

2012 top 10 advances in heart disease and stroke research

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Resuscitation, cell regeneration, a new high blood pressure treatment and developments in devices for treating stroke are among the key scientific findings that make up this year's top cardiovascular and stroke research identified by the American Heart Association and American Stroke Association.

"At this time of year, it's gratifying to reflect on scientific progress in the prevention and treatment of cardiovascular diseases and stroke," said Donna Arnett, Ph.D., president of the [American Heart Association](#).

"Cardiovascular disease research is truly helping people lead longer, healthier lives and the American [Heart](#) Association is pleased to be at the forefront of supporting, promoting and translating many important discoveries into practice."

The association has been compiling an annual list of the top 10 major advances in heart disease and stroke research since 1996.

The association's top research advances for 2012 include:

1. Extended CPR saves lives

The effect of the duration of CPR on meaningful recovery is uncertain. A study of hospitals using the Get With The Guidelines-Resuscitation [quality improvement program](#) found survival was higher for cardiac arrest patients who received CPR for a longer amount of time. Patients

at hospitals with the longest median duration of 25 minutes for resuscitation efforts had a 12 percent higher likelihood of being revived compared with patients at hospitals with the shortest median time of 16 minutes. Patients who survived after longer efforts did not appear to have substantially worse [neurological function](#) vs. patients who responded early. This study's unique findings raise critical questions about resuscitation duration and have the potential to change [medical practice](#).

Goldberger, et al: Duration of resuscitation efforts and survival after in-hospital cardiac arrest: an observational study. *Lancet* 380:1473-1481, 2012. www.thelancet.com .

Funding: American Heart Association, Robert Wood Johnson Foundation and the NIH.

2. Converting "non-beating" heart cells into "beating" heart cells

Myogenesis (methods for growing new heart muscle) is an emerging frontier, with promise that robust approaches can be found to replace heart muscle lost or injured in heart attacks or other disorders, or not appropriately formed as is the case with some types of congenital heart disease.

Two studies showed methods for reprogramming readily available "non-beating" heart muscle cells (non-cardiomyocytes) into "beating" heart muscle cells (cardiomyocytes) that could be used to replace heart cells and repair scarring.

Song, et al. Heart repair by reprogramming non-myocytes with cardiac transcription factors. *Nature* 485:599-604, 2012. www.nature.com .Funding sources are listed in the article.

Qian, et al. In vivo reprogramming of murine cardiac fibroblasts into induced cardiomyocytes. *Nature* 485:593-598, 2012. www.nature.com .
Funding: NIH and Gladstone Institutes.

3. Biopsied heart cells improved heart function and reduced scars

Two human trials, each using different types of cells, showed that cells from heart biopsies could be purified and replaced into the patient's own heart, improving heart function and reducing scarring.

Bolli, et al. Cardiac stem cells in patients with ischaemic cardiomyopathy (SCIPIO): initial results of a randomized phase 1 trial. *Lancet* 378:1847-1857, 2011. www.thelancet.com . Funding: University of Louisville Research Foundation and NIH.

Makkar. Intracoronary cardiosphere-derived cells for heart regeneration after myocardial infarction (CADUCEUS): a prospective, randomized phase 1 trial. *Lancet* 379:895-902, 2012. www.thelancet.com .

Funding: NHLBI and Cedars-Sinai Board of Governors Heart Stem Cell Center.

4. "Disconnecting" the kidneys might be the key to treating high blood pressure

The sympathetic nervous system controls most of the body's internal organs. A hyperactive sympathetic nervous system is believed to be a major contributor to hypertension. Now, four studies conclude that renal denervation—a procedure that reduces the functional connection between the sympathetic nervous system and the kidneys—is safe and effective at lowering [high blood pressure](#) resistant to other treatments.

Surgery is not required; instead a catheter delivers small bursts of radiofrequency energy to ablate, or reduce, part of the sympathetic nervous system's connection to the kidneys.

Vink EE and Blankestijn PJ (2012) Evidence and consequences of the central role of the kidneys in the pathophysiology of sympathetic hyperactivity. *Front. Physio.* 3:29. www.frontiersin.org/Physiology . Funding: Dutch Kidney Foundation.

Symplicity HTN-1 Investigators. Symplicity Clinical Trial Catheter-Based Renal Sympathetic Denervation for Resistant Hypertension Durability of Blood Pressure Reduction Out to 24 Months. *Hypertension.* 2011; 57: 911-917. Funding: Ardian, Inc. hyper.ahajournals.org . Funding sources are listed in the article.

Ukena, et al. Effects of renal sympathetic denervation on heart rate and atrioventricular conduction in patients with resistant hypertension. *Int J Cardiol.* www.internationaljournalofcardiology.com .

Persu, et al. Renal denervation: ultima ratio or standard in treatment-resistant hypertension. *Hypertension.* 2012 Sep;60(3):596-606. hyper.ahajournals.org . Funding: no outside funding noted.

5. Progress for children in transplant bridging and Kawasaki Disease

Two studies found significant improvements for treating children with heart disease. A study led by U.S. researchers highlights a new procedure that dramatically extends the life of children under age 16 who are awaiting a heart transplant. Traditionally, these children would have been placed on ECMO, an external device that helps deliver oxygen-rich

blood through the body when the heart is unable to. But a smaller device called VAD (ventricular assist device) may buy time for children awaiting transplant.

A second study conducted in Japan identified a new and highly effective treatment to prevent coronary abnormalities in children suffering from Kawasaki disease—a rare but deadly autoimmune disease that causes inflammation and long-term damage to the blood vessels.

Fraser CD, et al. Berlin Heart Study Investigators.

Funding: Prospective trial of a pediatric ventricular assist device. *N Engl J Med*. 2012 Aug 9;367(6):532-41. www.nejm.org . Funding: Berlin Heart and the FDA.

Kobayashi T, et al. RAISE study group investigators. Efficacy of immunoglobulin plus prednisolone for prevention of coronary artery abnormalities in severe Kawasaki disease (RAISE study): a randomised, open-label, blinded-endpoints trial. *Lancet*. 2012 Apr 28;379(9826):1613-20. Epub 2012 Mar 8. PubMed PMID: 22405251. www.thelancet.com .

Funding: Japanese Ministry of Health and Labour Sciences Research Grants.

6. Why children and adolescents should "just say no" to sugary drinks

Although we've known for years about the association between consuming sugar-sweetened beverages and overweight and obesity, two clinical trials this year provided definitive evidence. Both independently concluded that reducing the consumption of sugar-sweetened beverages reduces weight gain in children and adolescents. The studies are the first-ever randomized controlled trials showing that calories from sugar-

sweetened beverages can harm children's health.

De Ruyter, Janne C. et al. A Trial of Sugar-free or Sugar-Sweetened Beverages and Body Weight in Children, *N Engl J Med* 2012; 367:1397-1406 October 11, 2012 DOI: 10.1056/NEJMoa1203034. www.nejm.org . Funding: Netherlands Organization for Health Research and Development, the Netherlands Heart Foundation and the Royal Netherlands Academy of Arts and Sciences.

Ebbeling Cara B. et al. A Randomized Trial of Sugar-Sweetened Beverages and Adolescent Body Weight September 21, 2012, at NEJM.org. *N Engl J Med* 2012;367:1407-16. DOI: [10.1056/NEJMoa1203388](https://doi.org/10.1056/NEJMoa1203388). www.nejm.org . Funding sources are listed in the article.

7. Global impact: ECHO screening for rheumatic heart disease

Rheumatic heart disease is a major global health problem, especially in Africa, Asia and the Pacific, affecting more than 15 million people. A clinical trial done in Ugandan children showed that an echocardiogram (ultrasound of the heart) is highly effective at screening for rheumatic heart disease—an inflammation of the heart valves that occurs as a result of certain types of Streptococcus infections. In this largest-ever screening trial of African children, the echocardiogram detected three times as many cases of rheumatic heart disease as the traditional use of the stethoscope only.

Beaton A, et al. Echocardiography screening for rheumatic heart disease in Ugandan schoolchildren. *Circulation*. 2012 Jun 26;125(25):3127-32. Epub 2012 May 24. Funding: partial support from the World Bank.

8. Devices for stroke

This year marked several important developments in the use of medical devices for treating stroke. The SOLITAIRE and TREVO devices were found to more effectively clear blocked blood vessels in the brain than the MERCI device, benefitting a significantly greater percentage of patients. On the other hand, the CLOSURE trial found that devices that closed small holes between the upper chambers of the heart (patent foramen ovale) in certain stroke patients did not prevent subsequent strokes any better than standard medical treatment.

Saver et al. Solitaire flow restoration device versus the Merci Retriever in patients with acute ischaemic stroke (SWIFT): a randomised, parallel-group, non-inferiority trial. *Lancet* 380:1241-1249. www.thelancet.com .
Funding: Covidien/ev3.

Nogueira, et al. Trevo versus Merci retrievers for thrombectomy revascularisation of large vessel occlusions in acute ischaemic stroke (TREVO 2): a randomised trial. *Lancet* 380:1231-1240, 2012. www.thelancet.com .

Funding: Stryker Neurovascular.

Furlan, et al. Evaluation of the STARFlex Septal Closure System in Patients with a Stroke and/or Transient Ischemic Attack due to Presumed Paradoxical Embolism through a Patent Foramen Ovale (CLOSURE I). *N Engl J Med* 2012;366:991-9. www.nejm.org .

Funding: NMT Medical, Boston.

9. Ideal cardiovascular health practices lead to longer life, lower risk

Two notable studies this year highlighted the huge impact lifestyle factors can have in lowering heart disease and stroke risk and in helping people extend their lives. People with "ideal cardiovascular health," as measured by seven components—health behaviors (not smoking, regular exercise and healthy diet) and health factors (ideal body mass index, cholesterol, blood pressure and blood glucose) had the lowest risk.

Ford, et al. Ideal Cardiovascular Health and Mortality From All Causes and Diseases of the Circulatory System Among Adults in the United States. *Circulation* 2012, 125:987-995. www.circ.ahajournals.org .
Funding: Centers for Disease Control and Prevention.

Berry, et al. Lifetime Risks of Cardiovascular Disease. *N Engl J Med* 2012;366:321-9. www.nejm.org .
Funding: NHLBI.

10. Bypass surgery vs. drug-coated stents for diabetes patients

A large clinical trial found that patients with diabetes who had multiple clogged heart arteries fared significantly better when treated with bypass surgery vs. drug-coated stents. These patients were less likely to die or have a heart attack within five years if they underwent bypass surgery compared to treatment with drug-coated stents. Patients like the ones studied represent about a quarter of all patients undergoing heart procedures in catheterization labs. The study suggests that bypass surgery should be considered an important treatment option for such patients.

Farkouh, et al; the FREEDOM Trial Investigators. Strategies for multivessel revascularization in patients with diabetes. *N Engl J Med*. 2012 Nov 4. [Epub ahead of print]. www.nejm.org .
Funding: NHLBI.

Provided by American Heart Association

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