

CYTOKINE PANEL (serum)

Cytokines are chemical messengers that primarily signal the immune system and also play a role as neuromodulators. They can be defined as either pro-inflammatory or anti-inflammatory. Cytokine imbalances are known to be involved in autoimmune disorders. Testing allows analysis of not only cytokine involvement in disease but it also provides an easy solution for monitoring therapy effectiveness.

Cytokines

Cytokines are signalling proteins and glycoproteins that mediate and regulate immunity, inflammation and haematopoiesis. More simply they can be described as chemical messengers between immune cells. They are also involved in cell growth and differentiation, cell death, angiogenesis, normal development and neuromodulation. Although the principal source of cytokines are the helper T cells and macrophages, most nucleated cells can produce cytokines usually as a response to injury.

Cytokines and the Immune System

Cytokines are critical to the functioning of both the innate (cell-mediated) and adaptive (antigen specific / humoral) immune systems. A simple classification system used for cytokines is to label them as promoters of inflammation, i.e. pro-inflammatory cytokines or anti-inflammatory cytokines which either reduce inflammation or suppress the activity of pro-inflammatory cytokines. Pro-inflammatory cytokines include interferon-gamma (IFN γ), interleukin-2 (IL-2) and interleukin-12 (IL-12), whereas interleukin-4 (IL-4) and interleukin-5 (IL-5) are examples of anti-inflammatory cytokines.

Pro-inflammatory cytokines are secreted from T-helper 1 (Th1) cells whose key function is to stimulate innate or cell-mediated immunity, fighting off viruses and other intracellular pathogens. Eliminating cancerous cells and stimulating delayed-type hypersensitivity skin reactions are also roles of the Th1 cells. Conversely, anti-inflammatory cytokines secreted from T-helper 2 (Th2) cells drive adaptive (humoral) immunity, up-regulating antibody production to fight extracellular pathogens. A healthy immune system is able to switch back and forth between Th1 and Th2 pathways depending on the 'attack'; when one pathway is up-regulated, the other is normally suppressed and vice versa. Under normal circumstances the Th1 and Th2 systems should be in balance.

Several distinct types of T-helper cells, namely Th1 cells, Th2 cells and Th3 cells, have been identified. These cells have different functions in the immune system.

The helper T cells (CD4) can divide into one of the following kinds of CD4 cells:

- Th1 cells which secrete the pro-inflammatory cytokines effective at killing invading organisms but may cause potentially damaging excessive inflammation.
- Th2 cells which secrete the anti-inflammatory cytokines and also direct the cells that produce antibodies to begin their antibody production.
- T-Reg cells (T regulator cells), which 'regulate' the balance between Th1 pro-inflammation and Th2 anti-inflammation.

When the pro-inflammatory cytokines are dominant, the body is aiming to seek and destroy whereas when anti-inflammatory cytokines are dominant, the body is repairing and replenishing.

Cytokines and Disorders of the Immune System

Over-activation of either the Th1 or Th2 system can cause disease, being active even when there is no threat. When Th1 is dominating abnormally, organ specific autoimmune type diseases can result. On the other hand, when the Th2 system is dominating, disorders that are primarily allergy or antibody driven occur. The body becomes overly sensitive to 'extracellular pathogens', often reacting and producing antibodies against non-pathogenic stimuli such as food and dust.

HEALTH DISORDERS ASSOCIATED WITH Th DOMINANCE	
Th1 Dominance (Pro-inflammatory)	Th2 Dominance (Anti-inflammatory)
Alzheimer's disease	Asthma
Atherosclerosis	Atopic dermatitis / Eczema
Coeliac disease	Cancer
Crohn's disease	Chemical sensitivities
Hashimoto's thyroiditis	Food allergies (IgE)
Multiple sclerosis	HIV
Psoriasis	Schizophrenia
Recurrent miscarriage	Systemic lupus erythematosus
Rheumatoid arthritis	Seasonal allergies, Allergic rhinitis
Type 1 Diabetes	Chronic Fatigue Syndrome

Blood cytokine levels are useful and important in the differential diagnosis of inflammatory disorders such as neutrophilia, eosinophilia, and in distinguishing tumour-caused fever from infectious fever in malignant lymphomas. Cytokines are critical to the functional both innate (cell-mediated) and adaptive (antigen specific/humoral) immune systems. They are known as either pro-inflammatory or anti-inflammatory. Pro-inflammatory cytokines include interferon-gamma (INF γ), interleukin-2 (IL2) and interleukin-12 (IL12); whereas interleukin-4 (IL4) and interleukin-5 (IL5) are anti-inflammatory.

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- ❖ GM-CSF, IL-1, IL-2, IL-4, IL-5, IL-6, IL7, IL8, IL-10, IL12, IL-13, IFNY, TNF α

How to order a test kit:

To order a test kit simply request the test name and/or test code on a NutriPATH request form and have the patient phone NutriPATH Customer Service on 1300 688 522.



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