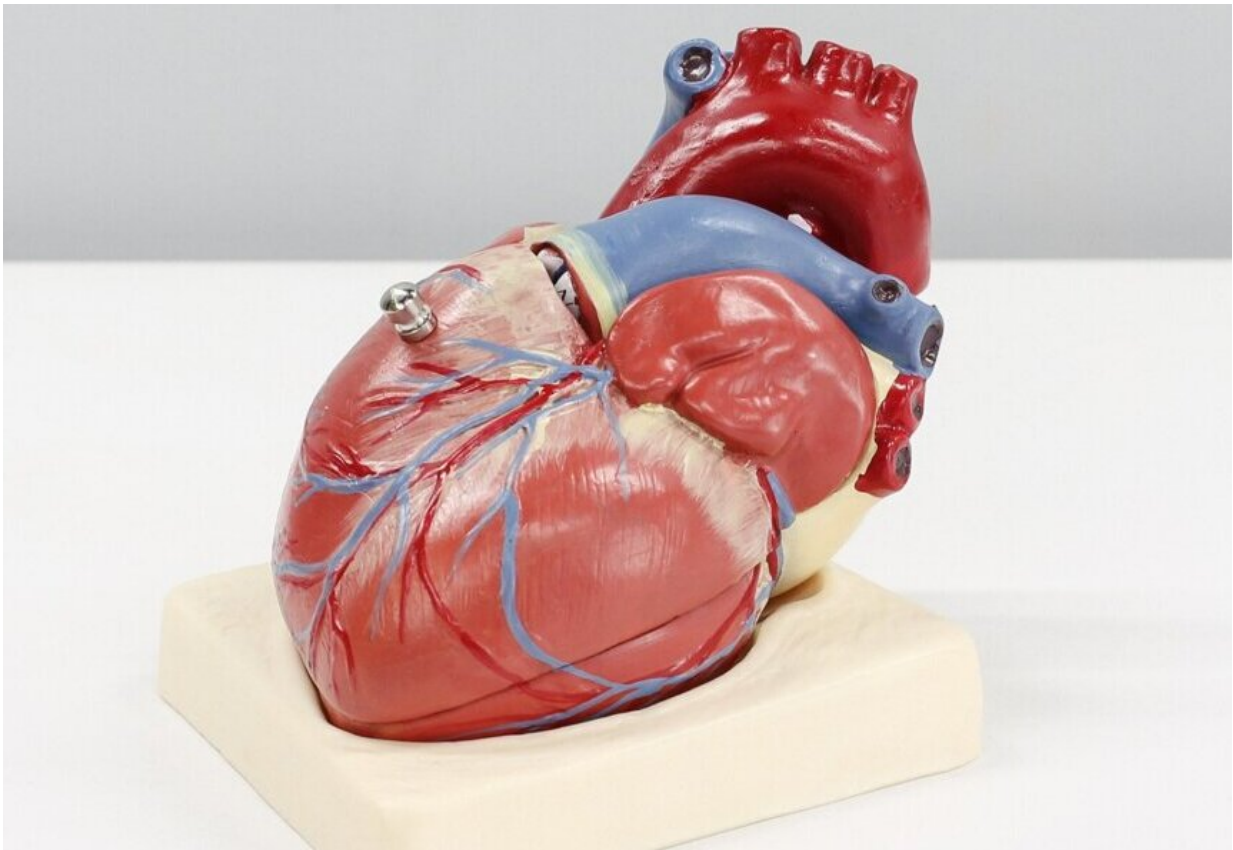


# Cardiologists reveal new heart disease risk calculator

November 10 2023

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A new calculator estimates a person's risk for cardiovascular disease (CVD) over the next 30 years by combining measures of cardiovascular, kidney and metabolic health for the first time, according to a new

American Heart Association Scientific Statement published today in *Circulation*.

An accompanying methods paper, published simultaneously today in *Circulation*, shares details about the development and testing as well as the formulas for the new risk [calculator](#). An online tool is in development.

The American Heart Association PREVENT (Predicting Risk of [cardiovascular disease](#) EVENTS) risk calculator estimates heart attack, stroke and [heart failure](#) risk. The calculator helps incorporate cardiovascular-kidney-metabolic or CKM syndrome into CVD prevention. CKM syndrome was first defined in an October 2023 [presidential advisory](#) and [scientific statement](#). The syndrome refers to the strong connections among cardiovascular disease, kidney disease and metabolic disease (type 2 diabetes and obesity).

According to the Association's 2023 Statistical Update, 1 in 3 U.S. adults has three or more risk factors that contribute to cardiovascular disease, kidney disease and/or metabolic disorders. As the underlying conditions of CKM syndrome worsen, the risk of heart attack, stroke, and/or heart failure increases.

"A new cardiovascular disease risk calculator was needed, particularly one that includes measures of CKM syndrome, which is highly prevalent in the U.S.," said Sadiya S. Khan, M.D., M.Sc., FAHA, chair of the statement writing committee for the Association. "The new PREVENT risk calculator enables clinicians to quantify this risk and may help people receive preventive care or treatment earlier to reduce CVD risk."

The PREVENT risk calculator uniquely quantifies risks for CVD for each biological sex. As more research has been conducted specifically in women, this is an important way to understand their unique differences

in CVD presentation and risk factors. PREVENT does not include race in its calculation, acknowledging that race is a social factor and not a biological variable and, therefore, is not a valid factor for predicting CVD risk. There is an option in PREVENT to include social factors if available.

The last CVD risk calculator, the Pooled Cohort Equation, was released in 2013. "However, new treatments are now available for CKM conditions such as obesity, type 2 diabetes and kidney disease," said Khan, who is the Magerstadt Professor of Cardiovascular Epidemiology and an associate professor of medicine (cardiology) and preventive medicine (epidemiology) at Northwestern University's Feinberg School of Medicine and a preventive cardiologist at Northwestern Medicine, both in Chicago.

"Estimating a person's risk for CVD related to these conditions with the new PREVENT risk calculator should prompt conversations between [health professionals](#) and patients to increase awareness of CKM health status and CVD risk, and to translate that awareness into actions that improve health and reduce risk," said Khan. "This includes health and lifestyle changes (routine physical activity, eating healthy foods) and possibly medications, if appropriate."

A risk calculator uses health, demographic and/or socioeconomic information in equations to calculate a risk estimate or score. Equations are developed by scientists based on information in national databases, large research studies and electronic health records.

The PREVENT equations were developed using data from more than 6 million adults in the U.S. from a variety of racial and ethnic, socioeconomic and geographic backgrounds. Information from the health records of about half of those people was used to develop the calculator, then it was verified in the other half. Some data were

collected from research studies, while other data were drawn from the electronic medical records of people seeking regular health care outside of a research setting. With this broad population, the calculator is more likely to accurately represent and be applicable to the general adult population in the U.S.

PREVENT equations use screening tests already in use in primary care to predict risk. Blood pressure measurement; blood tests for cholesterol, blood sugar and kidney function; and questions about tobacco use and whether people take medications for CVD risk factors are common in health assessments. This information can be entered in the PREVENT risk calculator, along with a person's age and sex, to determine estimated risk.

Key differences between the PREVENT calculator and the Pooled Cohort Equations are described below.

## **PREVENT is for adults as young as age 30 and estimates 10-year and 30-year risk of total cardiovascular disease**

The Pooled Cohort Equations were designed to assess 10-year risk of heart attack and/or stroke for people ages 40-79. The new calculator can assess CVD risk in people from ages 30 to 79, and it can predict risk for heart attack, stroke and/or heart failure over the next 10 years and 30 years.

"Longer-term estimates are important because short-term or 10-year risk in most young adults is still going to be low. We wanted to think more broadly and apply a life-course perspective," Khan said. "Providing information on 30-year risk may reveal earlier opportunities for intervention and prevention efforts in younger people."

PREVENT can also inform a person's CKM syndrome stage when risk is high to help guide further assessments and treatment recommendations. CKM syndrome ranges from Stage 0, or no risk factors and an entirely preventive focus, to Stage 4, the highest-risk stage, when cardiovascular disease is already present.

## **The PREVENT risk calculator includes measures of kidney function**

Kidney function is important in cardiovascular health, and chronic kidney disease increases cardiovascular risks. The calculator includes estimated glomerular filtration rate and allows for the use of urine albumin excretion (which monitors kidney disease) to further individualize risk assessment and help inform personalized treatment options.

## **The PREVENT risk calculator includes a measure of metabolic health**

The PREVENT equations allow the inclusion of hemoglobin A1C, a measure of blood sugar control, if necessary to monitor [metabolic health](#). Abnormal blood sugar is associated with CVD risk in people with and without type 2 diabetes.

## **Heart failure risk prediction is included**

Heart failure is a serious condition in which the heart isn't pumping well enough to keep up with the body's need for oxygen-rich blood. Heart failure is especially important in the context of CKM syndrome. Among people with obesity, type 2 diabetes and/or [kidney disease](#), the risk for heart failure can be higher than the risk for heart attack or stroke.

## **Risk calculations are race-free.**

While there are clear racial and ethnic disparities in CVD [risk factors](#) and in the incidence of CVD among people based on the social construct of race and ethnicity, the statement writing committee concluded that race should not be included in the PREVENT calculator.

This decision is in line with a growing consensus in the scientific and medical community to remove race from algorithms in medical care to reduce the potential for race-specific treatment decisions.

"The Pooled Cohort Equations were developed with data from only white and Black adults and had separate equations for people of each race. There was not a risk model for individuals from other race and ethnicity groups, so we likely were not accurately estimating risk in many people," Khan said. "Part of the rationale for race-specific equations was that race was considered a proxy or substitute for the lived experience of racism and its potential health effects. However, we were concerned that the inclusion of race as a proxy may still be harmful."

The PREVENT calculator has similar accuracy among varied racial and ethnic groups. Also, the equations include the option to use the Social Deprivation Index, which incorporates measures of adverse social determinants of health such as education, poverty, unemployment and factors based on a person's environment.

"The PREVENT equations are a critical first step toward including CKM health and social factors in risk prediction for CVD," Khan said. "Concerted research efforts are needed to determine the causal and social factors that underlie racial differences in CVD risks and outcomes. As we strive towards more equitable preventive care, we also acknowledge that racism, and not race, operates at multiple levels to increase risk for CVD."

## Knowledge gaps and areas for more research

The statement includes an assessment of gaps in knowledge and suggestions on where the PREVENT equations could be further refined with more research. These include:

- Incorporating "net benefit" to identify the expected benefit of treatment recommendations based on an individual's level of risk.
- Collecting more data from people of diverse race and ethnic backgrounds to better represent the increasing diversity in the U.S. The number of Hispanic and Asian people included in the PREVENT datasets is lower than national estimates in the general U.S. population, so risk estimations in these populations may be less precise.
- Expanding the collection, reporting and standardization of social determinants of health data, such as individual information rather than neighborhood information. Future research should prioritize systematic assessment of [social factors](#) so health impacts of structural racism may be better understood and addressed.
- Expanding risk assessment and prevention to earlier in life (childhood and/or adolescence) and in key life periods, such as during the peripartum period since adverse pregnancy outcomes are associated with increased CVD risk.
- Investigating whether predicting adverse kidney outcomes, particularly among people with and without type 2 diabetes, may further optimize cardiovascular risk prediction.

**More information:** Novel Prediction Equations for Absolute Risk Assessment of Total Cardiovascular Disease Incorporating Cardiovascular-Kidney-Metabolic Health: A Scientific Statement From the American Heart Association, *Circulation* (2023). [DOI: 10.1161/CIR.0000000000001191](https://doi.org/10.1161/CIR.0000000000001191)



Provided by American Heart Association

Citation: Cardiologists reveal new heart disease risk calculator (2023, November 10) retrieved 28 April 2024 from

<https://medicalxpress.com/news/2023-11-cardiologists-reveal-heart-disease.html>

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