

Elevated stress hormones linked to higher risk of high blood pressure and heart events

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Adults with normal blood pressure and high levels of stress hormones were more likely to develop high blood pressure and experience cardiovascular events compared to those who had lower stress hormone levels, according to new research published today in *Hypertension*, an American Heart Association journal.

Studies have shown that cumulative exposure to daily stressors and exposure to [traumatic stress](#) can increase [cardiovascular disease risk](#). A growing body of research refers to the mind-heart-body connection, which suggests a person's mind can positively or negatively affect cardiovascular health, cardiovascular risk factors and risk for cardiovascular disease events, as well as cardiovascular prognosis over time.

"The [stress](#) hormones norepinephrine, epinephrine, dopamine and cortisol can increase with stress from [life events](#), work, relationships, finances and more. And we confirmed that stress is a key factor contributing to the risk of [hypertension](#) and [cardiovascular events](#)," said study author Kosuke Inoue, M.D., Ph.D., assistant professor of social epidemiology at Kyoto University in Kyoto, Japan. Inoue also is affiliated with the department of epidemiology at the Fielding School of Public Health at the University of California, Los Angeles.

"Previous research focused on the relationship between [stress hormone levels](#) and hypertension or cardiovascular events in patients with existing hypertension. However, studies looking at adults without hypertension were lacking," Inoue said. "It is important to examine the impact of stress on adults in the general population because it provides new information about whether routine measurement of stress hormones needs to be considered to prevent hypertension and CVD events."

Study subjects were part of the MESA Stress 1 study, a substudy of the Multi-Ethnic Study of Atherosclerosis (MESA), a large study of atherosclerosis risk factors among more than 6,000 men and women from six U.S. communities. As part of MESA exams 3 and 4 (conducted between July 2004 and October 2006), white, Black and Hispanic participants with [normal blood pressure](#) from the New York and Los Angeles sites were invited to participate in the substudy MESA Stress 1. In this substudy, researchers analyzed levels of norepinephrine,

epinephrine, dopamine and cortisol—hormones that respond to stress levels. Hormone levels were measured in a 12-hour overnight urine test. The substudy included 412 adults ages 48 to 87 years. About half were female, 54% were Hispanic, 22% were Black and 24% were white.

Participants were followed for three more visits (between September 2005 and June 2018) for development of hypertension and cardiovascular events such as chest pain, the need for an artery-opening procedure, or having a heart attack or stroke.

Norepinephrine, epinephrine and dopamine are molecules known as catecholamines that maintain stability throughout the autonomic nervous system—the system that regulates involuntary body functions such as heart rate, blood pressure and breathing. Cortisol is a steroid hormone released when one experiences stress and is regulated by the hypothalamic-pituitary-adrenal axis, which modulates stress response.

"Although all of these hormones are produced in the adrenal gland, they have different roles and mechanisms to influence the cardiovascular system, so it is important to study their relationship with hypertension and cardiovascular events, individually," Inoue said.

Their analysis of the relationship between stress hormones and development of atherosclerosis found:

- Over a median of 6.5-year follow-up period, every time the levels of the four stress hormones doubled was associated with a 21-31% increase in the risk of developing hypertension.
- During a median of 11.2-years of follow-up, there was a 90% increased risk of cardiovascular events with each doubling of cortisol levels. There was no association between cardiovascular events and catecholamines.

"It is challenging to study psychosocial stress since it is personal, and its impact varies for each individual. In this research, we used a noninvasive measure—a single urine test—to determine whether such stress might help identify people in need of additional screening to prevent hypertension and possibly cardiovascular events," Inoue said.

"The next key research question is whether and in which populations increased testing of stress hormones could be helpful. Currently, these hormones are measured only when hypertension with an underlying cause or other related diseases are suspected. However, if additional screening could help prevent hypertension and cardiovascular events, we may want to measure these hormone levels more frequently."

A limitation of the study is that it did not include people who had hypertension at the study's start, which would have resulted in a larger study population. Another limitation is that researchers measured stress hormones via a urine test only, and no other tests for stress [hormone](#) measurement were used.

Co-authors are Tamara Horwich, M.D.; Roshni Bhatnagar, M.D.; Karan Bhatt; Deena Goldwater, M.D., Ph.D.; Teresa Seeman, Ph.D.; and Karol E. Watson, M.D., Ph.D.

Provided by American Heart Association

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