



american federation
for aging research

aging

&

the promise
of geroscience

2013 Annual Report

AFAR | 2013 at a Glance

This year, the American Federation for Aging Research strengthened and supported the field of aging research through a range of public programs and publications to engage investigators, industry leaders, and consumers with the latest biomedical research that will enable us all to live healthier, longer.



At AFAR's annual grantee conference in Santa Barbara, California, poster sessions sparked dialogue among our newly funded investigators from across the country.



Dr. Valter Longo of the University of Southern California, Davis, and winner of AFAR's 2013 Vincent Cristofalo Rising Star Award in Aging Research, and Dr. Julie Andersen of the Buck Institute for Research on Aging discussed the latest biomedical perspectives in a special panel preceding our awards dinner in Los Angeles.



AFAR Deputy Scientific Director Dr. Nir Barzilai addressed a standing-room-only crowd during a panel discussion, "Can We Delay Aging?," organized in collaboration with Science Writers in New York (SWINY) in October.



With the Gerontological Society of America (GSA), AFAR cosponsored a special edition of the widely distributed *Public Policy & Aging Report*, "The Longevity Dividend: Geroscience Meets Geropolitics," which was launched at a press conference at the GSA annual conference in New Orleans.

AGING &: THE PROMISE OF GEROSCIENCE

Thanks to twentieth-century scientific and public health triumphs, life expectancy has grown dramatically. However, our lifespan tends to exceed our healthspan.

What's compromising our late-life health is an epidemic of chronic disease. Eight out of 10 older adults now have at least one chronic condition, such as cancer, diabetes, heart disease, stroke, or Alzheimer's disease. For society, this poses huge medical—and economic—challenges, as chronic diseases account for 95 percent of older adults' health care costs. Within the next 20 years, at least 20 percent of the American population will be 65 or older. Put it all together, and you have the health crisis of our time.

AFAR believes that the solution lies in studying the biology of how our bodies age.

Understanding the biology of aging is key to unlocking the etiology of the chronic diseases of old age. This outcome promises many medical and economic benefits to society and individuals alike.

Yet, for far too long, aging research has been separated from *chronic disease* research.

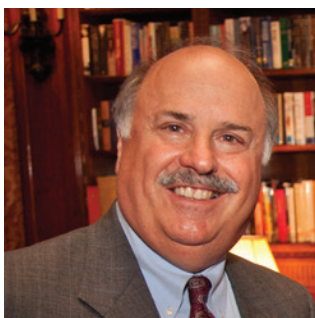
But a promising shift in the scientific community's approach began taking shape in 2013: amid newfound attention to aging research, the interdisciplinary commitment to understanding the relationship between aging and age-related diseases, known as **geroscience**, has emerged.

In the past 10 years, geroscience has yielded discoveries that once might have sounded unimaginable. Today, this growing scientific approach has profound implications for medicine and healthy aging. One of the most significant is the ability to modify the aging process in laboratory animals through a variety of interventions, including caloric restriction, pharmaceuticals, and genetic manipulation. Scientists now believe they will soon be able to delay or even prevent the diseases of old age in humans. Indeed, for many years, geroscientific research by AFAR-affiliated investigators nationwide has been providing increasing evidence that studying aging and chronic disease together yields mutually beneficial results.

AFAR experts also are influencing the attention of the federal government to geroscience. In October 2013, the National Institutes of Health (NIH) hosted a landmark two-day event, "Advances in Geroscience," which brought together 500 researchers, including representatives from 20 of the 27 NIH institutes and many AFAR investigators who are working on age-related diseases.

AFAR continues to advance interdisciplinary biomedical research on aging by funding the best and brightest scientific investigators through our rigorously reviewed grant programs, supporting researchers at pivotal moments in their careers while building the pipeline of talent devoted to helping us all live healthier, longer. In this report, we highlight the promise of geroscientific research led by AFAR experts, focusing on the relationship between **Aging & Alzheimer's disease, Aging & Cancer, and Aging & Diabetes.**

Geroscience holds great promise for us all, and with your support AFAR is helping to transform that promise into results.



William J. Lipton
Chair, Board of Directors



Stephanie Lederman
Executive Director

AFAR proudly dedicates its 2013 Annual Report to two valued partners:

- **MetLife Foundation** for its ongoing commitment to healthy aging and Alzheimer's disease research.
- **National Institutes of Health** for organizing the "Advances in Geroscience" summit this year and for spearheading the Trans-NIH Geroscience Interest Group.



- Alzheimer's disease affects 1 in 9 Americans over 65; it jumps to 1 in 3 citizens over 85
- Alzheimer's disease is the 5th leading cause of death in adults over 65

Among the mysteries of Alzheimer's disease, one fact is clear: aging and Alzheimer's disease are intertwined. "Aging is the #1, #2, and #3 risk factor for Alzheimer's, and the disease simply does not happen in children," notes Randall Bateman, MD, Charles F. and Joanne Knight Distinguished Professor of Neurology at Washington University School of Medicine and a 2007 AFAR Beeson scholar. "The real power and attraction in studying aging is not just its immediate use in how to treat disease, but in potentially changing how aging itself occurs."

One of the most significant ways AFAR-affiliated experts are looking at the relationship between aging and Alzheimer's/dementia is by studying the impact of age of diagnosis on our understanding of the disease.

In particular, Dr. Bateman's research looks at early intervention in Alzheimer's diagnosis and treatment. He invented the SILK (stable isotope-labeled kinetics) process, which shows that people with Alzheimer's clear amyloid beta from their bodies more slowly than healthy people: this discovery may allow doctors to predict Alzheimer's in patients with no other symptoms.

Dr. Bateman also directs the Dominantly Inherited Alzheimer's Network Therapeutic Trials Unit (DIAN-TU), a remarkable international collaboration between 12 pharmaceutical companies, the leading research centers in the field, and adult research participants who have a parent with a mutated gene known to cause dominantly inherited early-onset Alzheimer's disease.

Working with people nearly certain to get the disease informs earlier intervention and holds out new hope, Dr. Bateman says. "For the first time in human history, we have a reasonable chance to prevent Alzheimer's disease and senility."

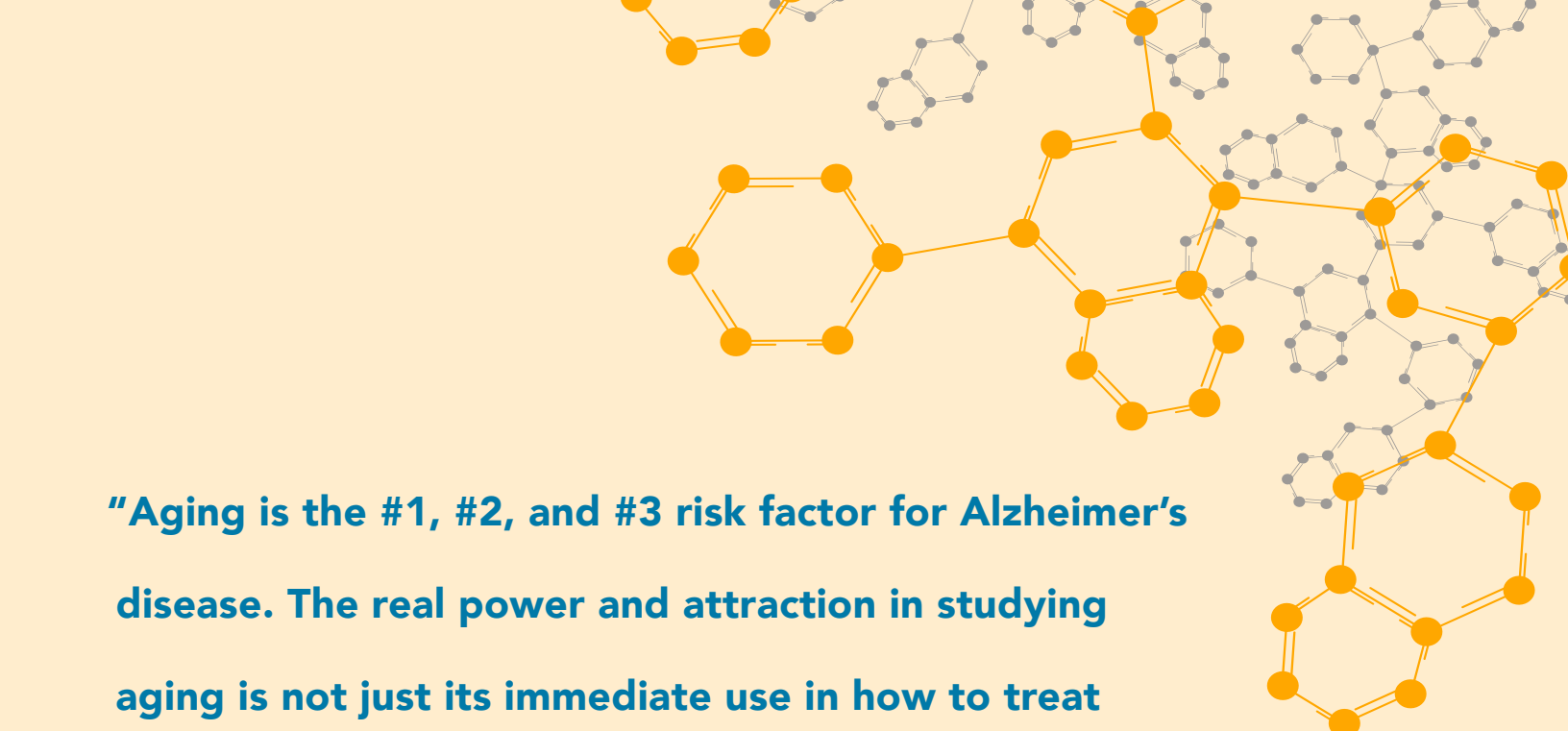
Early detection also drives the research of Edward Koo, MD, professor of neurosciences at the University of California San Diego School of Medicine, and a 1995 AFAR Beeson scholar.

Dr. Koo's work looks "upstream" to examine why synapses in the brain (the structures that permit neurons to pass signals to other cells) are lost or stop functioning correctly, destroying normal brain function, possibly before the neurons actually die. "If we knew why amyloid damages the synapses, we could block the damage, restore the damaged synapses, or prevent further damage—I'll take any of those outcomes," he says.

Dr. Koo also believes more than one drug will eventually be needed to address different stages of Alzheimer's progression, and his work on the potential for anti-inflammatory drugs (NSAIDs) to modulate the body's production of a toxic form of amyloid has progressed into pharmaceutical trials.

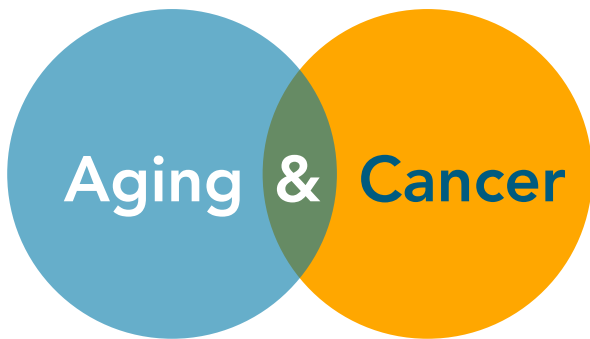
AFAR is committed to strengthening the pool of researchers dedicated to Alzheimer's disease through our New Investigator Awards in Alzheimer's Disease; AFAR also helps translate Alzheimer's and dementia-related research from the lab to the clinic through its administration of the MetLife Foundation Awards for Medical Research in Alzheimer's Disease.

To date, AFAR has awarded over \$21.2 million to 216 scientists researching Alzheimer's disease and related dementias at 89 institutions in 32 states, as well as in Ireland and Israel.



“Aging is the #1, #2, and #3 risk factor for Alzheimer’s disease. The real power and attraction in studying aging is not just its immediate use in how to treat disease, but in potentially changing how aging itself occurs.” — Dr. Randall Bateman





- Age is the most important risk factor for developing cancer; 53% of cases appear in people over 65
- Cancer is the 2nd leading cause of death in people over 65, and nearly 70% of cancer deaths occur in people over 65

The direct biomedical connection between cancer and aging is undisputed today, but just a few decades ago, “this was something that very few people realized,” says Judith Campisi, PhD, professor at the Buck Institute for Research on Aging and senior scientist at the Lawrence Berkeley National Laboratory. Since receiving an AFAR Research Grant in 1990, Campisi has gone on to make significant contributions to understanding why aging is cancer’s biggest risk factor.

Campisi’s lab investigates cellular senescence, the process by which cells stop from dividing. This occurs when cells experience certain types of stress, especially stress that can damage the genome. Senescence actually can slow cancer cell proliferation, while also possibly promoting healing, fighting infection, and supporting immune response.

But, as we age, senescent cells tend to accumulate in tissues, secreting damaging enzymes and promoting chronic (and toxic) inflammation. In this phase, they can actually hasten or even cause cancer as well as many of the other diseases of aging. Eliminating senescent cells has been shown to extend the healthspan of laboratory mice that age prematurely, so a part of Campisi’s current research is looking at how this might apply to humans. Campisi is working to calibrate the correct amount of senescent cells to remove—enough to lower toxicity but not so many that useful tissue healing functions are compromised.

“I think the idea that cancer is driven by a basic aging process—not simply by genomic mutations—has finally gained traction,” she says. “In this way, cancer is an ambassador for geroscience and how thinking about the basic aging process can give us a new handle on diseases associated with aging.”

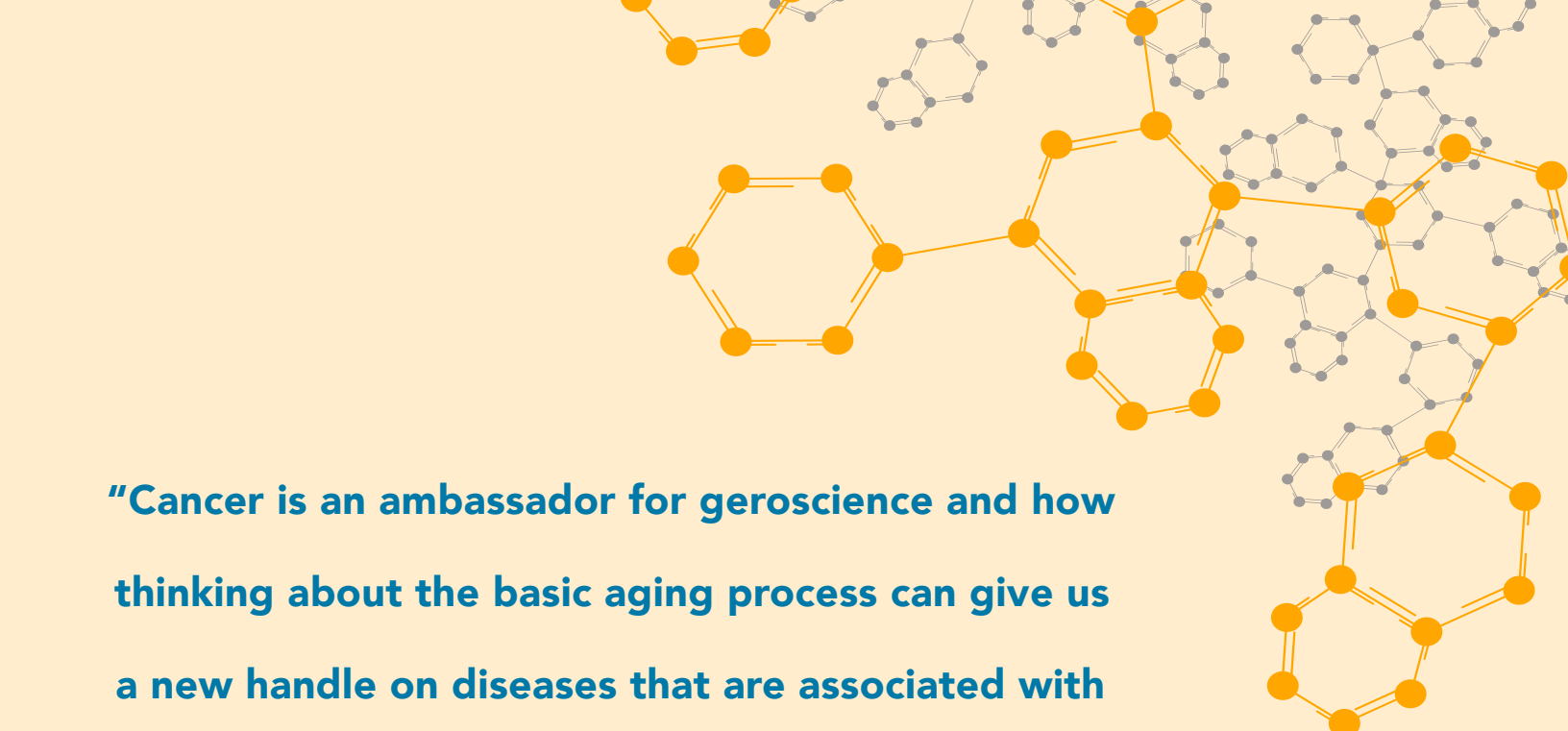
Age also becomes a critical influence in cancer treatment and clinical decision making. Old age is a risk factor for a poor response to the toxicity of chemotherapy, and few tools are available for predicting how much a patient will be able to tolerate.

“Older patients’ cancer may behave differently, and they may respond to it differently,” says Harvey Jay Cohen, MD, professor of medicine, director of the Center for the Study of Aging and Human Development at Duke University School of Medicine, and president of AFAR’s Board of Directors. “Older patients also tend to have other chronic diseases in addition to their cancer, and we want to consider their level of functional decline, both cognitive and physical, and diminished reserve capacity. All these things create a greater risk of a bad outcome.”

Dr. Cohen has pioneered research into adapting the comprehensive geriatric assessment for oncologic use to reduce those risks. Steps include identifying patients who are at risk, building up their reserves before treating them, and designing better-targeted regimens with lower levels of toxicity. “The holy grail for geriatric assessment, as I see it, is to use the information that you get to help in the management of patients so that they can tolerate more therapy.” Doing this will require both a better body of clinical evidence about what works best in treating older people, and a population of providers with both geriatrics and oncology backgrounds who can put it to good use.

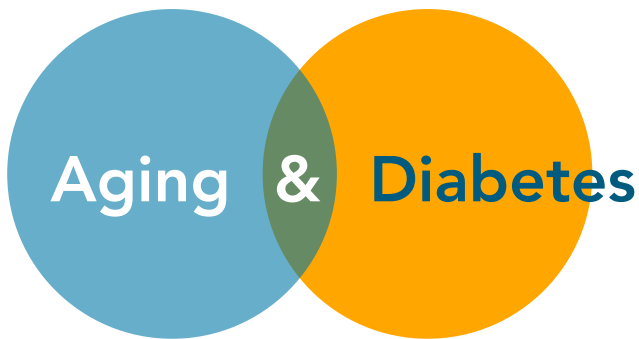
Like Dr. Campisi and Dr. Cohen, many of AFAR’s grantees have focused their research on the relationship between aging and cancer, particularly through our Paul Beeson Career Development Awards in Aging Research grant program.

To date, AFAR has awarded over \$3.6 million to 69 scientists conducting cancer-related research at 51 institutions in 21 states.

A decorative graphic in the top right corner of the page, featuring a network of interconnected nodes and lines. The nodes are represented by small circles, some in yellow and some in grey, connected by thin lines. The overall structure resembles a complex molecular or biological network, with several hexagonal and pentagonal shapes visible.

“Cancer is an ambassador for geroscience and how thinking about the basic aging process can give us a new handle on diseases that are associated with aging.” — Dr. Judith Campisi





- Diabetes affects 1 in 4 in Americans over the age of 65
- Diabetes is the 6th leading cause of death in adults over age 65

Diabetes and aging have a dangerous synergy. Aging is a major risk factor for diabetes, while diabetes accelerates many of the problems of old age, according to Jesse Roth, MD, FACP, investigator and head of the Laboratory for Diabetes and Diabetes-Related Research at the Feinstein Institute for Medical Research and a former AFAR board member. “Cognitive impairment comes on earlier—and worse—when diabetes is present, heart disease becomes more deadly. Partnered with excess body weight, diabetes magnifies cancer risk,” he says.

Although diabetes can be managed, there is still no cure for the disease.

For geroscientists, diabetes and aging share an equally important, though less visible, link. “At the molecular level, Type 2 diabetes mirrors the aging process, so a 40-year-old person who develops diabetes displays molecular and metabolic alterations that are very similar to a person who is 70 or 80 years old,” says Nicolas Musi, MD, director of the Barshop Institute for Longevity and Aging Studies at the University of Texas Health Science Center San Antonio, a 2007 AFAR Beeson scholar, and current member of AFAR’s National Scientific Advisory Council.

“If we can understand what causes diabetes at a molecular level, it will help us better understand some of the processes of aging. By targeting the mechanisms of aging, we will be more likely to find the causes of diabetes. And if we could slow down the aging process in human beings, that would lead to some degree of prevention or reversal of diabetes,” Musi adds.

Musi’s research at the cellular level uses a process called proteomic profiling to take a snapshot of all the proteins in a person’s mitochondria, allowing scientists to explore the mitochondrial decline that happens with age and the power of exercise to reverse that decline.


“With exercise, an older person’s mitochondria rejuvenate to the extent that you can’t distinguish them from the profile of the younger person,” Dr. Musi says. “There is a signal or a switch that helps the mitochondria stay healthy and active. We are interested in finding that signal, learning why we lose it with age, and why it is possible to turn it back on with exercise.” The ultimate goal of Musi’s research: identifying a pharmaceutical, a nutraceutical, or even a food that could, in effect, mimic the benefits of exercise.

Absent a cure, more tailored treatment for older diabetic adults, particularly those with multiple chronic conditions, is also essential. “If we take the usual treatments of younger patients and apply them rigorously to older patients, we risk doing more harm than good,” says Dr. Roth. Insulin therapy is particularly tricky for older adults, who suffer much greater harm from hypoglycemia.

For now, diabetes prevention is still the best offense, and the earlier, the better. Roth has pioneered the study of how problematic weight gain differs by ethnic group, and he is developing methods to spot early signs of insulin sensitivity by tracking patients’ insulin levels under resting conditions within a tight personalized range. “With this individualized measurement, we can follow people for a while, notice when they break out of their own level, and intervene earlier.”

By investigating aging and diabetes together, geroscience is helping bridge research and clinical practice, and AFAR programs such as our Biology of Aging grants are helping push these investigations forward.

To date, AFAR has awarded over \$4 million to 30 scientists conducting diabetes-related research at 20 institutions in 10 states.

A complex molecular structure diagram in the top right corner, featuring interconnected rings and chains of atoms. Some atoms are highlighted in yellow, while others are in grey. The structure appears to be a large, multi-ring organic molecule.

“If we can understand what causes diabetes at a molecular level, it will help us better understand some of the processes of aging. By targeting the mechanisms of aging, we will be more likely to find the causes of diabetes.” — Dr. Nicolas Musi



MINDING THE GAP



“The fundamental processes that underlie aging have often been dissociated from clinical work. In an attempt to bridge this gap, researchers have established the emerging field of geroscience.”

— Richard Hodes, MD, Director, National Institute on Aging (NIA),
before the Senate Special Committee on Aging, 10.29.2013

The opportunity to bridge the gap—between research and care, the lab and the clinic, and aging and other chronic conditions—is stronger than ever, thanks both to compelling advances in aging research and to geroscience’s interdisciplinary approach. On many levels, this new spirit of collaboration will explore new ways to understand how the basic mechanisms of aging underlie the pathologies associated with chronic diseases.

At the laboratory level, recent advances in extending the healthy life of animals have been enormous, but few people realize how sharp the cutting edge in aging research actually is, says Steven Austad, PhD, chair of the University of Alabama at Birmingham Department of Biology and AFAR Scientific Director. “Nearly one-third of the drugs we’ve tried in the [multicenter NIA-sponsored] Interventions Testing Program have been successful.”

Minding the gap also means moving lab discoveries more quickly into human clinical trials. Austad calls on aging researchers to seek constructive systemic change: “I’d like to see a fundamental change in how people-studies are designed. We need more older people included in clinical trials, as well as people who have more than a single health issue, and the trials need to examine the effect these interventions have on more than just one condition at a time.”

At the clinical level, physicians and other providers need to develop a greater capacity for applying new and emerging evidence to patient care. One recommendation from the recent NIH Geroscience Summit was to examine the two-way street that exists between aging and disease, particularly on inadequately understood age-linked phenomena such as chronic inflammation.

Richard W. Besdine, MD, Director of the Division of Geriatrics and Palliative Medicine at Brown University’s Alpert Medical School and AFAR Medical Director, agrees this progress could improve care by permitting earlier and more informed medical intervention. “I would look toward a time where the detection of an increase of inflammation, beyond a small age-related degree, would be regarded as a signal for comprehensive evaluation, like a fall or episode of delirium is today.” Likewise, the John A. Hartford Foundation, an AFAR funding partner, recently launched a new initiative designed to help accelerate the pace of change in health care practice: the Hartford Change AGENTS will increase the use of new models of care and new knowledge to improve the health of older Americans.

Finally, looking to the future, a secure funding base is indispensable to recruit the best young scientists into aging. Fortunately, says Dr. Austad, “aging research has become really sexy science in the last ten years. The students keep getting better and better. It’s a really attractive field to young minds, and that’s a good sign.”

Just as AFAR supports researchers focusing on aging at every level, at this critical demographic moment with a fast-aging population, fulfilling the promise of healthier aging will require renewed and refocused efforts at every level, from our partners, foundations, government and individual funders, as well as our grantees.

Looking ahead, AFAR will launch new initiatives in 2014 to mind gaps around the world and across fields:

- The **Glenn/AFAR Postdoctoral Fellowship Program for Translational Research on Aging** will support research that aims to bridge the gap between discoveries in biomedical research and clinically relevant findings, treatments, diagnostics and prevention, encouraging findings from the laboratory to be brought to clinical practice (and vice versa—clinical observations are made and brought back to the laboratory for further testing).
- The **Clarence Pearson Internship in Global Health and Aging** will highlight the international impact of age-related issues by identifying like-minded organizations overseas to develop joint projects, share best practices, and address common concerns across nations facing exploding aging populations.

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Since 1981, AFAR has provided approximately \$132 million to more than 2,800 talented investigators and students selected through a rigorous review process by renowned experts. Learn more about each program at afar.org/research.

- **AFAR Research Grants for Junior Faculty**
- **ANRF/AFAR Arthritis and Aging Research Grant**
- **Paul Beeson Career Development Awards in Aging Research Program**
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- **Glenn/AFAR Breakthroughs in Gerontology Awards**
- **Glenn/AFAR Scholarships for Research in the Biology of Aging**
- **John A. Hartford Foundation Centers of Excellence in Geriatric Medicine and Training National Program Office**
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- **Medical Student Training in Aging Research (MSTAR) Program**
- **The New Investigator Awards in Alzheimer's Disease**

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“I am pleased to contribute to AFAR’s work in two personally meaningful roles: one as a member of its Board, and the other as the son and nephew of active Centenarians who themselves exemplify healthy aging.” — Thomas G. Kahn, CFA



Genentech’s Andrew Chan, MD, PhD (above), and Michael Varney, PhD, received the Chairman’s Award of Distinction at our October Awards Dinner at the California Club in Los Angeles.



AFAR board members Helen and Jay M. Edelberg were among the guests who enjoyed our Awards Dinner at the Lotus Club in New York City in April.



For their Alzheimer’s disease activism, we presented a special AFAR Award to Ashley Campbell and the Campbell family at our October Awards Dinner in Los Angeles.

AFAR is deeply grateful to our donors for their generous support. Their continued contributions enable us to fulfill our mission and strengthen our programs.

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AFAR honored the longtime dedication of founding board member George E. Doty and his wife, Marie, with a tribute award. The award was received by their son, William Doty, at our Awards Dinner at the Lotus Club in New York City in April.

SUPPORT AFAR | ADVANCE HEALTHY AGING

The American Federation for Aging Research (AFAR) has long led the field of biomedical research on aging.

For over 30 years, we have offered a broad range of grants to successfully identify, fund, and mentor enterprising and talented scientists dedicated to achieving breakthroughs in the biology of aging. Our distinguished research committees are comprised of the nation's leading experts who conduct peer reviews and build consensus to ensure that the highest quality candidates are selected for funding.

Our individual supporters and donors from the foundation, corporate, and government sectors help sponsor our programs and advocate on our behalf. We build the intellectual resources—the scientists and medical professionals—who will tackle the challenge of an aging population that is living longer and is expected to increase almost fourfold by 2050.

Today, we are at a turning point. With the youngest baby boomers set to turn 50 in 2014, our research is more important than ever. Exciting, new scientific discoveries have the potential to transform our understanding of the field of aging.

But we still need your help to continue advancements in scientific innovation, encourage more physicians to specialize in geriatrics and/or train to meet the needs of an aging population, and increase public education on healthy aging. Please join us and become an AFAR donor. We offer a range of giving options:

- Make a gift to our **annual campaign**, the central vehicle through which our operations and our core AFAR research grant program are funded. Our administrative and overhead costs are kept to a minimum, ensuring that the bulk of your donation goes directly to programs. Gifts may be made annually or through our monthly and quarterly gifts program.
- Make a gift to underwrite or endow a **research grant** in your name, your foundation's name, or your company's name. Naming opportunities in support of AFAR research grants, new investigator, or disease-specific grants are available at multiple levels of giving.
- Make a gift to **sponsor scientific conferences or public educational programs**. Naming opportunities in support of AFAR informational activities are available at several levels of giving.
- Make a **planned gift** or bequest.
- Make a **memorial or a tribute gift** to honor a loved one or mark a special occasion.
- Make a gift through your **employer's matching gift program**, which leverages additional funds.
- Make a **gift of stock** or other tangible property.

For additional information, **please contact Shelley Binder** at shelley@afar.org, or 212.703.9977.



AFAR's accomplishments and low administrative expenses have secured the highest rating from Charity Navigator, an independent evaluator of the nation's charities, for sound fiscal management and commitment to accountability and transparency.

"As President of the Board, my late husband Vincent was intimately involved in AFAR's pursuit of scientific excellence. I am delighted to support AFAR in its mission to sponsor enterprising research investigators, including those who are well-experienced and those who are new to the field. AFAR has long been a pioneer in aging research, and I look forward to AFAR's continuing leadership in the field." — Margaret F. Cristofalo

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"I am proud to continue the legacy of my grandfather, Dr. Irving S. Wright, who founded AFAR over 30 years ago. AFAR plays such a key role in advancing our understanding of the biology of aging. I am gratified to have served on the AFAR Board of Directors for the past sixteen years and for the opportunity this has afforded me to support and advocate on AFAR's behalf." — Alexandra L. Gatje

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