

SPRi based biosensor for the detection of extracellular vesicles as rehabilitation biomarkers

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Surface Plasmon Resonance imaging (SPRi) is a sensitive analytical technique that has been successfully applied for the detection of multiple subfamilies of blood-derived EVs layer in real time and simultaneously, providing remarkable advantage thanks to multiplexing and high throughput features. Indeed, SPRi allows to detect variations in the mass adsorbed on a gold chip, thanks to an evanescent wave propagating for about 200 nm from the chip. As this range closely matches EV dimensions, SPRi is an effective approach to analyze proteins localized on intact EV surface and allows the use of a secondary analyte to evaluate cargo modifications on EV membranes. EV membrane cargo has a role in cell interactions and can change under pathological conditions and during regenerative mechanisms. For this reason, the investigation of the presence of specific molecules on membranes of distinct EV populations could help the monitoring of neuroplasticity and restorative processes occurring in the brain and in the vascular system after stroke.

Different brain and non-brain populations of EVs have been detected on the SPRi chip and the variations in their relative amount have been studied not only comparing pathological conditions to healthy status, but also comparing the effects of an intensive rehabilitative program. The SPRi technology has demonstrated to be a useful, novel and EV-tailored approach for the quantitative analysis of different EV-associated molecular components.