Adipsin (Complement Factor D)

Analyte: Complement Factor D

Specimen Type: Serum, Inquire for addtional option(s)

Optimum Volume: 0.5 mL

2-8°C	-20°C	-70°C
Unstable*	N.A.*	N.A.*

Reporting units: ng/mL

Method: ELISA

Biological or Clinical Significance:

The complement system comprises approximately 30 circulating plasma proteins, as well as cell-surface receptors, that function as part of the innate and adaptive immune system to eliminate pathogens. The system is organized into multiple proteolytic cascades where proteases exist as inactive zymogens and are activated via the action of an upstream active protease. Three pathways of complement activation (classical, lectin, and alternative) exist. These pathways converge in the generation of the C3 convertase, which is responsible for the initiation of a series of events leading to the generation of bacterial opsonin (that facilitates the phagocytosis of opsonized pathogens), anaphylatoxins (that mediate inflammation), and the formation of the terminal membrane attack complex (that induces the lysis of pathogens or cells).

Complement factor D, also known as adipsin, is a serine protease that is indispensable for the initiation of complement activation via the alternative pathway. Upon activation through reversible substrate-induced conformational change into an active enzyme, factor D functions to cleave the C3b-bound factor B, resulting in the formation of C3bBb complex, which is the alternative pathway C3 convertase. Human complement factor D is synthesized as a 253 amino acid precursor that contains a signal peptide (aa 1-20), a five-residue activation/pro-peptide (aa 21-25), and the mature chain (aa 26-253). Under physiological conditions, mature factor D lacking the activation peptide circulates as an inactive enzyme and requires interaction with its natural substrate, C3b-bound factor B, for activation of its catalytic activity. Mature human factor D shares 98%, 96%, 84%, and 66% aa sequence homology with the chimpanzee, rhesus monkey, porcine, and mouse protein, respectively. Factor D is expressed in multiple tissues, including monocyte/macrophages, muscle, sciatic nerve, endometrium, kidney, intestine, and at especially high levels in adipocytes. Even though the level of factor D expression is reduced in various mouse models of obesity, a role for factor D in fat metabolism or systemic energy balance has not been demonstrated so far.

Some functions of this protein that are associated with adipose tissue and it was independently termed adipsin by obesity researchers. It was shown nearly two decades ago that factor D and adipsin are the same protein. However, the exact role of adipsin is still somewhat unclear. Interestingly, adipsin concentrations are reduced in rodent models of obesity, but they are increased in obese humans. Obese Pima Indians, for example, have serum adipsin levels that are much higher than non-obese Pimas. Conversely, in subjects with anorexia nervosa, adipsin levels are low and increase during refeeding.

Serum factor D/adipisin concentration is regulated through catabolism in the kidney where factor D is filtered by the glomerulus and reabsorbed by the proximal tubule. In patients with renal failure, circulating levels of protein are elevated. Similarly in patients with Fanconi syndrome, a disorder in which the proximal tubular function of the kidney is impaired, urinary factor D concentrations are also highly elevated. Complement factor D deficiency is associated with low activity of the alternative complement pathway and low capacity to opsonize bacteria. In patients with mutations in the factor D gene resulting in complete factor D deficiency, recurrent bacterial infections were observed.

Principle of Test Method:

The Complement Factor D assay employs the quantitative sandwich enzyme immunoassay technique.

*Please contact nexelis for stability information.

References:

1. White RT, Damm D, Hancock N, Rosen BS, Lowell BB, Usher P, Flier JS, Spiegelman BM. Human adipsin is identical to complement factor D and is expressed at high levels in adipose tissue. J Biol Chem. 1992; 267:9210-9213.
2. Diamond F. The endocrine function of adipose tissue. Growth Genetics and Hormones. 2002; 18:17-22.