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Nanoscale Affinity Chip Interface for Coupling Inhibition SPR Immunosensor Screening with Nano-LC TOF MS.

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The on-line nanoscale coupling of a surface plasmon resonance (SPR)-based inhibition biosensor immunoassay (iBIA) for the screening of low molecular weight molecules with nano-liquid-chromatography electrospray ionization time-of-flight mass spectrometry (nano-LC ESI TOF MS) for identification is described. The interface is based on a reusable recovery chip (RC) that contains a nanoscale biosorbent composed of a hydrogel layer modified with antibodies raised against the analyte featuring the unique possibility of performance characterization using the SPR biosensor. Various hydrogel chemistries were evaluated, and the standard Biacore CM5 chip showed the highest capture capacity in combination with affinity-purified polyclonal antibodies. The procedure has four stages: the samples are prepared (1) and screened using a screening chip (SC) in the iBIA (2). Suspected noncompliant samples as being noncompliant are reinjected over the RC, and the analyte is captured at subnanogram level (3). The captured analyte is released, and the eluate is analyzed with nano-LC ESI TOF MS via a loop-type interface (4). The coupling of the technologies proved effective for screening enrofloxacin, a model compound, in incurred chicken muscle samples followed by identity confirmation in suspected noncompliant samples. Ciprofloxacin, a known metabolite of enrofloxacin, was identified as well in incurred chicken samples.

This demonstrates the potential of the technologies coupled by means of a RC for the rapid screening and identification of known as well as unknown compounds. Finally, we demonstrate the feasibility of combining the two biosensor chips (SC and RC) with a robust chip-based nano-LC chip TOF MS system, thus providing a robust alternative triplechip system.