Brazos Neuroscience

4800 Fournace Place, BW3
Bellaire TX, USA 77401
Lab Director: Kevin P. Rosenblatt, M.D., Ph.D.
CLIA: 06D2174124 | Phone: (281) 727-0927
CAP: 8647015

Test Order Information

Patient Name: [redacted]
Patient Gender: Male
Patient Date of Birth: 01/18/1995
Patient Race: Unknown
Specimen Type: Plasma Citrate
Received Date: 10/31/2025 10:00 CT

Ordering Provider: [redacted]
Ordering Facility: Florida Wellness and Rehabilitation Center of Homestead
Date of Injury: 01/18/2025
Collection Date: 10/30/2025 12:14 CT
Reported Date: 11/05/2025 17:41 CT

NEUROTRAUMA ASSESSMENT TEST

Test	Result
GFAP Glial Injury Marker (Values > 12.5 pg/mL are considered positive)	**Positive** 13.5 pg/mL
Glial Fibrillary Acidic Protein (GFAP) is an astroglial cytoskeletal protein that is exclusive to the central nervous system (CNS). This protein forms networks that provide support and strength to the glial cells. The glial cells nourish and support nerve cells within the brain and spinal cord. If nerve cells are injured, glial cells respond by activating and generating more cells in a process called gliosis; during gliosis, the glial cells rapidly produce more GFAP. Thus, this protein is released after CNS injury and high levels are associated with glial and neuronal cellular damage. GFAP is a sensitive blood marker for traumatic brain injury (TBI), including mild TBI (mTBI). It is also used to aid decisions about whether CT scans of the brain should be performed after TBI.	

Test	Result
UCH-L1 Neuronal Injury Marker (Values > 17.2 pg/mL are considered positive)	**Positive** 333.83 pg/mL
Ubiquitin C-terminal hydrolase-L1 (UCH-L1) is a cytoplasmic protein enzyme found in nerve cells throughout the brain. UCH-L1 breaks down damaged and unneeded proteins in nerve cells. Injured nerve cells release UCH-L1 into the blood. Hence, elevated UCH-L1 is a post-TBI marker of injury. It is also used to aid decisions about whether CT scans of the brain should be performed after TBI.	

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Test	Result
S100B Injury Marker (Values < 1.1 pg/mL are considered Negative)	**Negative** < 1.1 pg/mL

The S100B protein (S100B) is a small calcium-binding protein that is predominantly found in the brain, specifically in astrocytes and certain other glial cells. This protein promotes neurite (connections) extension and increases neuronal cell survival. When the brain is wounded, such as during a traumatic brain injury (TBI), cells that contain S100B can become damaged or disrupted resulting in the release of the protein into the extracellular fluid and, ultimately, into the bloodstream. Therefore, detecting elevated levels of S100B in the blood can serve as an indicator of TBI. The level of S100B positivity can provide valuable information about the extent of the injury and neuronal damage, and it has been studied for its potential in aiding the diagnosis, management, and prognosis of TBI. Its presence in extracellular fluids is often used as a biomarker for brain damage and it is an indication of the attempt by the astrocytes to repair damaged areas through the process of gliosis, forming a neurological scar tissue to repair and protect itself in the aftermath of injury. While gliosis plays a critical role in the acute phase of injury by limiting damage and initiating repair, excessive or chronic gliosis can contribute to the pathology of various neurological diseases by interfering with neural connectivity and function. S100B is considered a useful biomarker because its levels in the blood correlate with the severity and outcome of TBI.

Test	Result
NFs Injury Marker (Values > 10.51 pg/mL are considered Positive)	**Positive** 18.84 pg/mL

Neurofilaments (NFs) are proteins that help construct the cytoskeleton of neurons. They are highly specific to neuronal cells, provide structural support and scaffolding for metabolism and signaling, and contribute to neuroaxonal caliber and strength. They additionally allow the transport of important biological materials along the axons and neuronal processes that enable cell survival and facilitate information transfer—information that allows us to move, respond to stimuli, and think, among other things. NFs are made up of three types of chains called light (NF-L), medium (NF-M), and heavy (NF-H) chains. NFs are especially useful as biomarkers for traumatic brain injury and cell death because damaged neuronal axons release NF proteins into the extracellular fluid, which then make their way into the cerebrospinal fluid (CSF), and, finally, the peripheral blood. During trauma to the brain, a patient may experience a shearing, or tearing, of the long axonal connection fibers of the neuron used for communication between cells, a process called diffuse axonal injury (DAI). As NFs are released during neuroaxonal damage, and because they make up over 80% of all neuronal structural proteins, they can be used as sensitive indicators of DAI, the severity of which has important prognostic repercussions. Importantly, because diffusion tensor imaging (DTI) findings correlate with and help diagnose DAI, NF testing can lead imaging findings (e.g. areas of injury) long before they may be seen on images and can serve as an early predictor of DTI findings and DAI severity.

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Test	Result
APOE	E3/E3

APOE ε3/ε3 Patient Diplotype and TBI

Diagnostic Line:

APOE ε3/ε3 Genotype: Associated with better outcomes after injury and increased improvement in neuropsychological performance at 6 months postinjury than APOE ε4 variant carriers

The patient's APOE genotype, ε3/ε3 (two copies of the most common ε3 allele), is associated with normal metabolism and processing of lipids compared to the ε2/ε2, ε2/ε3, ε2/ε4, and ε4-related diplotypes. The ε3 allele is correlated with better effects on cardiovascular disease and neurological health, neuroinflammation and in Alzheimer Disease than ε4 carriers—ε4 carriers have higher amyloid (Aβ) levels and amyloid plaque loads the in brain than non-ε4 carriers. These ε3/ε3 patients tend to have better outcomes at 6 months postinjury than those that carry an ε4 allele; it is expected that their improvement in neuropsychological performance at 6 months postinjury is also better than carriers of one or two copies of the ε4 allele.

Note that there are many other genetic and non-genetic factors involved in disease development and early vascular disease.

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Test	Result
MTHFR-2 (667)	G/A
MTHFR-1 (1298)	T/T

MTHFR 677 G/A (Heterozygous, decreased activity allele), 1298 T/T (Homozygous, "Wild Type" Reference Allele), and TBI

Diagnostic Line:

MTHFR Intermediate Metabolizer: Predisposition to mild homocysteinemia and correlation with possible poorer recovery post-TBI than patients will full MTHFR enzyme activity (677 G/G, 1298 T/T)

Homocysteine levels are significantly inversely related with Montreal Cognitive Assessment (MoCA) scores. For mTBI, increases in homocysteine levels correlate with decreases in MoCA scores. mTBI patients with higher homocysteine are more likely to experience cognitive decline. Consider checking patient folate and homocysteine serum/plasma levels.

This MTHFR genotype may be associated with a mild decrease serum folate and mild homocysteinemia (elevated blood homocysteine levels). Within the 1298 T/T genotype, each additional 677 A allele reduces mean serum folate and increases mean total homocysteine by an average of 7% and 6%, respectively (Ulvik et al, 2007). Folate therapy may be useful to prevent mild hyperhomocysteinaemia. **This patient may have Lower Risk than Compound Heterozygotes for both mutations (677 (G/A)/1298 (T/G) genotype) that have been associated with 36% of the reference protein activity (Ulvik et al, 2007). Due to possible increased homocysteine, there is relevance to neurological, cardiovascular, and other diseases.**

Note that there are many other genetic and non-genetic factors involved in disease development and early vascular disease.

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Methodology

- The Neurotrauma Assessment Test (NAT) is an immunoassay that incorporates magnetic microspheres (beads) to enable the quantitative, single or multiplexed detection and measurement of UCH-L1 (ubiquitin C-terminal hydrolase L1), S100B (S100B calcium-binding protein), and NF-H (neurofilament heavy chain) in plasma; it can be used in a single- plex form to detect UCH-L1, S100B, or NF-H independently, or in a multiplexed format to measure those proteins simultaneously. The assay uses antibody pairs (2 antibodies) that recognize UCH-L1, S100B, and NF-H in an ELISA format using the magnetic colored bead technology from LuminexTM. Capture antibodies to UCH-L1, S100B, and NF-H are attached to four distinct bead sets with internal dyes colored differently for identifying UCH-L1, S100B, and NF-H independently; specific detection antibodies to UCH-L1, S100B, and NF-H are bound to fluorescent labels for quantifying the amount of the analytes in a sandwich interaction between the antibody pairs (capture and detection antibodies) and the analytes. A flow cell allows the beads and labels to be detected using lasers or light emitting diodes (LEDs) and high-speed detectors and digital signal processors for quantifying the sandwich-antibody, binding interactions on the UCH-L1, S100B, and NF-H analytes separately.
- The GFAP ELISA assay requires two antibodies specific to two different epitopes of the GFAP antigen. These two antibodies include a capture antibody that coats wells within a 96-microtiter plate and a detection antibody labelled with a Biotin conjugate. The biotin binds to a Streptavidin conjugate during the assay process. The streptavidin is labeled with the HRP (horseradish peroxide) enzyme after the antibody binding steps, the GFAP will be sandwiched (sandwich assay) between the capture and detection antibodies. A chemical substrate called tetramethylbenzidine (TMB) is incubated with the HRP enzyme in the sandwich structure, which creates a color product that can be detected by a plate reader (colorimetric reaction) and then quantified to determine the GFAP protein concentration.
- Brazos Neuroscience independently verified the performance characteristics of all tests against vendor specifications. All tests are considered to be Laboratory-Developed Tests (LDT's) as defined by the U.S. Food and Drug Administration (FDA). As a result, they have not been cleared or approved by the FDA. Brazos Neuroscience is regulated under the Clinical Laboratory Improvement Amendments of 1988 (CLIA# 06D2174124/CAP# 8647015) and is qualified to perform high-complexity testing.
- Common and rare variants for the listed alleles are detected via PCR-based assays. The assays utilized detect variants with known clinical significance and have an analytical sensitivity and specificity of > 99%. Rare false negative or false positive results may occur.
- This Genetics panel detects the most common variations of the ApoE and MTHFR genes which are of known clinical significance. Only the targeted allelic variations specified in the Test Details section of this report will be determined. Additional allelic variations in these genes will not be detected and are outside the scope of this report. Therefore, these results do not rule out the possibility that the individual providing the test sample could be a carrier of other mutations/variations not detected by this gene mutation (variation) panel. Additionally, rare occurrences of false negatives and/or positives are possible.

Disclaimer

- The Neurotrauma Assessment Test has not been cleared or approved by the FDA. The test was developed, and its performance characteristics determined, by Brazos Neuroscience laboratory (CLIA# 06D2174124/CAP# 8647015).
- The laboratory is regulated and accredited under CLIA and CAP and is qualified to perform high-complexity clinical testing. This test is used for clinical purposes. It should not be regarded as investigational or for research.

Test Information

- This testing was performed in the Brazos Neuroscience laboratory (CLIA# 06D2174124/CAP# 8647015), located at 4800 Fournace Place, Suite BW3, Bellaire, TX 77401. For inquiries, the physician may contact the Lab at 281-846-6723
- Lab Director: Kevin P. Rosenblatt, MD, PhD

Date: 11/05/2025 17:41 CT

Accession #: BRMDTBI00005839

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