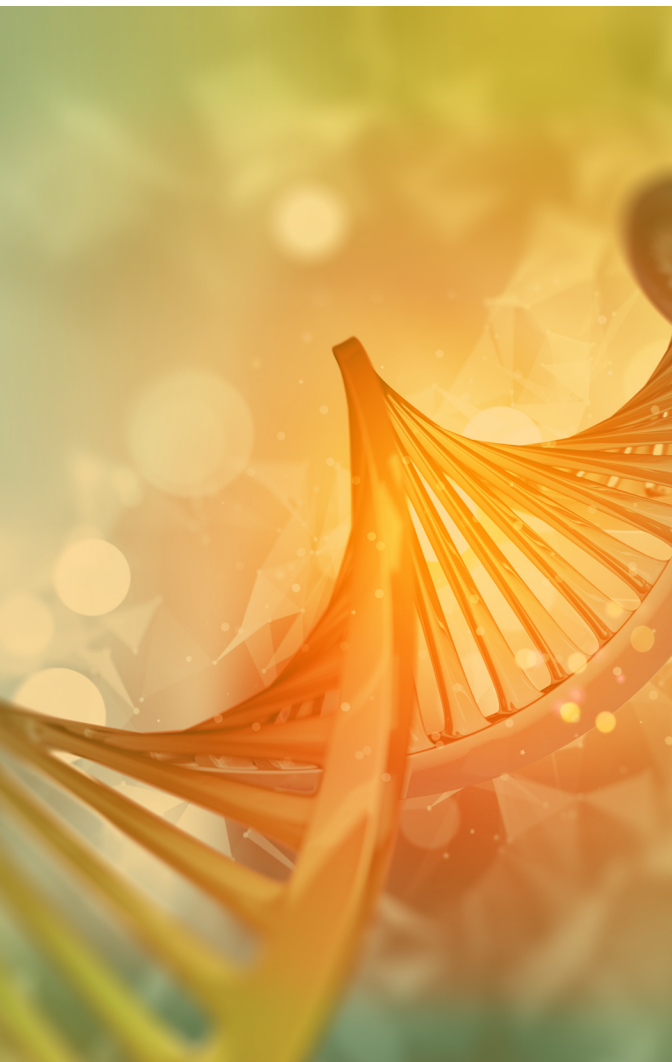
**MORGAN
LEVINE, PHD**

- 2021 Vincent Cristofalo Rising Star Award in Aging Research
- Yale School of Medicine



BREAKTHROUGH
**RELIABLE
MARKERS OF
BIOLOGICAL
AGE ARE HERE.**

For years researchers have sought markers that will reliably reveal biological age as contrasted to chronological age. The DNA in our cells is ornamented with thousands of tiny chemical tags that help determine whether genes are turned on or off. During aging, these tags are rearranged, disappearing from some sites, appearing at others. Evidence has now accumulated that the overall pattern of these tags across the entire genome does indeed reliably indicate biological age in nearly any mammal species, including humans. It now appears as if such a biomarker for aging may have been discovered.



ADVANCING RESEARCH: GRANTS AND LEADERSHIP

For four decades, AFAR has served as a talent incubator and collaborative leader in biomedical research on aging. AFAR's core initiatives support healthy aging by advancing research, driving innovation, and furthering the field.

AFAR's grant programs are central to our mission to support and advance healthy aging through biomedical research. Since its founding, AFAR has granted close to \$189 million to more than 4,300 talented researchers, physicians, and medical students to conduct research and to help them build and grow careers in aging research and geriatric medicine.

A trusted leader and strategist, AFAR also works with public and private funders to oversee grant programs and interdisciplinary research networks. Foundations, trusts, corporations, and individuals have turned to AFAR to create customized initiatives in aging research that include grant making, meeting organization, and evaluation.

AFAR is committed to strengthening the research pipeline by providing grants and professional support at timely moments in investigators' careers that allow them to advance their studies and the field at large.



ODETTE VAN DER WILLIK

AFAR Deputy Director and Director,
Grant Programs

FUNDING RESEARCH

AFAR's Biology of Aging grant programs have demonstrated over the years that by studying the basic biology of aging and aging mechanisms underlying age-related diseases, we can potentially delay many common, chronic diseases, including cancer, stroke, heart disease, type 2 diabetes, and Alzheimer's disease.

AFAR awards 35 to 40 grants and scholarships each year. These grants support research along a continuum, from very basic studies of model systems, molecules, and cells to studies that are building on early-stage translational research addressing human aging and healthspan.

AFAR grantees are selected through scientifically rigorous, multiple review processes to ensure that only the most promising science and investigators receive our support. Members of AFAR's Scientific Review Committees — more than 300 members strong — are accomplished experts in biomedical research on aging, including many former AFAR grantees. AFAR's multiple review processes are regarded as the standard in the field.

AFAR's current grant programs include:

- Glenn Foundation for Medical Research and AFAR Grants for Junior Faculty
- Glenn Foundation for Medical Research Breakthroughs in Gerontology (BIG) Awards
- Glenn Foundation for Medical Research Postdoctoral Fellowships in Aging Research
- Diana Jacobs Kalman/AFAR Scholarships for Research in the Biology of Aging
- McKnight Brain Research Foundation Innovator Awards in Cognitive Aging and Memory Loss
- The Sagol Network GerOmic Award for Junior Faculty



BUILDING INFRASTRUCTURE

The National Institute on Aging (NIA) of the National Institutes of Health (NIH) has awarded several grants to AFAR to help lead three of its initiatives: the Nathan Shock Centers of Excellence in the Basic Biology of Aging Coordinating Center, the Research Centers Collaborative Network, and the Clinician-Scientists Transdisciplinary Aging Research (Clin-STAR) Coordinating Center.



**NATHAN SHOCK CENTERS
OF EXCELLENCE IN THE
BASIC BIOLOGY OF AGING**

Learn more at www.nathanshockcenters.org

The **Nathan Shock Centers of Excellence in the Basic Biology of Aging** provide leadership in the pursuit of basic research into the biology of aging. The Coordinating Center, housed at AFAR, provides coordination and communication between the eight Nathan Shock Centers, the NIA, and the biology of aging research community.



**RESEARCH CENTERS
COLLABORATIVE NETWORK**
of the National Institute on Aging, NIH

Learn more at www.rccn-aging.org

The **Research Centers Collaborative Network (RCCN)** aims to initiate new cross-disciplinary collaborative networks that bring together key thought leaders from each of the six NIA center programs: Alzheimer's Disease Research Centers, Centers on the Demography and Economics of Aging, Claude D. Pepper Older Americans Independence Centers (OAICs), Nathan Shock Centers of Excellence in the Basic Biology of Aging, Resource Centers for Minority Aging Research (RCMAR), and the Roybal Centers for Translational Research on Aging.



Learn more at www.clin-star.org

The **Clinician-Scientists Transdisciplinary Aging Research (Clin-STAR) Coordinating Center** provides a multi-faceted national platform to promote and enrich the career development, training, and transdisciplinary research of clinician-investigators across the US in order to improve patient-centered care for older adults across specialties and disciplines.

Since its founding,
AFAR has granted
close to
\$189 million
to more than
4,300 investigators.



WHAT'S NEEDED NEXT?

Age-related diseases are the #1 threat to human health globally. Because we now live longer than at any time in the 300,000-year history of our species — clearly longer than nature designed our bodies to last — we are suffering the maladies of aging as humans have never suffered them before. For example, the number of people living with Alzheimer's disease has more than doubled just during the first two decades of the 21st century.

Furthermore, aging begins at conception, and it has become increasingly apparent that fundamental aging processes contribute to disease risk, progression, and severity across the lifespan, even in children. For example, some people treated with chemotherapy or radiation for cancers as children are developing an accelerated aging-like state, with multiple age-related disorders and diseases, even before reaching middle age.

The solution is to accelerate the research, development, testing, and approval of effective, evidence-based treatments that target all the disorders and chronic diseases of aging at once by targeting the biological processes of aging that are their foundation.

How do we get there from here? As seen in the previous section, numerous scientific breakthroughs may one day soon be translated into life-changing interventions. With four decades of leadership in supporting healthy aging through biomedical research, AFAR is uniquely positioned to help move these discoveries from the lab into our lives, with therapies that can extend health and delay multiple diseases.



JAMES L. KIRKLAND, MD, PHD

AFAR President

2012 Grantee

2020 Irving S. Wright Award

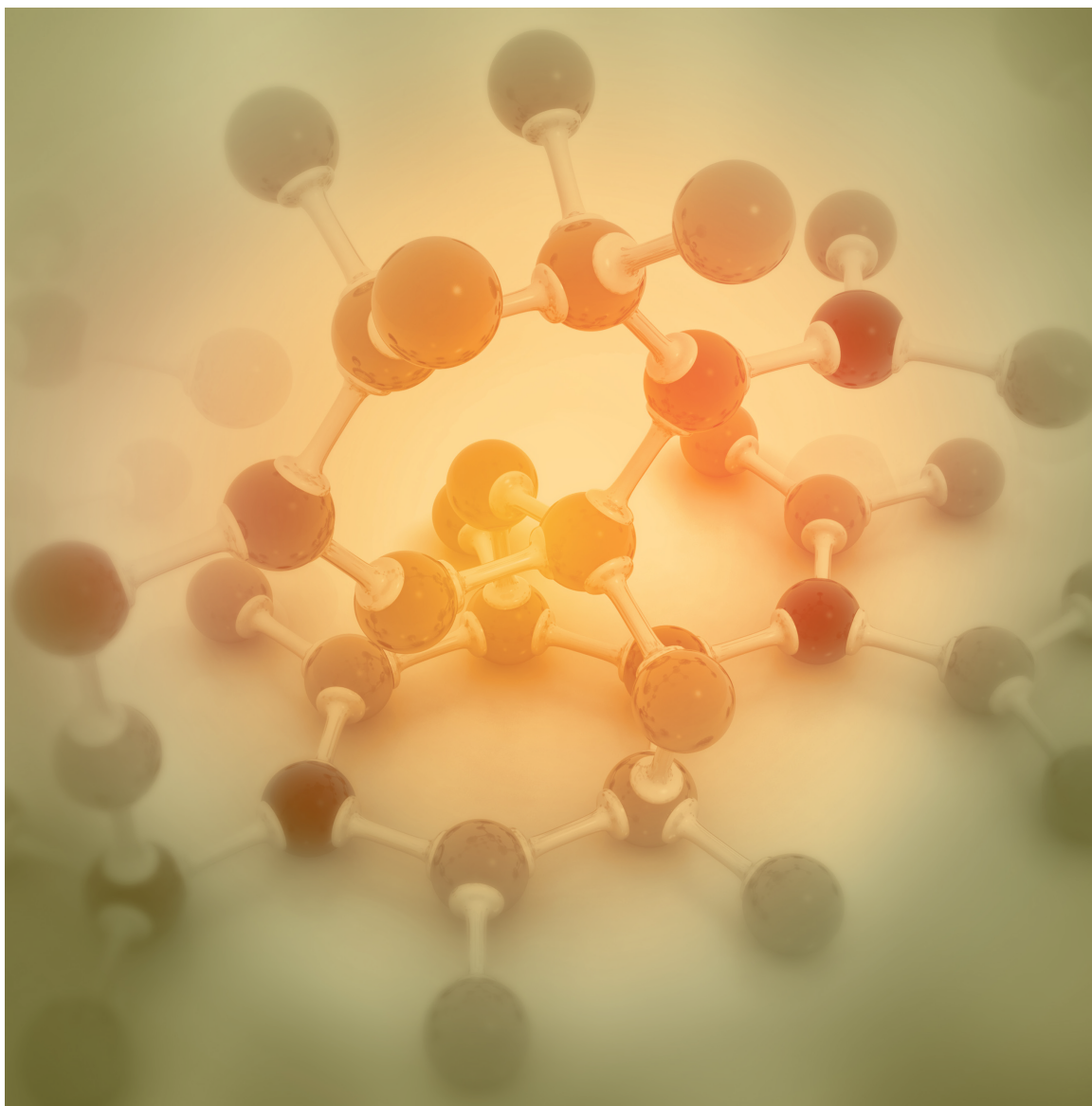
Mayo Clinic

EXPANDING BASIC RESEARCH ON THE MOLECULAR MECHANISMS THAT ARE THOUGHT TO INFLUENCE AGING AND SUSCEPTIBILITY TO DISEASE

The past 20 years have seen a wealth of discoveries identifying cellular processes that influence the length of healthy life in animal models and animal and human cells and tissues. We need to move these discoveries toward developing effective lifestyle, dietary, and pharmacological interventions to enhance and extend our years of health and independence, or healthspan.

EXPANDING DRUG DISCOVERY AND OTHER MEDICAL INTERVENTION EFFORTS THAT MIGHT TARGET MULTIPLE AGE-RELATED DISEASES AND CONDITIONS

The field is ready to target the processes of aging in the same way that we target individual disease processes. Addressing the many maladies of aging one at a time — the traditional medical approach — only extends the period of ill health as one disease replaces another. Targeting aging can preserve health itself.





FOSTERING PROOF-OF-CONCEPT STUDIES AND OUTCOME MEASURES NEEDED TO ADVANCE TRANSLATION INTO CLINICAL INTERVENTIONS

A major gap exists in the pipeline of translation from animal and human tissue studies that have successfully targeted aging to implementation of those discoveries in people. AFAR seeks to provide research and training in the technical skills and knowledge necessary to close this gap. Doing so will accelerate the pace at which laboratory discoveries become available as health-prolonging treatments.

DEVELOPING THE CLINICAL TRIAL PARADIGMS NEEDED TO EVALUATE EFFECTIVE INTERVENTIONS THAT AFFECT THE PROCESSES OF AGING

How can promising interventions that target the biological processes of aging be tested? Pharmaceutical companies have avoided research and development in this area because they have assumed that it would take many decades to convince regulatory bodies such as the FDA that their drugs effectively did what they promised. Researchers with AFAR have shown that this assumption is wrong. They have developed and continue to improve clinical trial paradigms to make such trials relatively short and cost-effective. Further work in this area will hasten the passage of health-extending drugs from the laboratory to the home medicine cabinet.

LAUNCHING THE TAME TRIAL IN ORDER TO MAKE AGING AN INDICATION FOR TREATMENT

AFAR is planning a large clinical trial to establish proof-of-concept that the effects of aging are a treatable composite of age-related diseases. Known as TAME (Targeting Aging with Metformin), the trial will investigate whether participants who take metformin — a widely used type 2 diabetes drug with a 60-year safety record — experience delayed development or progression of age-related chronic diseases compared with those who take a placebo.

PROMOTING PROMISING THERAPIES TO EXTEND HEALTHSPAN

Among the many promising potential therapies are:

- **Senolytics**, which target so-called “zombie cells” (damaged or senescent cells that tend to accumulate as we age and destroy other cells around them). A combination of the leukemia drug dasatinib and the supplement quercetin, which extended lifespan and healthspan in mice, has moved into human trials.
- **Rapamycin**, which has been shown to extend lifespan in mice by 25 percent and is now the focus of the University of Washington-based Dog Aging Project to see if it promotes longer lifespans in canines. Clinical trials with rapamycin for age-related conditions are just beginning.
- **NAD boosters**, molecules that restore levels of nicotinamide adenine dinucleotide (NAD) — a compound found in all living cells that naturally decreases by half as we age. Clinical trials with these agents are beginning.
- **Humanin**, a mitochondria-derived peptide (or short chain of amino acids that are naturally found in many foods) that prevents age-related cognitive decline in mice and has been associated with improved cognitive age in humans.
- **Fisetin**, a natural product found in many fruits and vegetables, which extends health and lifespan in mice by clearing out senescent cells. Fisetin is in very early clinical trials.
- **SS-31**, a mitochondria-targeted peptide that reverses age-related oxidation reduction (redox) stress and improves tolerance of exercise in aged mice.
- Many others, among them **CD38 inhibitors** and **17-alpha estradiol**, are in late phase animal and human tissue studies that may progress to early clinical trials.



WHERE DO WE GO FROM HERE?

Over the past four decades, AFAR has played a critical role in building the field of aging research. We have provided close to \$189 million to more than 4,300 investigators at premier research institutions across the country and around the globe. Many of the leading and most highly respected researchers in the field received crucial AFAR support at one or more stages of their careers.

For this report, we reached out to a cross-section of AFAR experts, board members, and peers to find out what they foresee happening over the next four decades in aging research.

We asked each the same question:

As AFAR turns 40 in 2021, what is your vision for how aging research will transform our lives over the next 40 years?

Their answers illustrate the innovation and creativity that are hallmarks of AFAR-supported researchers, and offer hope that the progress made in AFAR's first 40 years is merely prologue to the transformative breakthroughs that await us in the coming decades.



NIR BARZILAI, MD

AFAR Scientific Director

Multiple Grantee

2010 Irving S. Wright Award

Albert Einstein College of Medicine

"In the past 40 years, the aging research field has gained much recognition for identifying multiple genes that when their activities are modulated can extend the lifespan of conserved longevity models across several species. For the next 40 years, I believe it will be of utmost significance to leverage this remarkable fundament of molecular knowledge to determine reliable cellular biomarkers of aging that predict biological age as well as disease risk, and integrate this into a more complete understanding at the organismal level, including the contributions of inter-tissue communication. Combined with more clinical trials for compounds with beneficial effects on healthspan, I hope we can use and translate all this valuable information to ultimately ensure better healthy aging for our growing population of older individuals, while at the same time educating the next generations of prolific aging researchers."

Malene Hansen, PhD

2020 Irving S. Wright Award of Distinction recipient and four-time AFAR grantee; Chief Scientific Officer and Professor, Buck Institute for Research on Aging, and Adjunct Professor, Sanford Burnham Prebys Medical Discovery Institute

"My research over the past 40 years has focused primarily on how to care for older persons with health concerns and at the ends of their lives. In the next 40 years, I am eager to see advances that will expand healthy life span through basic research to understand the biology of aging and also behavioral health research that will encourage healthier lifestyles at all ages. Not all of us wish to live longer, but we all wish to live healthier for a longer time."

Terrie Fox Wetle, PhD

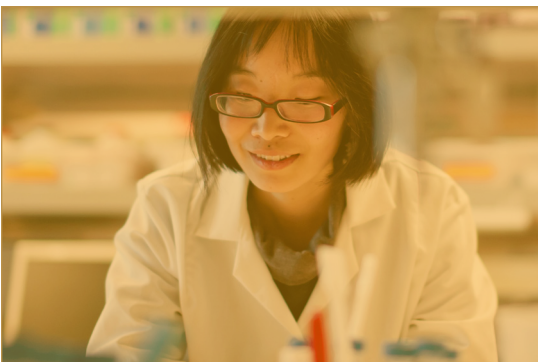
AFAR Executive Committee Member and former Board President; Inaugural Dean, School of Public Health, Brown University



"The science of aging is catching up with the aspiration of many to live healthier, and possibly longer. It is increasingly recognized that aging is a central cascade from which the diseases of aging emerge and proliferate in later life, and as such this science, so well curated and developed by AFAR, deserves a lot more attention and finding than it currently receives. Allowing people to age with dignity and lessened infirmity, as well as to enjoy the world, family life, and experiences for longer, must be the most worthwhile cause on the planet."

Jim Mellon

AFAR Board Member;
Chairman, Juvenescence Limited



As AFAR turns 40 in 2021, what is your vision for how aging research will transform our lives over the next 40 years?

"I have been dedicated to longevity and healthspan science for decades, and I can truly say that we are at an exciting point for aging research. Many new breakthroughs in therapeutics are driven by GerOmics, an emerging field of research sitting at the intersection of data science and biology. Given the complexity of the aging process, GerOmics can reveal novel insights into aging and age-related diseases. Researchers can analyze using AI to predict mortality or disease, improve personalized medicine and diagnostics, and even determine the effectiveness of new therapeutics. GerOmics can enhance the foundation of research in the basic biology of aging to support and advance healthy aging."

Sami Sagol
AFAR Board Member;
Chair, Sagol Network

"Aging has now become the most important risk factor for chronic diseases facing long-lived populations across the globe. The infectious disease model that was constructed in the late nineteenth century to treat one disease at a time was effective against communicable diseases, but the same approach applied to diseases of older ages made it clear that chronic fatal conditions do not operate independent of each other. Research on aging like that funded by AFAR is ushering in a new era of medicine and science that has the potential to be as transformative to our lives as any medical or public health intervention in history. Expect to see an extended period of healthy life at middle and older ages and a challenge of what to do with the gift of healthy life brought forth by aging science."

S. Jay Olshansky, PhD
AFAR Board Member; Professor,
School of Public Health, University of
Illinois at Chicago



"In the last 40 years we have learned much about how the body ages at the molecular, cell, and organ level, and in model systems have intervened in these processes to extend lifespan and healthspan. In the next 40 years I think that we will move this whole field forward by developing drugs to understand which processes drive specific clusters of age-related diseases and then targeting them to prevent or treat multimorbidity."

Janet Lord, FMedSci
Director of the Institute of Inflammation and Ageing, University of Birmingham, UK

"The majority of children born in high income countries today are expected to live into their ninth and tenth decades. Progress in the next forty years will mean these lives will also be healthier for longer. That combination will refashion what we do at each age. The economy and society will adjust to support a three-dimensional longevity dividend — lives that are longer, healthier and more productive. There is much discussion of a 'silver' economy aimed at the needs of older people. The real growth will be in an 'evergreen' economy providing products and services — from health and education to finances — that support healthy and productive longer lives and careers."

Andrew J. Scott, DPhil

Professor of Economics, London Business School

"The next 40 years hold the promise to drastically change our approach to aging and aging-related disease. This will happen through three innovative directions. First, multi-Omics-based prediction tools will be able to identify everyone's disease risk and likely aging patterns with great certainty. Second, personalized prevention approaches involving individualized diet, exercise and other lifestyle modifications approaches will be tailored for us in order to avert these risks. Third, through sophisticated real-time monitoring of relevant digital and biological biomarkers, the progression and aging- and disease-processes will be assessed and precision-based interventions targeting specific pathways will be used to delay and reverse these."

Pinchas "Hassy" Cohen, MD

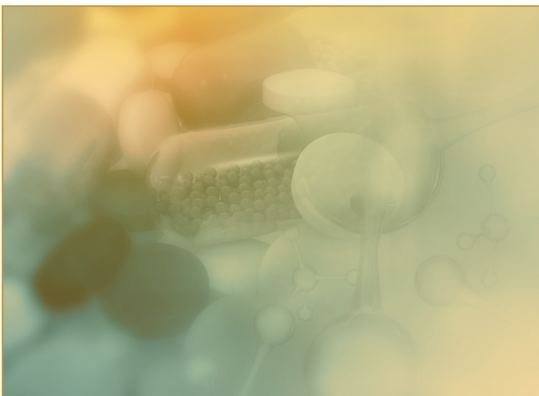
2017 Glenn Foundation for Medical Research Breakthroughs in Gerontology (BIG) Award; Dean, USC Leonard Davis School of Gerontology



"We need to view age through the lens of healthspan, not just lifespan. Right now, the longer we live, the less healthy we become — and both science and medicine focus more on age-related diseases, rather than the biology of aging itself. We have the potential to be physically and cognitively healthier as we age than we currently are. But to achieve that potential and make it accessible and equitable to everyone across the globe, we must incentivize the scientific, medical, and academic communities to work together, focusing efforts around aging as a biological condition. We must spur medical innovation in new areas, in order to accelerate drug discovery and development and move the needle on better aging for all."

Mehmood Khan, MD

CEO, Hevolution Foundation



YOUR SUPPORT IS VITAL

During the last century, innovations in public health and biomedical science have generated a dramatic transformation in how long we can live.

Today, however, the question is not simply how to live longer, but how to live *healthier* longer.

As we celebrate the achievements of our first 40 years and the field at large, AFAR is invigorated to continue to support and advance healthy aging through biomedical research.

Thanks to the science AFAR supports, and thanks to your support, we are making constant progress toward a simple and compelling vision: the ability for all of us to live healthier each and every day of our lives as we grow older.

Thank you for believing that science is vital.

Thank you for believing in the health and vitality of older adults.

Thank you for considering a gift to AFAR at www.afar.org/give.





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