Surface plasmon resonance methodology for adalimumab and anti-adalimumab antibody quantification

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Adalimumab (ADL) is one of the most widely used and administered tumor necrosis factor alpha (TNF-α) inhibitors. Particularly, ADL is a fully human anti-TNF-α monoclonal IgG, developed through phage display technology. Despite being a fully human immunoglobulin, immunogenicity against the drug has been reported in patients under treatment and, in particular, insurgence of anti-ADL antibodies (AAA) has been described as one of the main causes of treatment failure and adverse effects [1].
The incidence of AAA onset in treated patients varied depending on different parameters, i.e. treatment duration, dose, administration timing, etc. In fact, different rates of incidence were observed, and the percentages reported in literature were heterogeneous arriving up to 87% of treated patients [2]. Moreover, AAA prevalence seems to be correlated with the detection method employed, making difficult a comparison among different studies. Till now no gold standard method has entered in the clinical routine for AAA evaluation. In fact, the development of AAA detection assays poses several challenges, the first one being the lack of a suitable secondary reagent able to distinguish between the anti-drug antibodies and the drug, an antibody as well. Moreover, the presence of drug/antibody complex and of other serum factors may interfere with the AAA quantification. The widely used ELISA method tried to solve the issues related to drug presence using indirect and bridging approaches, but despite ELISA specificity, AAA can be underestimated because of the ADL presence [3].
With all these considerations in mind, we have previously proposed a qualitative methodology for AAA detection using surface plasmon resonance methodology [4]. Herein we propose the set-up of a real-time label free protocol not only for AAA identification but also for AAA quantification that has been also applied to ADL detection. This method does not need sample pretreatments and the use of a reference channel for both assays reduced non-specific interactions and matrix effects, characteristic challenges in the SPR detection.

Key words: *antibody detection, anti-drug antibodies, surface plasmon resonance*

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