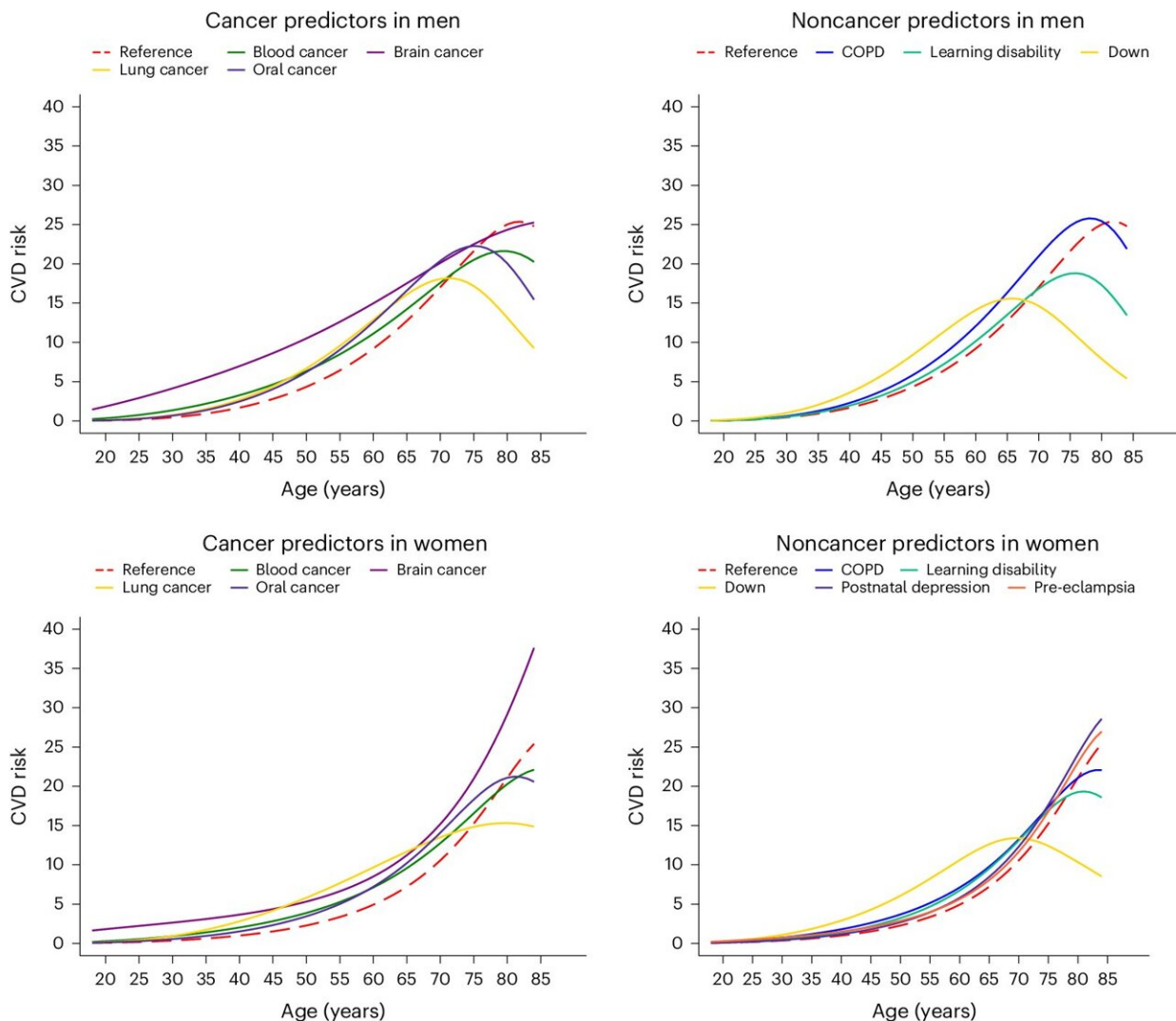


New heart disease calculator could save lives by identifying high-risk patients missed by current tools

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Effect of the new risk factors on prediction of 10-year CVD absolute risk. Ten-year CVD risk predictions for men and women over different ages. Credit: *Nature Medicine* (2024). DOI: 10.1038/s41591-024-02905-y

Collaborative research, led from the University of Oxford and [published](#) today in *Nature Medicine*, has developed a new tool called QR4 that more accurately predicts an individual's 10-year risk of cardiovascular diseases, such as heart disease and stroke, particularly identifying high-risk patients that current prediction tools miss.

Cardiovascular disease is a leading cause of death globally. The new tool, QR4 can be thought of as a type of calculator that lets doctors use an individual's health data, such as [blood pressure](#), age and [medical history](#), to estimate their likelihood of developing a [cardiovascular disease](#) over the next 10 years, allowing them to intervene early to prevent illness.

QR4 includes seven new risk factors applicable to all adults: [chronic obstructive pulmonary disease](#) (COPD), learning disabilities, Down syndrome and four cancer types (blood, lung, oral and brain), highlighting how other significant diseases impact on heart health.

QR4 also identified factors specific to women's health that were predictive of future heart disease risk, such as complications from high blood pressure during pregnancy, and postnatal depression.

"While traditional cardiovascular risk factors such as smoking and high cholesterol are well-recognized, our latest research identifies less

obvious, yet crucial risk indicators," said Dr. Julia Hippisley-Cox, lead author, Professor of Clinical Epidemiology and General Practice, at the University of Oxford's Nuffield Department of Primary Care Health Sciences.

"For instance, conditions like postnatal depression and Down syndrome significantly contribute to cardiovascular risk, underscoring the complex interplay between mental health, genetic factors, and heart health. QR4 also helps to address inequalities in health, particularly around learning disabilities, which often coincide with barriers to effective health management and access, leading to an increased risk.

"We believe that these findings are important to both patients and policymakers," said Professor Hippisley-Cox. "They indicate that more groups of people are at increased risk for heart and circulatory diseases than previously recognized. These people could and should now benefit from treatments and other preventive measures to reduce their risk."

"Our findings also reveal that women with COPD are at a higher risk of cardiovascular diseases than previously understood," said Professor Mona Bafadhel, co-author, Chair of Respiratory Medicine, King's College, London and Asthma + Lung UK Professor. "This underscores the critical need for targeted cardiovascular monitoring and interventions in these patients, which begins with an early diagnosis."

As part of a comprehensive evaluation, the QR4 algorithm was rigorously tested against some of the most well-established cardiovascular risk assessment tools currently used in both the United States and Europe. It outperformed the most widely used heart disease risk calculators, including QRISK3 recommended by the National Institute for Health and Care Excellence (NICE) in the U.K., accurately identifying more [high-risk patients](#).

"This important update to the QRISK tool will allow clinicians to build the clearest picture yet of individuals' risk of developing heart and circulatory diseases," said Professor Bryan Williams, Chief Scientific and Medical Officer at the British Heart Foundation. "Informed by large amounts of data from diverse populations, the new and improved algorithm takes vital steps towards improving risk assessment in populations where cardiovascular risk may often go under-detected. The QR4 tool will offer a much-needed, renewed focus on better identifying people at risk and improving the prevention of cardiovascular diseases."

"Cardiovascular risk has been under-recognized in some populations, which through QR4 we can now better address," said Professor Keith Channon, BHF Professor of Cardiovascular Medicine at the University of Oxford. "The new findings will help identify more diverse groups of people who have high cardiovascular risk, enabling them to access interventions and treatments to reduce their risk."

"The QR4 model potentially sets a new standard in cardiovascular risk assessment," said Dr. Carol Coupland, senior researcher at the University of Oxford and Professor of Medical Statistics in Primary Care at the University of Nottingham and co-author of the study. "Our head-to-head comparisons with established models show that QR4 provides a more detailed risk profile for each individual, allowing for earlier and more precise intervention strategies. This is crucial in a field where early detection can save lives and could significantly impact how we approach prevention on a global scale."

This new algorithm builds on almost two decades of work and global leadership in the field of risk algorithms, and cardiovascular risk algorithms in particular. QR4's predecessor, QRISK is widely used in the NHS to assess over 5 million patients a year, often as part of NHS Health Checks.

The researchers hope that clinicians, advisory bodies, regulators, and health and care policymakers consider the implications of QR4's advanced predictive capabilities on national health guidelines and support its adoption in clinical settings to improve cardiovascular health outcomes.

More information: Julia Hippisley-Cox et al, Development and validation of a new algorithm for improved cardiovascular risk prediction, *Nature Medicine* (2024). [DOI: 10.1038/s41591-024-02905-y](https://doi.org/10.1038/s41591-024-02905-y)

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