Circulating Biomarker for Early Detection of Post-Operative Cardiac Arrhythmias

Tech ID: 25710 / UC Case 2015-451-0

SUMMARY

The Cai group at UCLA has found that nitric oxide can be used as a non-invasive biomarker to predict a patient's risk of post-operative atrial fibrillation and other arrhythmic phenotypes.

BACKGROUND

Cardiac arrhythmias, such as atrial fibrillation, affect over 30% of patients who undergo cardiac procedures. These events are highly associated with morbidity and mortality in cardiac surgery patients. A robust biomarker that predicts the risk of atrial fibrillation and other arrhythmias would greatly improve the rate of operation-related complications after cardiac surgeries.

INNOVATION

Dr. Hua Cai and his colleagues have found that decreased levels of nitric oxide in a patient's blood may act as a novel biomarker to predict a patient's risk for atrial fibrillation. Their previous work shows that nitric oxide is a robust inhibitor of NOX4, a molecule that increases the inflammation during cardiopulmonary bypass, which may escalate the risk of atrial fibrillation. Nitric oxide is a circulating biomarker, and can therefore be detected noninvasively in peripheral blood samples.

APPLICATIONS

- Detect a patient's risk of cardiac arrhythmias before serious, life-threatening damage occurs
- Decrease morbidity and mortality that arise from complications associated with cardiac surgery

ADVANTAGES

- Non-invasive screening
- Early detection of post-operative complications
- Decreased morbidity and mortality in cardiac surgery patients

STATE OF DEVELOPMENT

Dr. Cai and colleagues have that a significant reduction in median serum nitric oxide levels was observed after cardiac surgery with cardiopulmonary bypass in a large cohort of patients. Patients with larger decreases in nitric oxide levels were more likely to develop atrial fibrillation.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,598,652	03/24/2020	2015-451

RELATED MATERIALS

- Zhang J, Youn JY, Kim AY, et al. NOX4-Dependent Hydrogen Peroxide Overproduction in Human Atrial Fibrillation and HL-1 Atrial Cells: Relationship to Hypertension. Front Physiol. 2012;3:140.

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INVENTORS

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OTHER INFORMATION

KEYWORDS

biomarker, post-operative atrial fibrillation, cardiac arrhythmia, nitric oxide

CATEGORIZED AS

- **Medical**
  - Diagnostics
  - Disease: Cardiovascular and Circulatory System
  - Screening

RELATED CASES

2015-451-0, 2010-769-0, 2014-526-0

▶ Siu KL, Lotz C, Ping P, Cai H. Netrin-1 abrogates ischemia/reperfusion-induced cardiac mitochondrial dysfunction via nitric oxide-dependent attenuation of NOX4 activation and recoupling of NOS. J Mol Cell Cardiol. 2015;78:174-85.

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

▶ A Novel Biomarker for Abdominal Aortic Aneurysm

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