UT Austin Portugal | 2019 Strategic Research Projects

NANOTECHNOLOGIES

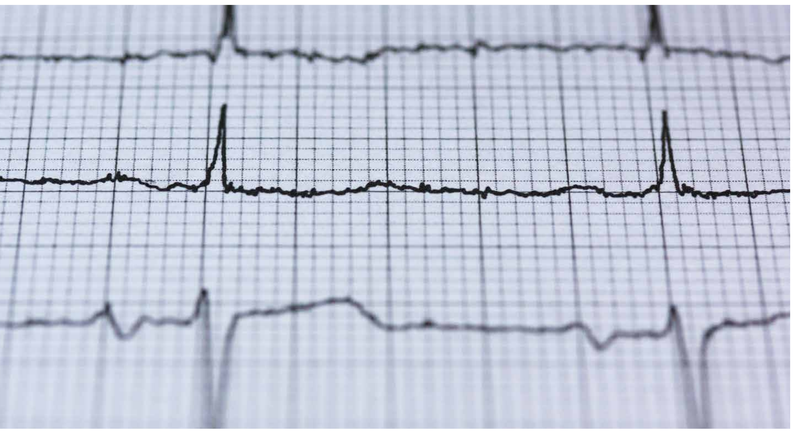
ADVANCED COMPUTING

Sentinel

Novel injectable biosensor for continuous remote monitoring of cancer patients at high-risk of relapse

Despite prostate-specific antigen (PSA) being the first approved cancer biomarker for diagnosing and screening prostate cancer, the benefits of PSA based screening for prostate cancer do not outweigh its harms. SENTINEL aims at developing a minimally invasive and biocompatible implantable biosensor based on novel plasmonic particles and hydrogel-based formulations for early tumor surveillance in post-operative prostate cancer patients.

Keywords: Cancer, biosensor, SERS, remote monitoring, artificial intelligence



Start Date: 01-APR-2020 Duration: 36 months Operation Code: 45914

Main challenge/problem the project seeks to address

Worldwide, the estimated number of people alive within 5 years of cancer diagnosis is 43.8 million. In these patients, with high risk of relapse, early identification of cancer is limited by sensitivity and specificity of tumor biomarkers, and by the accuracy of related assays. Despite PSA being the first approved cancer biomarker for diagnosing and screening prostate cancer, the benefits of PSA based screening for prostate cancer do not outweigh its harms.

Proposed solution

SENTINEL proposes a radical new approach to remotely monitor patients with high risk of cancer recurrence. This is provided by an injectable and hydrogel-based biosensor integrating plasmonic particles. The biosensor formulation enables simple and affordable implantation procedure, which, after implantation, supports detection and monitoring of cancer biomarkers by label free surface-enhanced Raman scattering (SERS) spectroscopy. Using a handheld device, SERS spectra can be acquired and analyzed using machine learning methods. Artificial intelligence tools are adopted to automate data acquisition and generate personalized and high granular monitoring outputs with high positive predictive value (PPV) and specificity.

Innovative Potential

The SENTINEL project will contribute to the digital transformation of cancer care through a novel breakthrough platform, based on a plasmonic based sensor and computational data analysis. SENTINEL concept provides a new cost-effective monitoring paradigm, thereby benefiting clinical follow-up of high-risk profile cancer patients and increasing current predictive rates.

Target beneficiaries

SENTINEL potentially enables the access to an untapped market segment related to remote monitoring of patients with high risk of tumor relapse. Immediate target beneficiaries include:

- Prostate cancer patients
- Healthcare service providers (that implement the technology within their ecosystem)

Consortium

PORTUGAL

Stemmatters – Biotecnologia e Medicina Regenerativa S.A. (Lead Beneficiary)
International Iberian Nanotechnology Laboratory (INL)
University of Minho
Clinic Academic Center - Braga, Association (2CA-Braga)

USA - UT AUSTIN'S PRINCIPAL INVESTIGATORS

James Tunnell (Cockrell School of Engineering)

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