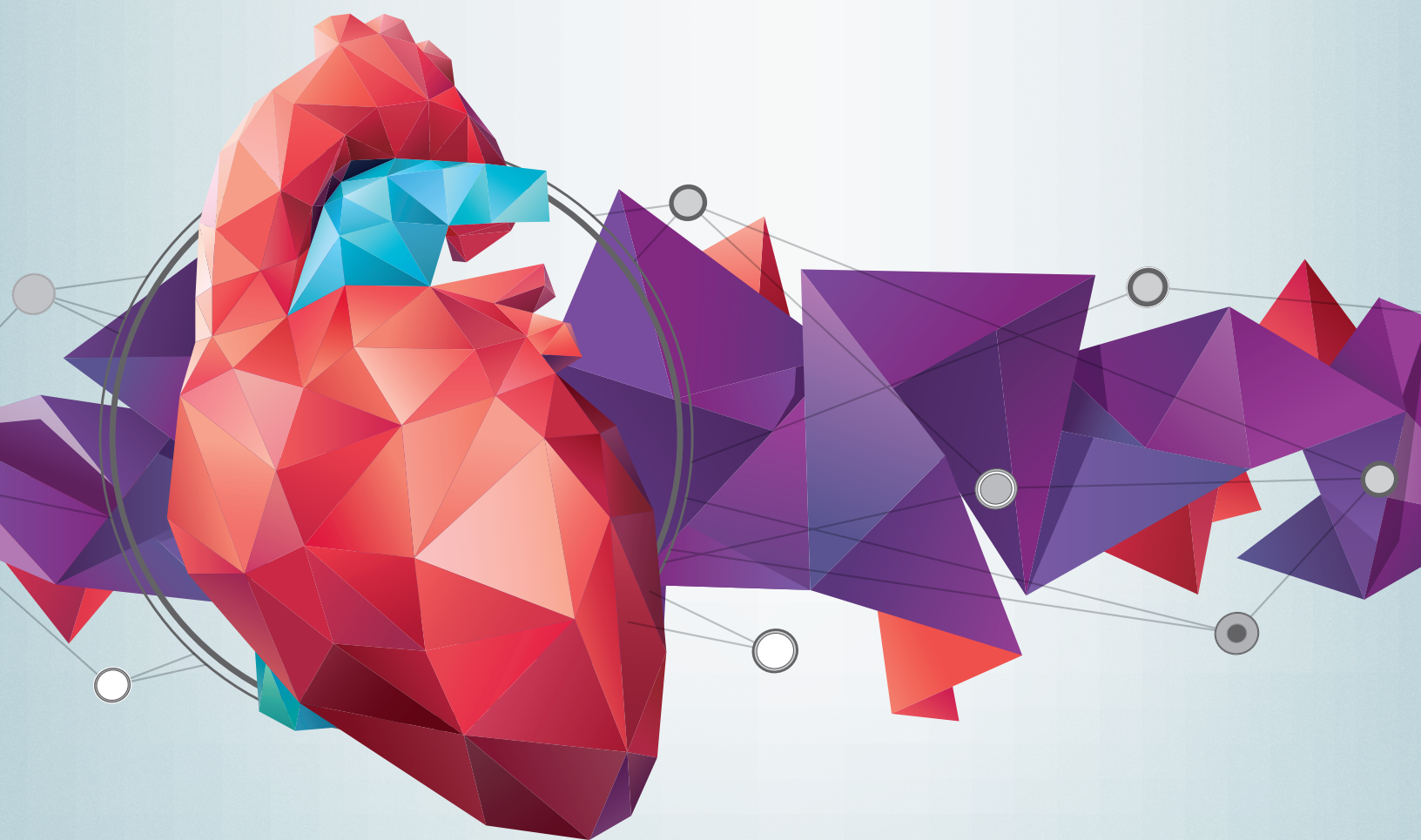




END OF NETWORK REPORT

DISPARITIES

IN CARDIOVASCULAR DISEASE AND STROKE



STRATEGICALLY FOCUSED RESEARCH NETWORK

For nearly 100 years, the American Heart Association has invested in fighting cardiovascular disease, the No. 1 killer worldwide.

Research is the foundation of all aspects of the AHA's work. Since 1949, the organization has invested more than \$4.6 billion to spur scientific innovations that help people live longer, healthier lives. As science evolves, the AHA's research has grown and evolved to keep pace.

In 2014, the AHA established the Strategically Focused Research Networks, a unique venture that brings together scientists from multiple institutions to study a common topic from different perspectives. Collaboration across disciplines helps create new ideas, approaches and knowledge. The AHA Board of Directors chooses the topic of each SFRN.

Because heart disease disproportionately impacts under-resourced communities, and under-represented racial and ethnic groups, the AHA committed \$15 million to establish the Disparities in Cardiovascular Disease and Stroke Strategically Focused Research Network. This SFRN gave researchers the critical opportunity to explore complex questions about cardiovascular health as it relates to race and society.

The AHA awarded four Centers \$3.7 million each for research beginning in 2015. They are:

- **Medical University of South Carolina**, to study post-stroke recovery and disparities in the African American population.
- **Morehouse School of Medicine / Emory University**, to target new ways of improving cardiovascular health by understanding the risk and resiliency among Blacks.
- **Northwestern University**, to investigate whether phosphate-based additives found in processed foods contribute to racial and socioeconomic disparities in heart failure and chronic kidney disease.
- **University of Colorado Denver**, to examine how racial discrimination and subsequent stress increase the risk of cardiovascular disease and health care disparities among urban American Indians and Alaska Natives.

Each Center was required to include a basic science, clinical science and population science research component. Other than that, "they were given free rein to come up with research that made sense for their group," said Oversight Advisory Committee Chairperson **Cheryl Anderson, Ph.D., M.P.H., M.S.**



Dr. Cheryl Anderson

"This SFRN was all about giving scientists a broad opportunity to have a real impact on the disparities of cardiovascular health outcomes across racial and ethnic groups," she said. "We wanted them to think about everything from genes to society – from the smallest molecular level all the way up to the biggest social construct – and to ask, 'What are the things that get in the way of us all achieving equitable health outcomes?'"

Each Center designed a two-year research postdoctoral training program for three

fellows. Those fellows created relationships with faculty across multiple disciplines, in their own institution and across all four Centers.

"Bringing different types of scientists to the table often gets much better results than if you bring together the same scientists who typically work together," said Anderson.

"There are so many strengths to the multi-disciplinary model. It created so many opportunities to improve cardiovascular outcomes and close the gaps."

Disparities SFRN Awardees and Oversight Advisory Committee



SFRN CENTERS: DISPARITIES IN CVD & STROKE

If there was one word to describe the relationship between researchers at the four Disparities SFRN centers, it would be “synergy.” Each center reported working together across disciplines and institutional borders to achieve network goals.

Medical University of South Carolina

Center Director: Robert Adams, M.D., M.S.

At the Medical University of South Carolina, researchers tackled a question that’s frustrated medical professionals for years: Why is stroke recovery worse for African Americans than for white people, even with the same access to rehabilitation?

To delve into the problem, MUSC scientists working in regenerative medicine, neuroscience and nursing used novel approaches to target the disparities and better understand the problem. In the basic project, researchers saw how recovery in the animal model was hampered by the multiple risk factors of blood pressure, diabetes and high cholesterol.

“We learned we’ve got to be more aggressive in treating preexisting conditions earlier, before people have a stroke,” said Center Director **Robert Adams, M.D., M.S.** Researchers studying brain health imaging came to a similar conclusion.

The population project developed long-lasting team nursing strategies to better help African Americans recover from stroke. “A nurse guides the team, but community health workers have an increasingly important role to play,” Adams said. The researchers identified several barriers and facilitators of post-stroke recovery (in terms of functional and psychosocial status and quality of life). The physical and cognitive changes remaining after stroke included mood changes, medication issues and lack of support



Dr. Robert Adams

and resources. Health care professionals identified knowledge and information, care coordination and, resources within the community, which were key to facilitating stroke recovery outcomes.

Adams said his center’s research shows that the Disparities SFRN model combines the best of all worlds.

“Some research projects are very broad and others are highly focused, but this SFRN is important because it’s in between: It brings just enough focus so people who think very differently can communicate in new ways,” Adams said.

An AHA volunteer since the 1980s, Adams credits the organization for its dedication to health disparities long before others made that a priority. The Disparities SFRN continued that mission by teaching scientists from distinct backgrounds to think differently.

“It’s a tremendous, exciting opportunity for everyone to trust one another, learn new things and look at society and science in a new way,” Adams said.

Morehouse School of Medicine / Emory University

Center Director: Herman Taylor, M.D.

When examining health disparities, sometimes it’s best to make a 180-degree turn, said Center Director **Herman Taylor, M.D.** from Morehouse School of Medicine.

“We spend 99% of our time examining how poorly Black health is maintained and virtually no time exploring how so many African Americans live long lives despite the challenges and stressors,” he said.

“Focusing on the negative has indeed created important research, but there’s another story to tell: the story of survival and resilience.”

To do that, Morehouse School of Medicine partnered with Emory University to create the MSM/Emory Cardiovascular (MECA) Center for Health Equity. Center scientists went to Atlanta to find out why some Black neighborhoods had good cardiovascular health and others fared poorly, despite similar income levels.

Using surveys, data analysis and lab tests, they discovered that heart health was better in communities where people regularly connected with their neighbors and had a strong sense of optimism, purpose and control over their lives.



Dr. Herman Taylor

The findings open the door for community and psychological interventions to try to improve cardiovascular health, Taylor said.

“Optimism is an attitude that can be created,” he said. “There are lessons to be learned from this study about human resilience and the incredibly positive narrative of African Americans thriving through some of the hardest challenges imaginable.”

Those challenges still loom large. Taylor pointed to a recent study that found more than 74,000 “excess deaths” occur annually among Black Americans because their mortality rate was higher than that of white populations.

“It’s a huge public emergency. It’s why the Strategically Focused Research Network on Disparities is as important as any initiative the American Heart Association has undertaken. And it’s why we need more funding to sponsor more studies that will potentially resolve these disparities.”

Northwestern University

Center Directors: Myles Wolf, M.D., M.Med.Sc., and Mercedes Carnethon, Ph.D., FAHA

At Northwestern University, researchers dug deep into the world of molecules to learn if food preservatives are linked with disproportionately high rates of heart and kidney disease among African Americans.

"We took an innovative approach to filling a unique niche," said **Mercedes Carnethon, Ph.D., FAHA**, who credited Co-Center Director **Myles Wolf, M.D., M.Med.Sc.**, for coming up with the idea. "We decided to look under the skin at the molecular mechanism that underlies disparities."

Researchers zoomed in on the microscopic properties of processed and packaged foods, which are often cheaper than fresh fruits and vegetables and are often bought by people experiencing food insecurity.

They found that phosphorous, a food preservative, can cause the body to produce high levels of the hormone Fibroblast Growth Factor 23 (FGF23) and harm blood vessels leading to the heart and kidneys. They also discovered that food insecurity was linked with higher levels of FGF23.



Dr. Myles Wolf

Finally, researchers tested diets that can reduce the damage and found that eating foods low in phosphorus may improve the heart health of people who have poor access to nutritious foods.

"Prior work on FGF23 had been done in people with advanced disease. This was an opportunity to step back and look at a population that didn't have preexisting disease and see if this marker is associated with disparities," she said.

The findings could impact public health policy similar to past studies that showed the dangers of trans fats, Carnethon said.

"As a result of that research, the United States and other countries began regulating trans fats," she said. "We hope this research presents an empirical piece of evidence to suggest that there should be labeling for phosphates. If the strength of evidence continues to grow, there should be regulations about their use."

Carnethon applauded the American Heart Association for coming up with a complex but cohesive way to explore disparities in cardiovascular health.

"It's really valuable to carve out space for 12 investigators at four centers who are all pursuing one big topic at the same time and touching base with one another," she said. "I think that sort of dedicated work on a single topic really accelerates progress."



Dr. Mercedes Carnethon

University of Colorado Denver

Center Director: Spero Manson, Ph.D.

At University of Colorado Denver, researchers explored the intersection of racial discrimination, stress and cardiovascular risk among American Indians and Alaska Natives in urban areas.

"There's the stereotype of native people living in rural and reservation areas, but in fact, over 70% of American Indian and Alaska Native people live in cities," said Center Director **Spero Manson, Ph.D.** "Because they remain so understudied, it puts them at double jeopardy."

Researchers set out to see if racial discrimination plays a role in cardiovascular disease, and if so, what can be done to reverse that.

One study measured experiences of racial discrimination and heart health in more than 500 American Indian and Alaska Natives living in the Denver area. Researchers found that perceived racism was linked to worse mental health, sleep and eating habits. Those who experienced more racism were at higher risk for heart disease and other health problems.

"Racism will always be in the environment, but the next step is intervening," Manson said. "If we can give individuals tools to have a greater sense of resilience and control, it might reduce the basic contributors to hypertension and cardiovascular disease."

Researchers also set out to test new ways of reducing the fear of racism in the doctor's office.

Before their appointments, patients waiting in the reception area took part in short "values affirmation" exercises: After choosing certain primary values from a list of about 10 choices, the patients were asked to write a few sentences about the meaning and importance of this value in their lives.



Dr. Spero Manson

The research found that American Indian and Alaska Natives who took part in the exercises had "an increased sense of self-efficacy" and were more likely to take their prescribed medication regularly and have better control of their blood pressure, Manson said.

For the three UC Denver fellows who worked on the SFRN, the experience "pushed them forward in a rapid advancement in their respective career paths," Manson said.

"Two of the research fellows are American Indians, who are among the most underrepresented racial groups in the scientific workforce today. The fellowships contributed to their sense of ability to conduct high-quality science, to advance academically, and it gave them a sense of value to the communities with whom they are partnered."

"In many senses, this initiative is an incubator that's fueled new lines of inquiry for us," Manson said. "It's been highly successful, both in terms of launching our work forward, but also in attracting human and capital resources. It's been a catalyst."

THE FELLOWS: A CLOSER LOOK

The Fellowship Program

Through the Disparities SFRN, the AHA mentored and trained 12 postdoctoral fellows to be part of an innovative new generation of disparities investigators.

Fellows were assigned to specific teams at each SFRN center. But they also collaborated within and beyond their centers, which prepared them to develop new goals and strategies.

"The fellows all learned to connect with different people in new ways," said Dr. Robert Adams, Center Director at the Medical University of South Carolina.

"You often start your career quite focused and protective of your ideas, but you learn that you can go so much further with collaboration," Adams said. "We teach fellows that it's better to be part of something than nothing at all"

The fellows forged relationships with other scientists and mentors across all four centers while conducting research on new ways to disparities in cardiovascular disease. The fellows also advanced their careers by networking and presenting research at the AHA Network Annual Meetings and other AHA conferences and meetings.

"The AHA really took care of us and helped connect us to national leaders with one-on-one mentoring sessions," said Jeong Hwan Kim, M.D., a fellow at the Morehouse School of Medicine/ Emory University Disparities Center.

"Even if you're already getting good mentorship in your own institution, this fellowship was unique in the way you learn from fellows and mentors who are all researching very different types of disparities. The structure of this program had so many benefits."



Dr. Joy Jones Buie

Here are the stories of five of the fellows:

Joy Jones Buie, Ph.D.

Medical University of South Carolina

SFRN Disparities Fellow, 2017–2019

For **Joy Jones Buie**, working on the Disparities SFRN was a "horizon-expanding experience."

"This fellowship gave me the ability to look at health disparities through a different lens," she said. "It gave me the chance to become a true translational scientist."

After Buie earned a Ph.D. in immunology in 2013, she became fascinated with how health disparities impact vascular diseases. When she heard about the Disparities SFRN fellowship at the Medical University of South Carolina, "it seemed like the perfect fit for me and for them."

Buie joined the center's WISSDOM initiative (Wide Spectrum Investigation of Stroke Outcome Disparities on Multiple Levels) and sought out new ways of improving stroke outcomes among African Americans.

"We know the biggest risk for stroke is high blood pressure, and we know about 75% of African Americans have high blood pressure by the age of 55. So, I really focused on understanding the unknown factors that lead to this disparity in the development of hypertension."

Dr. Suzanne Burns



Buie's findings confirmed previous research on the stiffness of blood vessels and cognitive impairment among African Americans with cardiovascular disease. It also opened new doors for her to conduct research on how social determinants and genetics impact health disparities.

She is particularly excited about studying the way psychosocial stressors impact the genes of African Americans.

"It's hard to change your socioeconomic status, but what if we create a drug or cognitive behavioral therapy to remedy some of the effects that stress has on the genome?" she said.

Buie's work on the Disparities SFRN contributed to her winning a K22-NINDS Advanced Postdoctoral Career Transition Award to Promote Diversity in Neuroscience Research. She said her fellowship inspired her to pursue a nursing degree at the Medical University of South Carolina and to think more broadly.

"This kind of health disparities research really helps everybody," she said. "Once we figure out what's happening in people with diseases that are more severe, then we can understand how to prevent disease for the general population."

Dr. Buie and Dr. Burns at SFRN Annual Meeting



Suzanne Burns, Ph.D.

Medical University of South Carolina

SFRN Disparities Fellow, 2016–2018

"I think we can all be guilty sometimes of staying in our silos," **Suzanne Burns** said. "This fellowship taught me to communicate and collaborate with professionals beyond our silos."

An occupational therapist specializing in treating stroke patients, Burns said she built relationships with scientists of all different stripes during her Disparities SFRN fellowship at the Medical University of South Carolina.

"It was really interesting to see how all these researchers from different disciplines came together to try to solve challenges," she said. "Along with my exquisite mentorship team, it really helped me feel confident and learn so many different approaches to research and science."

Burns focused on MUSC's population science study, working with nurses and community health workers to create and test culturally tailored ways to help African Americans who've had a stroke.

The research will have a significant impact in the Deep South "stroke belt" where black people have worse outcomes than white people, she said. "But I also think there are a lot of opportunities for delivering those interventions across the U.S."

As part of the fellowship, Burns gave presentations and co-authored publications, including *My Guide to Living with and Preventing Stroke: A Handbook for People Who Have Had a Stroke and their Families, Caregivers and Communities*. In wake of the fellowship, she won the ASA/ACRM Young Investigator Award in Post-Acute Stroke Rehabilitation. She's currently an assistant professor in the School of Occupational Therapy at Texas Woman's University.

"The fellowship definitely opened a lot of doors and helped me find a career in academia," she said. "With the Disparities SFRN, the AHA is training and inspiring a generation of scientists to conduct research that will move this work forward and improve outcomes for people recovering from stroke."

Ehimare Akhabue, M.D.

Northwestern University

SFRN Disparities Fellow, 2016–2018

“No matter what stage we’re at, we can always learn more.”

That was **Ehimare Akhabue’s** credo during his Disparities SFRN fellowship at Northwestern University, where he investigated whether phosphate-based additives found in processed foods contribute to disparities in heart failure and chronic kidney disease.

Akhabue was already a cardiologist at Northwestern during his AHA fellowship. By the time he finished the program, he was a full-time faculty member at Robert Wood Johnson Medical School at Rutgers University.

Taking part in the AHA’s Disparities SFRN opened his eyes to new ways of working, he said.

“Collaboration is essential when you’re learning,” he said. “This was a great opportunity to not only think of your own ideas, but to learn from senior investigators who also contribute ideas and make sure you’re headed in the right direction.”



Dr. Ehimare Akhabue



AHA Fellow Panel Presentations at SFRN Annual Meeting

Working with his peers at the Northwestern Disparities Center, Akhabue found that a preservative in processed and packaged foods can cause the body to produce high levels of the hormone FGF23. That hormone is linked to increased cardiovascular risk in African Americans.

“I think these studies are very important in terms of achieving health equity and being able to provide more personalized care to African Americans.”

His work on the Disparities SFRN appeared in several publications, including the AHA journal *Hypertension*.

“I appreciate the American Heart Association for giving me this platform and allowing me to become a better investigator and thinker,” he said. “I think the AHA really understands the importance of developing junior investigators and trainees by providing research opportunities that can improve outcomes.”

Jeong Hwan Kim, M.D.

Morehouse School of Medicine/Emory University
SFRN Disparities Fellow, 2017–2019

Like many clinical doctors, **Jeong Hwan Kim** learned to have a laser focus on helping sick patients get better. Now, thanks to his Disparities SFRN fellowship, he also understands the bigger picture.

“I have a better insight into what’s happening outside the hospital, which was really important for me to learn,” Kim said. “Collaborating with psychologists, social scientists and epidemiologists gave me a new perspective.”

Working with investigators at Morehouse School of Medicine and Emory University, Kim studied what makes people and neighborhoods healthier among Black Americans living in Atlanta and how that affects their cardiovascular health.

The concept of community “resilience” could be a key to identifying new ways to improve heart health among Black Americans, he said.

“Specific areas of Atlanta are resilient to adverse outcomes, while certain areas are even more at risk,” he said. “We often think about communities in terms of walkability or green space or how safe it is. Our findings suggest non-tangible things like social connection and social network may actually be more meaningful.”

Dr. Jeong Hwan Kim



Kim’s work from the Disparities SFRN, *Individual Psychosocial Resilience, Neighborhood Context, and Cardiovascular Health in Black Adults* was published in *Journal of the American Heart Association*, *Circulation: Cardiovascular Quality and Outcomes*, *Preventing Chronic Disease* and *Annals of Epidemiology*. He plans to finish a cardiology fellowship at Emory University by the end of the year. After that, he wants to research the complexities of heart health, race and society.

“I’ve come to appreciate how difficult it is to tease apart the multi-factoral aspects. It’s the context that matters,” he said. “I’m truly grateful for the opportunity that AHA has given me. It’s really helped me prepare for the next stage of my career: becoming an independent investigator studying disparities.”

Chad Danyluck, Ph.D.

University of Colorado Denver

SFRN Disparities Fellow, 2017–2019

When **Chad Danyluck** heard about the Disparities SFRN, he was finishing his Ph.D. dissertation on “physiological synchrony” – the idea that when two strangers interact, it changes their biology.

It turns out there was already a synchronicity between his career focus and the Disparities project being launched by the University of Colorado Denver.

“To my great surprise, the key goals of the AHA fellowship were similar,” he said. “It enabled me to deepen my prior expertise.”

Danyluck worked with the UC Denver team to explore how negative interactions such as racial discrimination and stereotyping can create stress that increases the risk of cardiovascular disease among urban American Indians and Alaska Natives.

His work focused on how discrimination can trigger depression, sleep problems and other mental health issues, leading to high blood pressure. Danyluck also studied how those problems seem to decline as people age.



Dr. Chad Danyluck

“Hopefully this work will provide insights that can lead to the development of culturally appropriate interventions that help American Indian and Alaska Natives cope with the harms of discrimination,” he said.

Danyluck presented his SFRN work at conferences and in publications including Validation of the Brief Perceived Ethnic Discrimination Questionnaire – Community Version, in American Indians and Alaska Natives in *Cultural Diversity & Ethnic Minority Psychology*. He said he built important new relationships at annual AHA meetings and the AHA Research Leaders Academy, and his fellowship also paved the way for funding from the National Institutes of Health to do more research on the topic.

He’s now an assistant professor in health psychology at Carleton University in Canada, where he plans to conduct further studies on Indigenous communities.

“The AHA fellowship was an amazing opportunity,” Danyluck said. “It gave me a wide range of responsibilities, broadened my expertise and gave me the chance to work with a fantastic interdisciplinary team of scientists. Everyone was quite invested in my training, and my closest mentors remain invested in my success.”

COLLABORATIONS

By design, the Disparities SFRN operated as a strong partnership: Scientists worked together inside and outside the four centers, sharing training opportunities, methods and models to effectively push research forward.

“It’s increasingly clear that science is no longer conducted by individuals, necessarily,” said Dr. Spero Manson, Center Director at the University of Colorado Denver. “If you look at the recent Nobel awards in science, you see they are not individuals, but teams of individuals. That team approach is important in this network setting, where perspectives and skillsets weave together.”

Collaborations occurred on many different levels. For example, fellows exchanged ideas during regular teleconferences. On a deeper level, Morehouse School of Medicine and Emory University School of Medicine teamed up to launch the joint MSM/Emory Cardiovascular (MECA) Center for Health Equity.

The partnership grew from an extension of several research programs focused on increasing a deeper understanding of cardiovascular disease in health disparities and social determinants of health, including conversations between Dr. Arshed Quyyumi at Emory and Dr. Herman Taylor of Morehouse, who became the center’s director.

“We saw this as a golden opportunity to work together toward a unique aspect of health in African Americans and the resolution of health disparities,” Taylor said.

“Collaboration was key — not just among scientists who think in the same space and who work in the same disciplines, but collaboration across multiple disciplines,” said Dr. Cheryl Anderson, the Oversight Advisory Committee Chairperson. “Collaboration ensured that the process was informed and enriched through multiple lenses.”

The exchange of ideas during the Disparities SFRN could help improve health inequities for years to come, said Dr. Mercedes Carnethon, Co-Center Director at Northwestern University.

“There are many different models for studying disparities,” Carnethon said. “For example, the group at University of Colorado Denver did ethnographies and interviewed people, which was so different than the laboratory studies we did at our center. I learned a lot about different disciplines and how they approach research.”

CONCLUSION

All AHA SFRNs share common goals, such as training new investigators, producing new research and identifying new programs and policies to reduce cardiovascular disease.

But the Disparities SFRN had the unique challenge of battling society-wide health inequities that have persisted throughout the nation's history, with a devastating impact on under-represented racial and ethnic groups.

As successful as the Disparities Network was, it's just the beginning, said Dr. Cheryl Anderson, the Oversight Advisory Committee Chairperson.

"The national conversation has shifted," Anderson said. "People are open to talking about these issues. Now we need a long-standing, sustained commitment to fighting the system of disparities and focusing on upstream factors."

"The American Heart Association has been fighting disparities for so long that it's well-positioned to lead in this space," she said. "This is a real opportunity."

Since the first SFRN launched in 2014, the AHA has created 11 more. In addition to Disparities in CVD & Stroke, three other networks have completed: Prevention, Hypertension and Go Red For Women.

Ongoing networks are focused on Heart Failure, Obesity, Children, Vascular Disease, Atrial Fibrillation, Arrhythmias & Sudden Cardiac Death, Cardiometabolic Health & Type 2 Diabetes Mellitus and Health Technologies & Innovation.





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