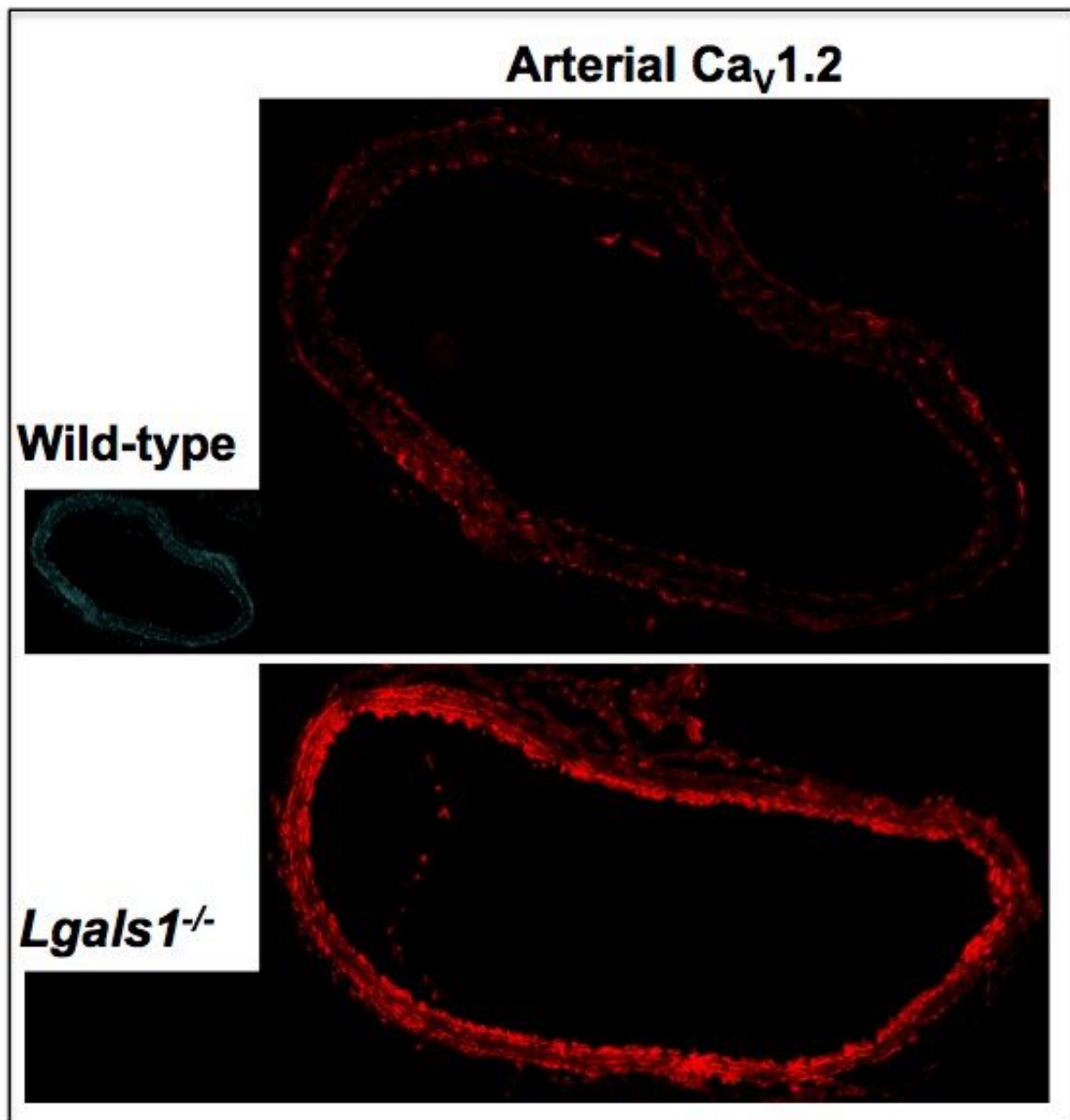


Scientists discover a new way to control blood pressure

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Knocking out Galectin-1 (lower panel) results in much higher expression of CaV1.2 calcium channels (stained red) in the arteries, compared with wild type (top panel). This finding supports the role of Galectin-1 in reducing the activity of CaV1.2 calcium channels in blood vessels, thus lowering blood pressure.

Credit: Dr. Zhenyu Hu

New, improved ways to fight hypertension and low blood pressure may be in the offing, thanks to a discovery of how blood pressure is controlled. National University of Singapore researchers have found a new means of controlling blood pressure that involves the protein galectin-1, present in blood vessels and various other tissues. The researchers showed that galectin-1 reduces the activity of CaV1.2 calcium channels in blood vessels, lowering blood pressure. Conversely, blood pressure could be raised by disrupting the interaction between galectin-1 and these calcium channels. This discovery could lead to novel treatments for hypertension and abnormally low blood pressure.

The finding by the multidisciplinary team from the NUS Yong Loo Lin School of Medicine (NUS Medicine) was published online in the April 2018 issue of *Circulation*. The team showed that the protein galectin-1 influences the function of another protein known as L-type (CaV1.2) calcium channel found on the arteries that normally acts to contract the [blood](#) vessels. By reducing the activity of these calcium channels, galectin-1 is able to lower blood pressure.

This project was led by Professor Soong Tuck Wah from the Department of Physiology together with Dr. Hu Zhenyu, the lead author of the study. It takes medical science a step closer to fighting cardiovascular disorders.

Hypertension—a silent killer

Hypertension is a common problem worldwide. About one in four Singapore residents aged 30 to 69 years have hypertension. Importantly, age is a major risk factor for the development of hypertension. Notably, in the 60 to 69 age group, more than one in two persons in Singapore have hypertension.

According to the World Health Organization, elevated blood pressure is estimated to cause 7.5 million deaths globally, which represents more than 12 percent of all deaths. Hypertension is associated with serious conditions including coronary heart diseases and stroke. In addition, hypertension can also cause renal impairment, retinal haemorrhage and visual impairment.

Although patients with stage 1 hypertension are mostly advised to make lifestyle changes to reduce the risks of other cardiovascular diseases, those with stage 2 hypertension or above have to take anti-hypertensive medicines to control blood pressure.

Calcium channel blockers (CCB) are traditionally used in clinics to lower blood pressure, but the use of such medications has been associated with increased risk for heart failure in hypertensive patients, particularly those with heart problems, due to their bad side effects. Therefore, drugs that adjust the activity of the L-type (CaV1.2) calcium channel, rather than blocking its normal function altogether, is considered a novel research direction for anti-hypertensive therapeutics. The discovery that galectin-1 can perform this function represents a pathway to control blood pressure.

Galectin-1 reduces the activity of L-type (CaV1.2) calcium channels by blocking their insertion in the cell membrane. The good news is that galectin-1 only targets this specific type of calcium channel in the blood vessels. It spares other types of calcium channels that are important for the general functions of our body.

"Because galectin-1 is predominantly found in our [blood vessels](#) and because of its selectivity for the Cav1.2 channels, galectin-1-specific drugs designed to lower our blood pressure are predicted to have minimal side effects," said Prof Soong, the lead investigator of the study.

"Currently, [calcium channel blockers](#) (CCB) are the most popular class of drugs used to treat high blood pressure because of their good side effect profile and their efficacy. However, many patients are troubled by side effects like leg swelling. Galectin-1-specific drugs have the potential for improved control with less side effects," said A/Prof James Yip, senior consultant, Department of Cardiology at the National University Heart Centre, Singapore.

Professor Vernon Oh, Department of Medicine, NUS Medicine, said, "The reported effects of the galectin-1 protein, and of its analogues, on the blood pressure in various models of human arteries and the circulatory system are encouraging. The results suggest that there is a reasonable likelihood of fabricating an antihypertensive treatment-molecule, based on galectin-1, which will consistently suppress, without negating, the v1.2 [calcium channel](#) in human impedance (resistance) arteries, so lowering the blood pressure in persons with pulmonary hypertension. The results from human pulmonary arteries suggest that the candidate treatment-molecule might also be useful in the condition known as pulmonary arterial [hypertension](#), for which highly cost-effective drugs are lacking."

Conversely, the team also found that interrupting the interaction of galectin-1 and the L-type [calcium](#) channels could raise blood pressure. This finding could lead to new treatments for conditions in which [blood pressure](#) is too low, such as sepsis.

More information: Zhenyu Hu et al, Regulation of Blood Pressure by Targeting CaV1.2-Galectin-1 Protein Interaction, *Circulation* (2018).

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