



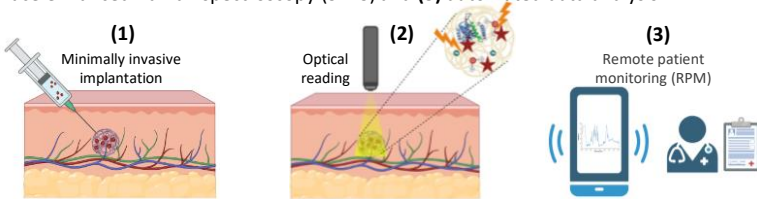
## SENTINEL

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

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## Objective and concept

SENTINEL project aims to develop a minimally invasive and biocompatible implantable biosensor to be used in early tumour surveillance of post-operative prostate cancer patients. The SENTINEL concept integrates three core technologies: (1) implantable biosensors, (2) surface enhanced Raman spectroscopy (SERS) and (3) automated data analysis.



Scheme 1. The three core technologies of SENTINEL.

## Implantable biosensor

Novel injectable and biologically compatible gellan gum (GG)-based biomaterial solutions were designed for stable incorporation of novel plasmonic gold star-shaped nanoparticles (GNS). Suitable biosensor administration procedures were demonstrated *in vivo*.

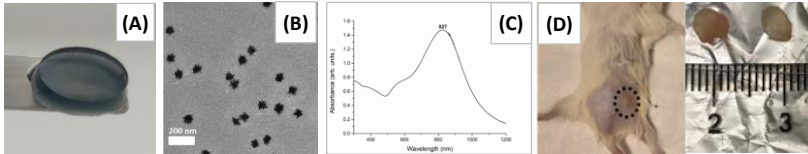


Fig. 1. (A) Formulated biosensor prototype; (B) Transmission Electron Microscopy (TEM) image of GNS; (C) Representative UV-Vis-NIR absorbance spectra of GNS; (D) *in vivo* testing of the novel injectable biosensor formulations.

## SERS acquisition

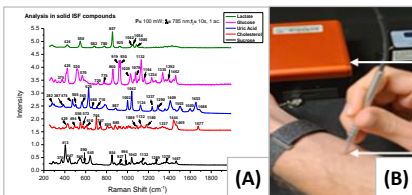


Fig. 2. Signal acquisition for biomolecular profiling of disease states (A) Raman of solid Interstitial Simulated Fluid compounds. (B) Raman handheld device.

## Data analysis

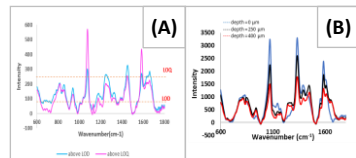


Fig. 3. Quality assessment of Raman signaling acquisition from the implanted biosensor: (A) Signal of 4MBA at the limited of detection and limit of quantification; (B) Example of signal attenuation at depth in skin.

## Main outcomes and next steps

Important milestones have been achieved for the core technologies supporting SENTINEL biosensor and approach. Ongoing efforts are aimed at assessing biosensor performance i) for discrimination of disease relevant clinical samples *ex vivo* and ii) *in vivo* for monitoring of prostate tumour development in a relevant disease model.

