Nanoparticles-Based Immunosensors for Cytokines Monitoring

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Cytokines, immunomodulating protein biomarkers secreted from immune cells, are indicators of the functional status of the human immune system. These proteins are widespread through mammals and even in invertebrates. There are several different families of cytokine proteins, which differ not only in their function, but also have a wide variety of molecular weight ranges from approximately 6-70 kDa. They play critical roles in regulating cell signalling, cell differentiation, and inflammatory response in the immune system. However, such cytokine related immune reactions are often extremely dynamic and occur quickly. In addition, the produced cytokine concentration is either not detectable or in pg mL^{-1} range in healthy individuals. Elevated concentrations of cytokines indicate activation of cytokine pathways associated with inflammation or disease progression. Thus, a sensitive and rapid immunoassay that affords comprehensive characterization and quantitative analysis of cytokines secreted from immune cells cytokine measurements, is important as these proteins are widely used as biomarkers to understand and predict disease progression and monitor the effect of treatment. We are targeting to develop nanoparticles-based immunorsensors for real time monitoring cytokines in body fluid or tissues.