Quanterix®

Simoa® IL-17A Advantage PLUS Fact Sheet

What is IL-17A?

Interleukin-17A (IL-17A) is a 35 kDa pro-inflammatory cytokine and a member of the IL-17 family. Alongside IL-17A, five additional homologous cytokines have been identified—IL-17B through IL-17F. Despite their structural similarities, these cytokines exhibit no sequence homology with other known cytokine families and demonstrate remarkable conservation across mammalian species, particularly between human and mouse homologs. IL-17A is characterized by its pivotal role in mediating immune responses and inflammation.

IL-17A exerts its biological effects through binding to its receptor, IL-17 receptor, which is widely expressed on various cell types, including epithelial cells, endothelial cells, fibroblasts, and immune cells. Upon stimulation by various pathogens or inflammatory signals, cells release IL-17A, which modulates downstream signaling pathways, such as the NF-κB and MAPK pathways, leading to the production of pro-inflammatory proteins, including cytokines, chemokines, and matrix metalloproteinases. These mediators promote inflammation, tissue infiltration by immune cells, and tissue damage, contributing to the pathogenesis of various inflammatory and autoimmune diseases.

Dysregulated IL-17A signaling is implicated in the pathogenesis of several cancers and autoimmune and inflammatory disorders, including rheumatoid arthritis (RA), psoriasis, chronic obstructive pulmonary disease (COPD), multiple sclerosis (MS), and chronic inflammation. Elevated levels of IL-17A have been detected in affected tissues and biological fluids of patients with these conditions and correlate with disease severity and progression, underscoring its significant role in disease pathogenesis.

In therapeutic contexts, the ability to measure IL-17A at ultra-low levels is critical in the research and development of IL-17A inhibitors as potential drug targets. Accurate quantification of this key cytokine and chemokine modulator enables precise monitoring of pro-inflammatory responses. This capability aids researchers in evaluating therapeutic interventions for a wide range of conditions. This is particularly crucial for programs focused on autoimmune and inflammatory disorders, oncology, and immuno-oncology, where precise tracking of inflammation dynamics is essential for therapeutic success. Understanding the molecular mechanisms underlying IL-17A signaling and its dysregulation in disease contexts provides valuable insights into the pathology and development of targeted therapies for these conditions.

How to Measure IL-17A?

The Simoa® IL-17A Advantage PLUS assay is an ultra-sensitive digital immunoassay for the quantitative determination of IL-17A in human serum, EDTA-plasma and CSF.

What is the Simoa® Difference?

Simoa® is a powerful digital immunoassay technology that is up to 1000 times more sensitive than standard sandwich-based immunoassay techniques. Traditional ELISA measurements are limited to pg/ml levels of detection. Quanterix Simoa® can achieve sensitivity as low as femtogram (fg/ml) levels, delivering the gold standard for early, ultra-sensitive detection and quantification of proteins far below the typical lower limit of quantification (LLOQ).

Simoa® is based upon the isolation of individual immunocomplexes on paramagnetic beads using standard ELISA reagents. The main difference between Simoa® and conventional immunoassays lies in the ability to trap single molecules in femtoliter-sized wells, allowing for a "digital" readout of each individual bead to determine if it is bound to the target analyte or not.
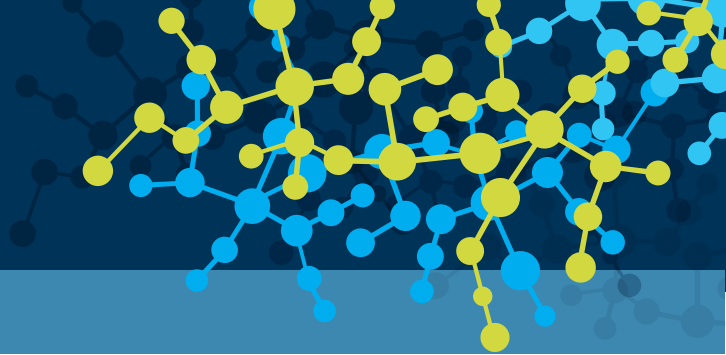
What is the Simoa® Difference? continued

Cancers and neurological, autoimmune, and inflammatory disorders continue to be challenging to diagnose early and treat. Unlike 'visible' illnesses, the subtle progression of these conditions can be overlooked or mistaken for other ailments. Additionally, no definitive tests exist for early detection of many of these disorders, and clinicians can only conclusively diagnose them once symptoms start to present. As a result, many patients may wait years for a diagnosis or a clear treatment pathway.

IL-17A has garnered increasing attention in recent years as a promising inflammatory biomarker, particularly within the context of autoimmune and inflammatory disorders. Thousands of studies have validated the use of Simoa® immunoassays to detect and measure biomarkers that hold promise as tools for early detection, prognosis, and monitoring treatment for a range of neurodegenerative conditions. Simoa® technology enables the precise detection and quantification of IL-17A levels, which may provide valuable insights into the pathophysiological mechanisms underlying IL-17A-mediated inflammation and its implications for disease prognosis and therapeutic interventions.