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NAGALASE IN BLOOD

-test for monitoring efficacy of therapy for cancer and certain viral infections, incl. HIV-

NAGALASE IN SERUM/PLASMA

The test measures the activity of alpha-N-acetylgalactosaminidase (nagalase) in blood.

Nagalase is an extracellular matrix-degrading enzyme that is (increased) secreted by cancerous cells in the process of tumor invasion. It also is an intrisic component of the envelope protein of various virions, such as HIV, Epstein-Barr virus (EBV), herpes zoster and the influenza virus. Thus, it is also secreted from virus-infected cells..[1,3,4,10]

Nagalase deglycosylates the vitamin D3-binding protein DBP (in humans better known as Gc-protein). Gc-protein is the precursor for the major macrophage-activating factor (MAF). Gc-protein carries one trisaccharide consisting of N-acetylgalactosamine with dibranched galactose and sialic acid termini. By deglycosylation, the (complete) trisaccharide is removed from the Gc-protein. This glycosylated Gc-protein can no longer be converted to MAF.

Normally MAF is produced from the Gc-protein by sequential removal of the galactose and sialic acid termini by beta-galactosidase and sialidase, selectively, with N-acetylgalactosamine as the remaining sugar. Macrophage-activation for phagocytosis and antigen presentation is the first step in the immune development cascade. Lost precursor activity leads to immunosuppression.

Increased nagalase activity has been detected in the blood of patients with a wide variety of cancers, like cancer of the prostate, breast, colon, lung, esophagus, stomach, liver, pancreas, kidney, bladder, testis, uterus and ovary, mesothelioma, melanoma, fibrosarcoma, glioblastoma, neuroblastoma and various leukeamias.[1,3,4] For various types of tumors, various levels of nagalase activity were found.[7] It appears that the secretory capacity of individual tumor tissue varies among tumor types depending upon tumor size, staging, and the degree of malignancy or invasiveness.[7] Increased nagalase activity has not been detected in the blood of healthy humans.[1]

Nagalase activity is directly proportional to viable tumor burden..[1,2 ,9] Studies correlating nagalse levels with tumor burden suggest that the measurement of this enzyme can diagnose the presence of cancerous lesions below levels detectable by other diagnostic means.[1] In research studies, nagalase activity decreased to near the tumor-free control level one day after surgical removal of primary tumors from cancer patients, suggesting that the half-life value of nagalse is less than 24 hous.[1,6] The short half-life of nagalase is valuable for prognosis of the disease during various therapies.[1,5]

Nagalase is the intrinsic component of envelope protein gp160 of HIV-virions and of the envelope protein hemagglutinin (HA) of influenza virus. Nagalase activity is the sum of enzyme activities carried by both HIV virions and unassembled envelope proteins.[4]

OTHER IMMUNE DISEASES

Increased activity of nagalase has been detected in the blood of patients with the autoimmune disease systemic lupus erythematosus[8].

TEST INDICATIONS

Nagalase in blood is a sensitive test for monitoring the efficacy of therapy in cancer and certain viral infections, including HIV . Because of the short half-life of nagalase, the method is suitable for

monitoring various types of therapy. The great sensitivity of the test may help the physician / oncologist in obtaining a better understanding of the therapy and to fine-tune the treatment.

Note: The values may be affected by certain drugs used in the five days preceding blood draw. Drug use must be indicated on the questionnaire submitted with the Requisition Form.

REFERENCES

1. Korbelik M., VR Naraparaju and N Yamamoto. The value of serum alfa-N-acetylgalactosaminidase measurement for the assessment of tumour response to radio- and photodynamic therapy. British Joumal of Cancer (1998) 77(6), 1009-1014

2. Reddi AL et al. Serum alpha-N-acetylgalactosaminidase is associated with diagnosis/prognosis of patients with squamous cell carcinoma of the uterine cervix. Cancer Lett. 2000 Sep 29;158(1):61-4.

3. Yamamoto N. and Urade M. Pathogenic significance of alpha-N-acetylgalactosaminidase activity found in the hemagglutinin of influenza virus..Microbes Infect 2005 Apr;7(4):674-81. Epub 2005 Mar 22.

4. Yamamoto N. Pathogenic significance of alpha-N-acetylgalactosaminidase activity found in the envelope glycoprotein gp160 of human immunodeficiency virus Type 1. AIDS Res Hum Retroviruses. 2006 Mar;22(3):262-71.

5. Yamamoto N. Immunotherpy for prostate cancer with GC Protein-derived macrophage-activating factor, GcMAF. Translational Oncology. Vol 1, no 2 june 2008, [pp 65-72.

6. Yamamoto N et al. Therapeutic efficacy of vitamin D3 binding protein derived macrophage activating factor for prostate, breast and colon cancers. Cancer Res. Proc. 38; 31 (1997)

7. Yamamoto N. et al. Deglycosylation of serum vitamin D3-binding protein leads to immunosuppression in Cancer Patients. Cancer Research 56 : 2827-2831, june 15, 1996

8. Yamamoto N. et al. Deglycosylation of serum vitamin D3-binding protein by alpha-N-acetylgalactosaminidase detected in the plasma of patients with systemic lupus erythematosus. 1997 Clin. Immunol Immunopathol. Mar;82(3):290-8,1997

9. Yamamoto N. et al. Prognostic Utility of Serum a-*N*-Acetylgalactosaminidase and Immunosuppression Resulted from Deglycosylation of Serum Gc Protein in Oral Cancer Patients. Cancer Research 57, 295-299, 1997

10. Yamamoto, Nobuto (Philadelphia, PA). Preparation of potent macrophage activating factors derived from cloned vitamin D binding protein and its domain and their therapeutic usage for cancer, HIV-infection and osteopetrosis. United States Patent 6410269.

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