Título del Proyecto	**Monitoring of Acquired Brain Injury and recovery biomarkers by the combined label-free nanoSensing of multiple circulating molecules - ABISens**
Nº de expediente asignado	AC18/00046
Abstract	The evaluation of patients after acquired brain injuries (ABI), like traumatic brain injury, stroke, haemorrhagic events or cancer, remains a major unmet clinical need. ABI usually produces severe impairments and nowadays the diagnosis, the prognosis and the efficacy of rehabilitation treatments are mainly assessed by clinical examinations, neuroimaging and electrophysiological tests during a long hospitalization stay. The detection and quantification of brain injury and recovery biomarkers in biofluids is indeed a challenge. First, a reliable biomarker-based evaluation requires to monitor a panel of multiple biomarkers with appropriate analytical robustness. Second, a blood-based test would be the best option because cerebrospinal fluid (CSF) withdrawals are unfeasible for long-term, repeated tests. On the other hand, brain biomarkers can be found in blood but usually at very low concentration. The aim of our proposal is to develop a new nanobiosensor platform able to identify and quantify multiple brain biomarkers (three miRNAs and three proteins initially selected) in blood and with high sensitivity. The final biosensor configuration will be based on a highly sensitive Bimodal Waveguide (BiMW) nanointerferometer device, integrated with a microfluidic network within a miniaturized optical platform for the label-free detection of the multiple selected biomarkers. The biosensing strategy will be fully based on oligonucleotide chemistry thanks to traditional and non-traditional oligoprobes for miRNA detection, and DNA-based aptamers for proteins detection. The project will be characterized by a strong interdisciplinary and translational nature resulting from the meeting between real clinical needs and high-level technological integration of biosensing and bimolecular aspects. The final tool will be validated on samples from 40 brain injury patients (and 15 healthy subjects) collected at the patient admission and during the rehabilitation period (six months).
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