

SPRi-based multiplex detection of unamplified circulating miRNAs related to multiple sclerosis

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One of the major unmet clinical needs related to most chronic diseases is the shortage of circulating biomarkers to finely monitor disease progression supporting clinical evaluations. A particular case of this condition is Multiple Sclerosis (MS). MS is peculiar because is characterized by a very heterogeneous course during the lifetime and because of the lack of reliable and predictive disease biomarkers [1].

Several studies have found alterations in the miRNA profiles of MS patients [2] but appropriate analytical technologies for the evaluation of miRNAs that combine sensitivity, specificity and cost-effectiveness are still needed in to allow the screening and validation of miRNAs in large cohorts of patients [3, 4].

Here we report a new nano-based approach for the enhancement of Surface Plasmon Resonance imaging (SPRi) signals that makes possible the simultaneous detection of multiple miRNA circulating in serum. This enhancement strategy is based on the development of a universal nano-enhancer (gold nanoparticles conjugated with an anti-DNA/RNA antibody) able to interact with all the DNA/RNA hybrids formed when different miRNAs are adsorbed on DNA probes immobilized on the SPRi gold chip. The proof of this approach was demonstrated by the simultaneous and universal detection of different miRNAs related to SM in samples from SM and control subjects, using neither PCR nor multiple sequence-specific enhancers [5].

References

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