



Flexible Balloon-Inflatable Electrochemical Impedance Spectroscopy To Assess Endoluminal Lipid-Rich Lesions

Tech ID: 30022 / UC Case 2015-182-0

SUMMARY

UCLA researchers have developed a novel flexible balloon-inflatable electrochemical impedance spectroscopy to facilitate the diagnosis of metabolically active atherosclerotic lesions.

BACKGROUND

Identifying metabolically active atherosclerotic lesions remains an unmet clinical challenge during coronary intervention. Detection of atherosclerotic lesions prone to rupture is of utmost importance in the management of patients with myocardial infarction and stroke. Atherosclerotic plaques usually contain high levels of inflammatory activity, due to oxidized lipids and foam cells. Predicting metabolically active atherosclerotic lesions has remained an unmet clinical need. A solution to this need is the use of electrochemical impedance spectroscopy (EIS) for detecting frequency-dependent changes in tissue impedance.

INNOVATION

UCLA researchers have developed a novel electrochemical impedance spectroscopy (EIS) sensor for the detection of atherosclerotic lesions. This sensor is flexible, stretchable, biocompatible (parylene-based) in design, and can be used with standard cardiovascular balloon catheters used in the clinic. It can provide real-time identification of atherosclerotic lesions in situ and detect oxLDL-rich regions by distinguished patterns of readout impedance magnitudes.

APPLICATIONS

- ▶ Diagnostic tool for atherosclerosis: to detect metabolically active atherosclerotic lesions
- ▶ Management of patients suffered from cardiovascular diseases
- ▶ Intravascular detection of atherosclerotic plaques in the cardiovascular system

ADVANTAGES

- ▶ Flexible and stretchable
- ▶ Biocompatible (Parylene-based)
- ▶ Deployable with standard cardiovascular balloon catheters used in common clinical practice
- ▶ Provides real-time identification

STATE OF DEVELOPMENT

The method has been demonstrated *ex vivo* and *in vivo*.

RELATED MATERIALS

- ▶ Yu, Fei, et al. "Elevated electrochemical impedance in the endoluminal regions with high shear stress: Implication for assessing lipid-rich atherosclerotic lesions." Biosensors and Bioelectronics 43 (2013): 237-244.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,736,537	08/11/2020	2015-182

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OTHER INFORMATION

KEYWORDS

Electrochemical impedance spectroscopy (EIS), atherosclerotic lesions, cardiovascular disease, atherosclerosis, catheter, Cardiovascular surgical devices, intravascular sensing, atherosclerosis, coronary heart disease, atherosclerotic plaque detection, balloon angioplasty, catheter ablation, electrochemical impedance spectroscopy

CATEGORIZED AS

- ▶ **Medical**
 - ▶ Devices
 - ▶ Disease: Cardiovascular and Circulatory System
- ▶ **Sensors & Instrumentation**
 - ▶ Biosensors
 - ▶ Medical
 - ▶ Other

RELATED CASES

2015-182-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

► [Intravascular Ultrasound-guided Electrochemical Impedance Spectroscopy \(IVUS-EIS\) to Assess Lipid-Laden Plaques](#)

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