

# Juice concentrate from Japanese fruit benefits cardiovascular health, scientists report

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Ume fruit. Credit: Dr. Hirotoishi Utsunomiya

More than 122 million Americans—about half of the U.S. population ages 20 and older—have high blood pressure, referred to medically as

hypertension. Hypertension is a major cause of cardiovascular disease, and despite advances in treatment, even patients who take medications to control their blood pressure remain at high risk of death from diseases like heart attack, heart failure, and stroke.

The lack of new drugs to effectively control [hypertension](#) and associated [cardiovascular problems](#) has fueled a search for novel treatment strategies, and now, researchers at the Lewis Katz School of Medicine at Temple University have found a promising alternative. In new work, the Temple researchers show that cardiovascular disease risk may be reduced with a simple juice concentrate from the Japanese plum (*Prunus mume*)—a fruit that is widely consumed in Asian countries and that is promoted as a health food in Japan. The new findings are described online in the journal *Hypertension Research*.

"It is recognized that drugs alone are not enough to reduce the risk of cardiovascular disease in hypertension patients," explained Satoru Eguchi, MD, Ph.D., FAHA, Professor in the Cardiovascular Research Center, Sol Sherry Thrombosis Research Center, and Center for Metabolic Disease Research at the Lewis Katz School of Medicine at Temple University and senior investigator and co-corresponding author on the new study. "To help solve this problem, we became interested in a supplement that could potentially decrease cardiovascular disease risk and began investigating the effects of bainiku-ekisu, an infused juice concentrate of the Japanese plum."

The raw fruit of the Japanese plum, traditionally referred to as "ume" in Japan, contains toxins, and it is therefore often processed into juices or wine that are safe for consumption. The infused juice concentrate, known as bainiku-ekisu, has been consumed in Japan as a health supplement since at least the 18th century.

Numerous claims have been made about the benefits of bainiku-ekisu,

including an ability to prevent heart disease, and although limited, evidence from previous studies so far supports these claims. In experiments in smooth muscle cells of blood vessels, bainiku-ekisu was found to attenuate growth-promoting signals induced by angiotensin II—a circulatory hormone that plays a central role in the development of hypertension.

To better understand the potential anti-hypertensive effects of bainiku-ekisu, Dr. Eguchi and Dr. Hirotoshi Utsunomiya, Professor in the Department of Rehabilitation at Osaka Kawasaki Rehabilitation University in Japan and co-corresponding author on the new report, utilized a [mouse model](#) in which animals received infusions of angiotensin II to induce hypertension. Mice were then given either plain water, in the [control group](#), or water containing bainiku-ekisu.

Evaluation of cardiovascular function and vascular tissues from both groups of mice revealed stark differences. Most notably, mice given bainiku-ekisu did not develop hypertension, and in these animals, tissue analysis indicated that the juice concentrate protected the vasculature from the effects of angiotensin II. In particular, hypertrophy (growth and enlargement) of the aorta was minimal in mice given bainiku-ekisu, whereas control animals had marked aortic hypertrophy. Bainiku-ekisu also attenuated the infiltration of immune cells, which trigger inflammatory processes associated with hypertension.

Dr. Eguchi and colleagues next explored possible mechanisms by which bainiku-ekisu prevented hypertension in mice. They looked specifically at molecular pathways involved in glycolysis, the process by which cells breakdown glucose and which is a central feature of hypertension-induced hypertrophy.

"In hypertension, cells shift from aerobic metabolism to glycolysis because there is less oxygen available in the cellular environment," Dr.

Eguchi explained. "This switch results in high levels of oxidative stress, which leads to more inflammation, more vascular stiffness, and eventually, the development of more severe cardiovascular disease."

The team's experiments in cells showed that bainiku-ekisu prevents the switch to glycolysis, suggesting that it protects against angiotensin II-induced hypertension by mitigating harmful metabolic changes that underlie hypertrophy and inflammation.

Dr. Eguchi and colleagues next plan to identify the specific compounds in bainiku-ekisu that are responsible for its protective effects. "There may be two or three compounds working together, which could explain why the infused juice concentrate of ume is so popular as a health supplement," Dr. Eguchi noted. "Multiple compounds working together would produce additive or synergistic effects that might be lost in a pharmaceutical preparation."

**More information:** Keisuke Okuno et al, Infused juice concentrate of Japanese plum *Prunus mume* attenuates inflammatory vascular remodeling in a mouse model of hypertension induced by angiotensin II, *Hypertension Research* (2023). [DOI: 10.1038/s41440-023-01332-9](https://doi.org/10.1038/s41440-023-01332-9)

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