

# Nagalase Information

Test for monitoring the effect of therapy of cancer and certain viral infections, including HIV & Autism.

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 intrinsic component of envelope protein of various virions, such as HIV and the influenza virus. It is secreted from virus-infected cells..

Nagalase was thought to deglycosylate the vitamin D3-binding protein DBP (in humans better known as Gc-protein) but it is actually more complicated than that. 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 the deglycosylation the (complete) trisaccharide is removed from the Gc-protein. The glycosylated Gc-protein cannot be converted to MAF anymore.

Normally MAF is produced from Gc-protein by sequential removal of the galactose and sialic acid termini from this protein by respectively beta-galactosidase of inflammation- primed B lymphocytes and sialidase of T lymphocytes, 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 activity of Nagalase 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, fibro sarcoma, glioblastoma, neuroblastoma and various leukemia's. For various types of tumors various levels of Nagalase activity were found. It seems likely that secretor capacity of individual tumor tissue varies among tumor types depending upon tumor size, staging, and the degree of malignancy or invasiveness. Increased Nagalase activity has not been detected in the blood of healthy humans.

It has been established that the Nagalase activity is directly proportional to viable tumor burden. Studies correlating Nagalase 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.<sup>1</sup> In research a day after surgical removal of primary tumors from cancer patients Nagalase activity suddenly decreased to near the tumor-free control level, suggesting that the half-life value of Nagalase is less than 24 hours. The short half-life of Nagalase is valuable for prognosis of the disease during various therapies.

Nagalase is the intrinsic component of the envelope protein gp120 of HIV-virions and of the envelope protein hem agglutinin (HA) of influenza virus. Nagalase activity is the sum of enzyme activities carried by both HIV virions and unassembled envelope proteins.

## Test Indications

Nagalase in blood is a sensitive test for monitoring the effect of therapy in cancer and certain viral infections, including HIV infection. 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.

## References

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