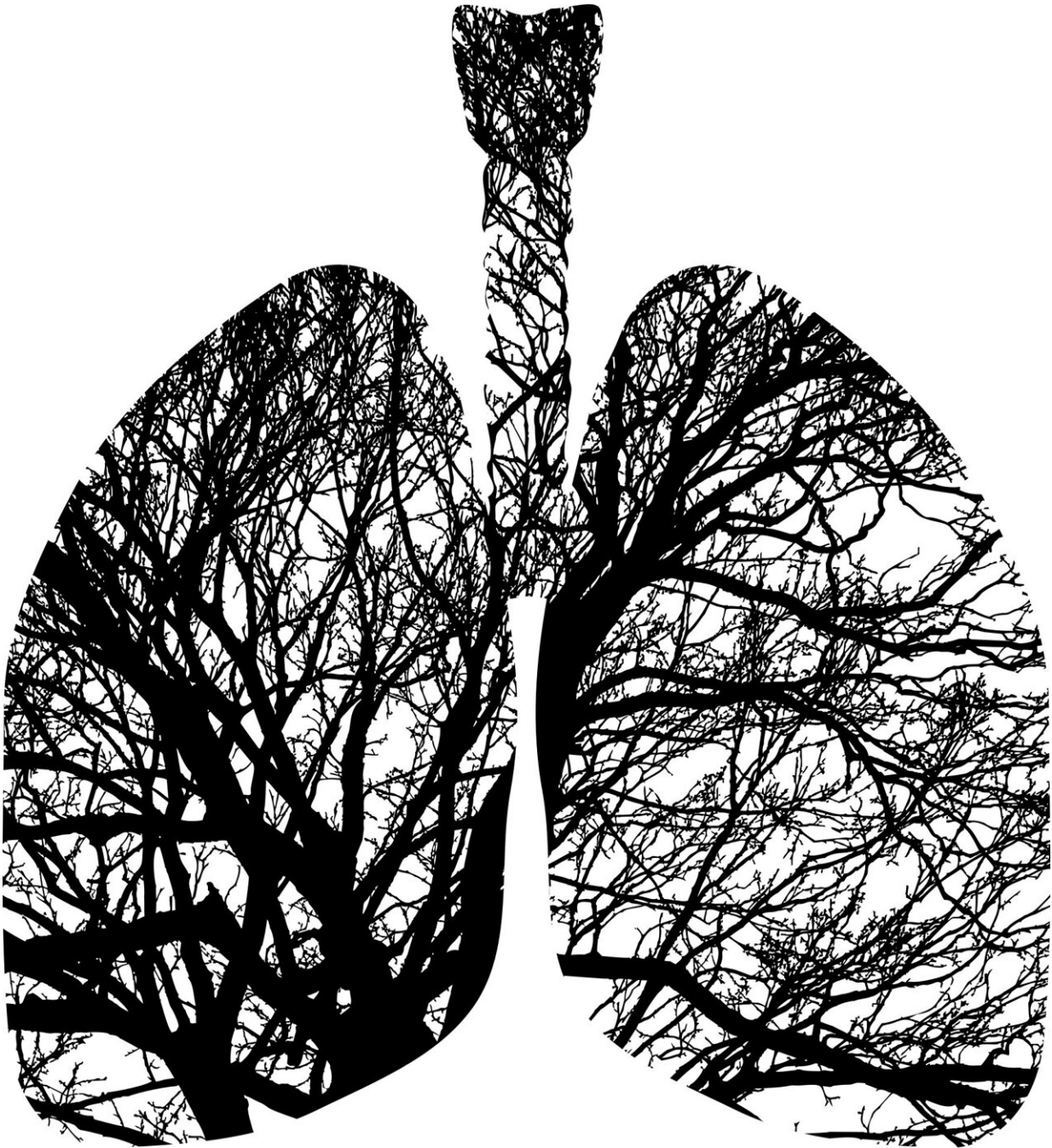


# Study questions race-based formula widely used to define lung disease

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New results from a long-term epidemiologic study reveal that one of the oldest racially based diagnostic formulas in medicine is no better than a

race-neutral equation, which suggests the formula used to diagnose lung disease should be changed.

The study, led by researchers at Columbia University Vagelos College of Physicians and Surgeons, was published Dec. 16 in the *American Journal of Respiratory and Critical Care Medicine*.

The race-based [formula](#) is used to define the severity of COPD (chronic obstructive pulmonary disease) and diagnose other [lung](#) diseases. Though it is based on old methodology, it is still recommended for use in the United States and globally.

Because the formula includes racial adjustments in defining normal lung function, Black people may be less likely to be treated with medications for COPD or diagnosed with other serious lung disorders compared to white people with the same test results on a spirometer, an instrument that measures the lungs' air capacity. (In an accompanying paper in the same issue, UCSF researchers found that fewer Black patients with COPD and other lung diseases are diagnosed correctly because of the race-based formula).

## History of the formula

The history of the formula is nearly 200 years old.

"The current approach to defining normal lung function goes back to the 1840s, when the inventor of the spirometer, John Hutchinson, used the spirometer to measure lung capacity in about 4,000 people and used a cross-sectional approach to define which values indicated disease and which values were normal," says the study's senior author, R. Graham Barr, MD, DrPH, the Hamilton Southworth Professor of Medicine at Columbia University Vagelos College of Physicians and Surgeons and chief of the Division of General Medicine at Columbia University Irving

Medical Center. Barr also is professor of epidemiology at Columbia's Mailman School of Public Health.

A similar cross-sectional study in the United States performed right after the Civil War found differences in lung capacity between "healthy" Black and white military personnel. Pro-slavery physicians interpreted these observations as a biologic difference, which they used to argue in favor of slavery. This cross-sectional approach to defining normal lung function persists to this day in the guidelines that recommend the inclusion of terms for race in the currently used diagnostic formula.

But cross-sectional studies only look at participants at a single point in time, instead of following the same people over time, which is a more modern and relevant method to determine which measurements fall in the healthy range and which may signify disease. Barr says that the cross-sectional study "was a fine and innovative approach in the 1840s, but most fields have moved on as longitudinal data became available." For example, the thresholds used to diagnose type 2 diabetes, hyperlipidemia, and hypertension are based upon long-term prospective cohort studies or clinical trials.

## **New approach**

Since the early 2000s, Barr and a multi-institution team of collaborators have been following a group of several thousand patients, and they have amassed a trove of data on spirometry measurements and long-term development of lung disease. That data allowed them to compare the race-based formula with a race-neutral one to see which was better at predicting lung problems.

The results were unambiguous: Stratifying patients' risk of [lung disease](#) based on race was no better than those obtained with the race-neutral spirometry formula and, in some instances, the race-neutral spirometry

formula yielded better predictions.

"This type of research is important to evaluate the algorithms and diagnostics that the [medical community](#) has historically used to diagnose and treat disease," says Lisa Postow, Ph.D., the program director of the COPD/environment program at the National Heart, Lung, and Blood Institute at the NIH. "Accurate algorithms are essential for accurate diagnosis and appropriate treatment."

Changing formulas could be straightforward and easy. "There is a published race-neutral equation, which we used as a comparison in this paper," says first author Arielle Elmaleh-Sachs, MD, postdoctoral clinical fellow in the Division of General Medicine at Columbia. "The race-neutral equation is available to everyone, and it would be relatively easy to move clinical practice to make the change."

**More information:** Aaron D. Baugh et al, Reconsidering the Utility of Race-Specific Lung Function Prediction Equations, *American Journal of Respiratory and Critical Care Medicine* (2021). [DOI: 10.1164/rccm.202105-1246OC](#)

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