

Using plants to produce enzyme may provide treatment for high blood pressure in lungs

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Using plant leaves to produce and deliver a key enzyme may improve treatment for life-threatening high blood pressure in the lungs, according to a study presented at the American Heart Association's High Blood Pressure Research Scientific Sessions 2014.

"Current therapies for pulmonary hypertension don't cure the underlying disorder and the long-term prognosis is poor, even with treatment," said Vinayak Shenoy, Ph.D., the study's lead author and an assistant research scientist at the University of Florida in Gainesville. "There is an urgent need to discover potential new therapies that can stop the disease process."

Pulmonary hypertension is not the same as systemic hypertension. It reflects the pressure the heart must exert to pump blood from the heart through the arteries of the lungs. Risk factors for pulmonary hypertension include family history, [congenital heart defects](#), cocaine use and chronic lung disease. It has no cure and treatments include pills (endothelin receptor blockers, phosphodiesterase inhibitors and soluble guanylate cyclase stimulators), inhaled medicines, injections and oxygen therapy. Reduced function of the protein angiotensin converting enzyme 2 (ACE2) is associated with pulmonary hypertension, heart failure and several other disorders. However, replenishing ACE2 has been shown to prevent pulmonary hypertension and its complications in animal studies. In fact, recombinant ACE2 protein is currently under clinical investigation as a treatment for certain lung injuries, but it can't be taken orally. "The proteins are easily degraded in the stomach, but

encapsulating the proteins within plant cells protects them," Shenoy said.

The researchers employed transplastomic technology, which inserts new genes into the DNA of chloroplasts, cells that make [plant leaves](#) green and capture energy from sunlight. By inserting genes coding for ACE2, they created plants with large quantities of ACE2 in their leaves. In the study, rats with drug-induced pulmonary hypertension were fed frozen powdered leaves from the drug-producing plants for four weeks. After receiving ACE2, the pulmonary [blood pressure](#) decreased while [pulmonary blood flow](#) increased. Function of the right side of the heart, which pumps blood to the lungs, also improved.

"We are developing a new drug and a low-cost, innovative delivery system to add to our arsenal in the fight against [pulmonary hypertension](#) and other cardiopulmonary diseases," Shenoy said. The next step in development is a phase I clinical trial to screen for safety.

Provided by American Heart Association

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