

# New study identifies possible cause of salt-induced hypertension

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New research from Case Western Reserve University School of Medicine and Kent State University shows that salt intake raises blood pressure because it makes it harder for the cardiovascular system to simultaneously juggle the regulation of blood pressure and body temperature.

For decades, medical researchers have sought to understand how salt causes salt-induced [high blood pressure](#) to no avail. Some individuals, described as "salt sensitive," experience an increase in blood pressure following the ingestion of salt, whereas others, termed "salt resistant," do not. Until now, scientists have been unable to explain why some individuals are salt sensitive and others are salt resistant. This inability to explain why salt raises blood pressure in some individuals but not others has hampered the development of a comprehensive theory as to what causes most cases of high blood pressure.

Since the cardiovascular system is responsible for maintaining normal blood pressure and also helps control body temperature by conducting heat from the muscles and internal organs to the skin's surface, a team of researchers led by Robert P. Blankfield, MD, MS, clinical professor of family medicine at Case Western Reserve University School of Medicine, and a member of the Department of Family Medicine at University Hospitals Case Medical Center and Ellen L. Glickman, PhD, professor of exercise science at Kent State University, tested whether these dual roles of the [cardiovascular system](#) might help explain how salt ingestion leads to salt-sensitive hypertension.

The researchers examined the effect of salt and water consumption versus just water upon a group of 22 healthy men without high blood pressure. The study participants' blood pressure, rectal temperature, cardiac index (the volume of blood pumped by the heart per minute), and urine output were monitored at one, two, and three hours after the men ingested either salt and water or water alone. Changes in rectal temperature were compared between the men identified as salt sensitive versus those who were salt resistant.

The study found that the ingestion of salt and water lowered body temperature more than the ingestion of water by itself. In addition, body temperature decreased more in individuals who are salt resistant than in individuals who are salt sensitive.

"It appears that salt sensitive individuals maintain core body temperature equilibrium more effectively than salt resistant individuals, but experience increased blood pressure in the process," Dr. Blankfield says. "Conversely, salt resistant individuals maintain blood pressure equilibrium more effectively than salt sensitive individuals following salt and water intake, but experience a greater temperature reduction in the process."

Matthew D. Muller, PhD, postdoctoral research fellow at the Penn State College of Medicine, and the paper's first author explains, "If our results are generalizable, it would be possible to account for the role of salt in the development of salt-sensitive hypertension: salt and water loading raises blood pressure in salt sensitive individuals, and the elevated blood pressure persists for a finite period of time during and after the salt and water intake. These transient blood pressure elevations, whether brief or prolonged, might initiate the complex changes within the walls of the arteries and arterioles that characterize individuals with essential hypertension."

Dr. Muller adds, "Nowadays, physicians tell their patients that no one knows what causes high blood pressure. Since we can now explain why salt-sensitive hypertension develops, a theory that will explain all hypertension may be possible. Thus, physicians may one day be able to tell their patients that the cause of high blood pressure is understood, and physicians may also be able to explain to their patients what must be done to avoid developing this chronic medical condition." Dr. Muller conducted this research as a doctoral student at Kent State University.

**More information:** The findings are described in a manuscript published in the April 14th issue of the journal *Hypertension Research*.

Provided by Case Western Reserve University

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