On the use of aptamer microarrays as a platform for the exploration of human prothombin/thrombin conversion

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Although the selection of aptamers has been described 25 years ago, the use and application of these RNA or DNA sequences in biosensing devices is significantly described since less than a decade. Microarrays are particular biosensors with multiple probes that are generally used for parallel and simultaneous detection of various targets. In this talk, we present microarrays functionalized with aptamer probes in order to follow up the different biomolecular interactions with a major enzyme, the thrombin protein, involved in the complex coagulation cascade. Several DNA based aptamers are used along with DNA control strands to simultaneously follow the interactions of a single sample with several probes. More precisely, thanks to the label-free Surface Plasmon Resonance imaging, we are able to monitor *in situ* and in real-time several events of the coagulation cascade: interactions of thrombin with DNA aptamers (two different sequences are followed), the differential binding of these aptamers with the prothrombin and last but not least, the enzymatic transformation of prothrombin into thrombin, catalyzed by the factor Xa. We are also able to appraise the influence of other biochemical factors and their corresponding inhibiting or enhancing behaviors on thrombin activation. Our study not only opens the door for the development of a complete microarray-based platform for the whole coagulation cascade analysis, but also for novel drug screening assays in pharmacology. On a more general point of view, the combination of such a label-free and user-friendly optical approach should significantly help in the use of aptamer microarrays for much wider applications.

References:

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