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**HARVARD GAZETTE ARCHIVES**

## C-reactive protein, high blood pressure linked

*Discovery could boost prevention,  
treatment efforts*

**By Alvin Powell**

Harvard News Office

Harvard researchers have linked an indicator for heart attack and stroke to high blood pressure, providing a potential new tool for prevention of hypertension and shedding new light on the nature of the disease.

Researchers from Harvard Medical School and Harvard-affiliated Brigham and Women's Hospital found a strong link between levels of C-reactive protein in the blood and the future development of high blood pressure. C-reactive protein (CRP) is an indicator of inflammation and has already been linked to an increased risk of heart attack and stroke.



Howard Sesso is the lead author of a study on high blood pressure. His research may, for the first time, provide indicators of who will develop the condition in the future. (Staff photo Rose Lincoln/Harvard News Office)

The research, conducted by the hospital's Center for Cardiovascular Disease and Prevention, provides evidence for the first time that high blood pressure, also known as hypertension, may be an inflammatory disease.

If that's the case, inflammation may contribute to a rise in blood pressure by promoting changes in the endothelium, which lines the walls of the blood vessels. Elevated levels of C-reactive protein may induce structural and functional changes in the endothelium ultimately contributing to the rise in blood pressure.

"This opens up a new area of research," said Assistant Professor of Medicine Howard D. Sesso, the study's lead author. "More often than not, high blood pressure is viewed as a risk factor for cardiovascular disease and not looked at [by those interested in] primary prevention."

Sesso worked on the study with Professor of Ambulatory Care and Prevention Julie E. Buring, Associate Professor of Pathology Nader Rifai, Instructor in Medicine Gavin J. Blake, Associate Professor of Medicine J. Michael Gaziano, and Eugene Braunwald Professor of Medicine Paul M. Ridker.

Blood pressure is a measure of the push of the blood against the walls of a person's arteries. It is made up of two numbers. The first number, called the systolic blood pressure, is the pressure when the heart beats. The second, the diastolic blood pressure, measures pressure when the heart relaxes. According to the American Heart Association, a person has high blood pressure when the systolic blood pressure is higher than 140 or the diastolic blood pressure is higher than 90.

High blood pressure makes the heart beat harder to circulate blood through the body and can also damage the arteries that carry the blood. Left uncontrolled, high blood pressure can lead to stroke, heart attack, heart failure, or kidney failure.

The American Heart Association estimates that 50 million Americans have high blood pressure, one-third of whom don't know it. High blood pressure was listed as the primary cause of death for 44,619 Americans in 2000, and as a major contributing factor in 118,000 more, according to Heart Association statistics.

In the study, published in the Dec. 10 issue of the Journal of the American Medical Association, researchers analyzed data from the Women's Health Study, an ongoing study of heart disease and cancer that began in 1992. They analyzed the results of 20,525 healthy women who provided baseline blood samples and who had no previous history of high blood pressure, heart problems, or cancer. Over an eight-year period, 5,365 of them developed high blood pressure.

Researchers analyzed blood drawn from the study subjects for the presence of C-reactive protein. They found that those in the highest category of C-reactive protein had a 52 percent higher risk of developing high blood pressure than those in the lowest category of the protein.

The trend held steady even for those among the lowest risk groups to develop high blood pressure. Among nonsmokers who were not overweight, who were not using hormone therapy, and who had neither diabetes nor high cholesterol, the association persisted. Of the 6,795 women in that group, those with high levels of C-reactive protein had a 69 percent greater risk of developing high blood pressure during the study period.

"These are middle-aged and older women who you ordinarily assume are in pretty good health," Sesso said.

Though the study establishes a link between C-reactive protein and high blood pressure, it doesn't indicate the nature of that link, Sesso said.

Sesso said that if C-reactive protein proves to be a cause of high blood pressure, then future research can focus on ways to reduce C-reactive protein levels in the blood at an early stage, perhaps even before the disease develops.

"If we can find ways to lower CRP levels or any other clinically relevant biomarker to reduce the level of hypertension in the population, that would have dramatic health effects," Sesso said.

On the other hand, if C-reactive protein levels are not causing the disease but are found to be linked in some other way, tests for C-reactive protein may still be used to gauge an individual's risk of developing high blood pressure. Then the patient and his or her health care provider can take steps to minimize that risk by limiting other known risk factors for hypertension, such as salt intake, inactivity, obesity, and smoking.

"What we don't know is whether it's simply a statistical association or whether it's biologically causal," Sesso said.

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