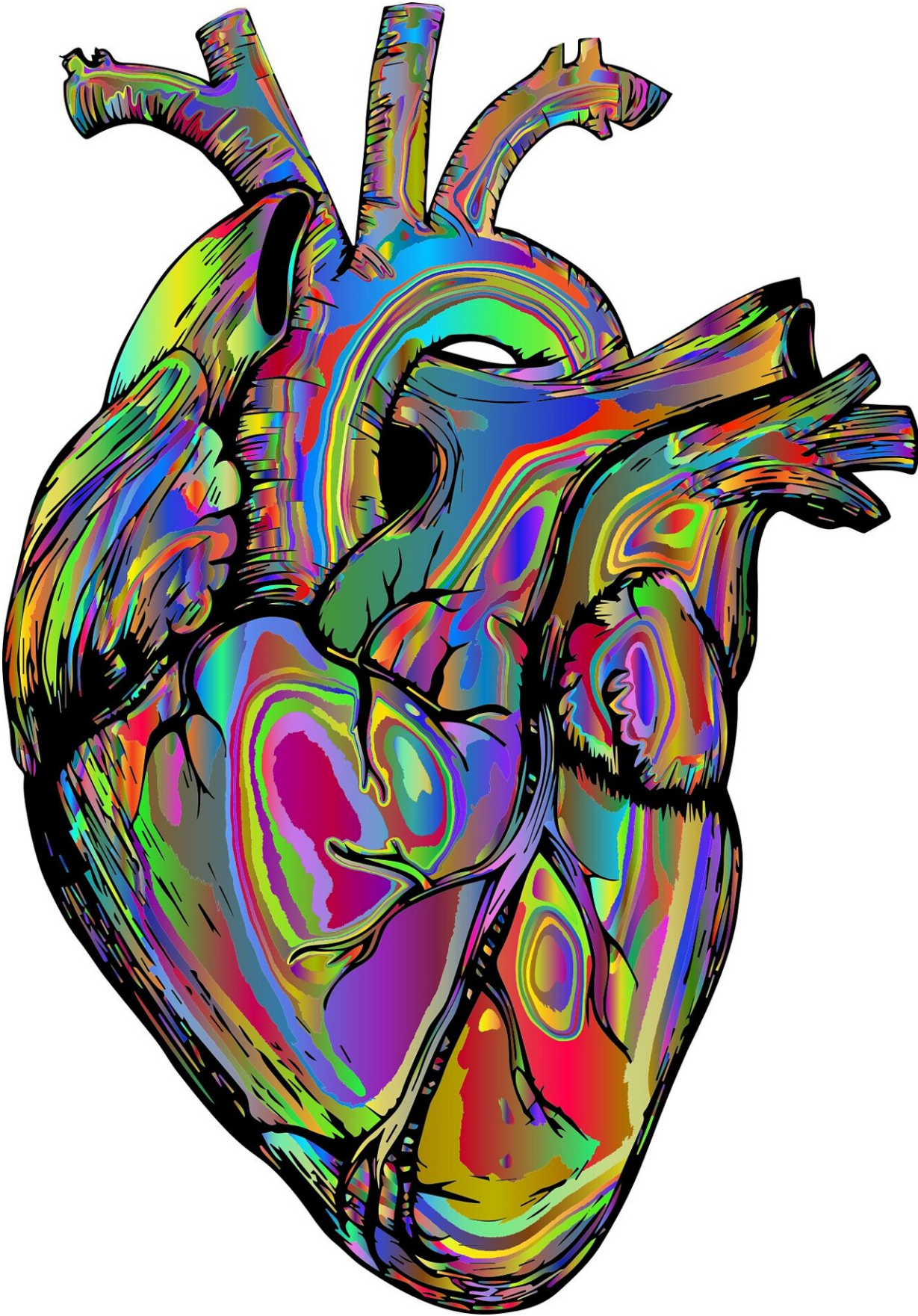


# What might the next century hold for cardiovascular disease prevention and care?

July 1 2024, by Laura Williamson

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The past century brought profound advances in the understanding and treatment of cardiovascular disease, leading to dramatic reductions in deaths linked to heart disease and stroke. But what will the next 100 years bring?

While no one can say for certain, experts point to three areas they expect may play a crucial role in the decades ahead: a push to halt the rise of cardiovascular risk factors using the knowledge gained in previous decades; the continued development of innovative technologies; and a heightened focus on the root causes of health disparities to prevent them from widening as the U.S. population grows more diverse.

## **Prevention: Putting knowledge gains to use**

Over the past century, an enormous body of research emerged surrounding the factors and behaviors that contribute to cardiovascular disease. The American Heart Association compiled this knowledge into eight key measures that, if properly managed, could help to substantially lower the risk for heart disease, stroke and other major health problems. These include physical activity, diet, [tobacco use](#), body weight, sleep duration and blood pressure, glucose and cholesterol levels.

"The challenge is how to translate that knowledge into health actions," said Dr. Adrian Hernandez, executive director of the Duke Clinical Research Institute and vice dean of Duke University School of Medicine in Durham, North Carolina. "That's where we have to do a lot more."

Research shows the rates of many cardiovascular risk factors have been rising in the U.S.—and are projected to keep doing so. High blood pressure, diabetes and obesity rates are expected to continue to climb over the next 30 years, along with coronary artery disease, heart failure, stroke and atrial fibrillation. Similar increases are projected among children.

A recent [AHA presidential advisory](#) estimates that by 2050, high blood pressure and obesity will affect more than half the population overall and more than 80% of some subgroups, such as Black and older adults. This is expected to have a direct impact on heart disease and stroke rates.

Most strokes could be prevented if these risk factors were reduced, said Dr. Hugo Aparicio, an associate professor of neurology at the Chobanian and Avedisian School of Medicine at Boston University.

"There are some risk factors we've been better at reducing," like smoking, he said. "But there are other risk factors, such as high blood pressure and obesity, with a stubborn increase, especially among younger adults."

Better education about how to manage those risks—delivered early in life—will be critical, said Dr. Alex Crystal, chief of cardiology at Mackenzie Health and director of Lawrence Park Cardiology, both in Toronto.

"There appears to be a gap in current public health education efforts regarding preventative health care measures for [young people](#)," he said. "This is particularly concerning for chronic diseases like obesity, where early intervention can significantly improve long-term health outcomes."

Teens and young adults don't understand those long-term health risks, such as the development of diabetes or cardiovascular disease early in

life, he said.

"Prioritizing educational initiatives targeting adolescents and young adults to emphasize the importance of healthy lifestyle choices, including regular exercise, proper nutrition and preventive screenings, and investing in targeted public health campaigns that effectively communicate these long-term health risks could be beneficial."

## **Innovative technologies and therapies**

One way to help people understand those consequences could be to show them their personalized health trajectories using innovative, genetics-related technologies and wearable devices that collect personal health data, Hernandez said.

"If we can create a map of human health and show people where they are on that map, it might help them understand why they need to prevent the conditions that lead to cardiovascular disease," he said. "We could show people how those risks add up."

Genetics will likely play a growing role in identifying—and lowering—a person's risk for disease, Aparicio said. Polygenetic risk scores, calculated by the presence or absence of gene variants, tell people their chances of developing medical conditions.

Gene editing, a field that has emerged over the past decade, allows scientists to change the DNA of an organism, making it theoretically possible to reduce disease risk. While still experimental, it has been successfully used to treat childhood leukemia and has led to the development of new therapies for hemophilia and cystic fibrosis.

Hernandez and Aparicio see an expanding role for gene editing in the years ahead.

For example, someone with a high genetic risk for stroke might be able to lower that risk through gene editing, Hernandez said.

Even if the genes can't be altered, between testing and passive data collected with wearable technology, such as smartwatches that monitor heart rate, heart rhythms and physical activity levels, "we should be able to get good information to understand what that data means for each person's cardiovascular risk profile," Aparicio said.

In the future, wearable technology could evolve beyond smartwatches to include devices implanted in clothing or eyeglasses that gather data not just from individuals but from the environment they're in, Aparicio said. He envisions it being able to alert people to other contributing health factors, such as poor air quality, to help them reduce their personal risks.

"Decades ahead, we should have much more information about our individual health and health trajectories than ever before," Hernandez said. "The combination of where someone stands with cardiovascular risk factors, their genome sequencing and assessments of daily health through passive, digital technology should allow us to better understand their total health and what it might look like over the coming years. It closes the loop for precision health."

## **Faster treatment may reduce brain damage**

Even if stroke rates rise, Aparicio sees a future in which they could do less harm.

He noted a growing area of research into medications that could be given immediately following a stroke, even in an ambulance, and possibly improve stroke outcomes. "They could protect the brain immediately," Aparicio said. "A lot of this is being developed right now."

Other [innovative technologies](#) such as mobile CT scanners that can fit in an ambulance also would allow faster diagnosis and treatment of people who have strokes. They are already being used in some areas and will likely become more commonplace, he said. Aparicio envisions a time when other non-invasive technologies, such as MRIs, might also be deployed in this way.

There are also exciting new technologies on the horizon to help resuscitate people who experience cardiac arrest, when the heart suddenly stops working, said Dr. Sarah Perman, an associate professor of emergency medicine at Yale University School of Medicine in New Haven, Connecticut.

ECPR, or extracorporeal cardiopulmonary resuscitation, allows a machine to pump blood for the heart. This allows doctors to preserve organ function as they try to determine what caused the cardiac arrest and treat it. ECPR for in-hospital cardiac arrests has been shown to reduce mortality and is becoming more widespread, but efforts to use it to treat out-of-hospital cardiac arrest are fairly new, gaining traction in Europe and in a few trials in the U.S., Perman said.

According to AHA's [advanced life support guidelines update](#) co-authored by Perman, ECPR is reasonable to use on people who have a [cardiac arrest](#) but their heart remains unresponsive after extended CPR attempts. But it would require a well-trained and equipped team.

"It's pretty rare right now, still in the early stages," Perman said. "But there are some pretty exciting opportunities here to save lives."

While new technologies can be expensive during the early stages, and available only to a select few, that tends to change over time, Aparicio said.

"Eventually, all of these technologies will likely become cheaper and more accessible and widespread," he said.

## **Tackling the underlying causes of health disparities**

Addressing racial, ethnic, gender and socioeconomic health disparities—already a significant problem—will become more critical in the coming years, experts say.

The U.S. Census Bureau projects that by 2030, immigration will become the main driver of population growth. By 2060, the Hispanic, Asian and multiracial populations are expected to increase significantly, which is likely to exacerbate underlying social determinants of health—such as access to health care and healthy foods—and potentially widen disparities.

Black adults already have disproportionately higher rates of [high blood pressure](#) and obesity, and they continue to have [higher death rates](#) from cardiovascular disease than their white peers. American Indians and Alaska Natives are [50% more likely](#) than white people to be diagnosed with [heart disease](#).

Because of shifting demographics, [researchers project](#) that within 30 years, Hispanic adults will see the largest total increase in cardiovascular disease and stroke, and Hispanic children will see the largest rises in high blood pressure, diabetes and [obesity rates](#), while Black children are expected to have the highest overall rates of [high blood pressure](#) and diabetes.

Identifying and treating risk factors earlier in life—critical for all populations—will be even more important within these higher-risk groups, Aparicio said.



"Certainly, as the population becomes more diverse, more attention needs to be paid to ensure that all people have the same chance to age with a healthy heart and a healthy brain," he said. "If the root causes of health disparities are not addressed, these populations are going to be more at risk."

Much research has already been done to identify those root causes, which include structural racism and its consequences related to income, employment and housing inequities, less access to health care, healthy foods and safe environments.

Some disparities exist because entire groups of people are left out of the research, Perman said. That's why it's so important when developing new technologies or treatments to ensure equal representation.

"As devices and technologies are being developed, we want to make sure we're not creating more disparities for people with lower socioeconomic status, underrepresented race or sex," she said. "We need to make sure we're being purposeful in how we design studies and who we are including in those studies. And, if we don't have data for women, we need to make sure we are careful if we generalize what we know about men to apply it to women."

Reversing deeply entrenched disparities won't be easy, experts say.

Research shows health care outcomes improve when people are treated by a more diverse medical workforce. Health care professionals who represent the patient community they serve have greater cultural sensitivity to patient needs, fewer language barriers and foster greater trust, which can be critical in getting people to comply with medical advice.

"In communities with the greatest health disparities, we need to take

action to improve trust in the health system," Hernandez said.

"And we need to make sure we improve access to health care everywhere."

Provided by American Heart Association

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