Longevity™ LAB-SOLUTIONS Where Health Gets Perfected

Longevity Lab-Solutions
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|---|---|---|---|
| **PATIENT NAME** | PATIENT, TEST | **ACCESSION** | 23112000006 |
| **PATIENT DOB** | Oct. 11, 1950 | **ORDER CODE** | GN23-0000302 |
| **PATIENT GENDER** | F | **SAMPLE TYPE & SOURCE** | Serum |
| **PATIENT PHONE** | | | |
| **PATIENT ALT ID** | | **COLLECTED** | 11-20-2023, 04:00PM (CST) |
| **ACCOUNT** | Longevity Lab-Solutions | **RECEIVED** | 11-20-2023, 04:38PM (CST) |
| **PROVIDER** | TEST PROVIDER | **REPORTED** | 11-22-2023, 11:05AM (CST) |
| **PATIENT FASTING** | N | | |
| **REPORT STATUS** | FINAL | | |

| | | | |
|---|---|---|---|
| **TEST INFORMATION** | LONGEVITY BRAIN-MICROGLIA | **DIAGNOSIS CODES** | |

| TESTS | RESULT | UNIT | FLAG | REFERENCE |
|---|---|---|---|---|
| **LONGEVITY BRAIN** | | | | |
| **BRAIN-DERIVED NEUROTROPHIC FACTOR (BDNF)** | **10.6** | **ng/mL** | **L** | **18 - 26** |

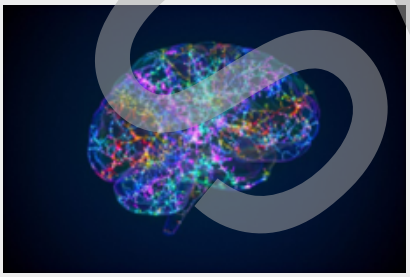
**---------- END OF REPORT ----------**

Tests were developed and performance characteristics determined by Longevity Lab-Solutions. Tests were performed in a CLIA certified laboratory and are intended for clinical purposes.

Longevity™
LAB-SOLUTIONS
Where Health Gets Perfected

# LONGEVITY BRAIN-MICROGLIA

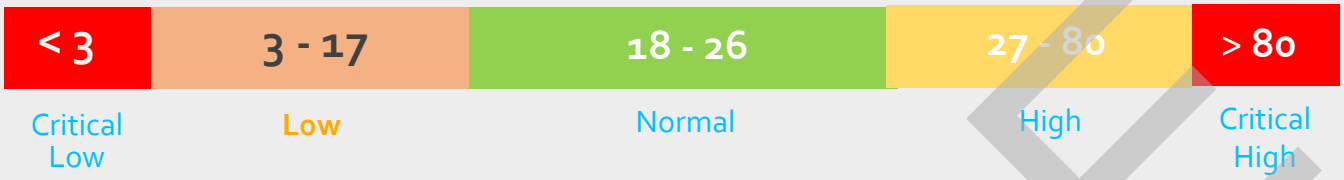




| | |
|---|---|
| NAME | Test Patient |
| DATE OF BIRTH | 11/11/1950 |
| DATE REPORTED | 11/22/2023 11:05 AM CDT |
| ACCESSION NUMBER | GN23-0000302 |

## TEST RESULTS

| BDNF | YOUR RESULT: | 10.6 ng/mL | LOW |
|---|---|---|---|




**Brain-Derived Neurotrophic Factor (BDNF)** is a protein that has several critical functions in the brain and nervous system. Its roles span across various aspects of neural health and activity:

**Neuronal Development and Survival:** BDNF supports the growth, development, and survival of neurons. It is vital during brain development and plays a significant role in neurogenesis, which is the formation of new neurons.

**Synaptic Plasticity:** BDNF is crucial for synaptic plasticity, the ability of synapses (connections between neurons) to strengthen or weaken over time in response to increases or decreases in their activity. This plasticity is fundamental for learning and memory.

**Cognitive Function:** By promoting synaptic plasticity and supporting neuronal health, BDNF contributes to various cognitive functions, including learning, memory, and higher-order thinking.

**Mood Regulation:** BDNF levels are associated with mood regulation. Low levels of BDNF have been linked to mood disorders such as depression and bipolar disorder.

**Response to Stress:** BDNF helps in adapting to stress. Chronic stress can reduce the production of BDNF, contributing to the development of mood disorders.

**Neuroprotection:** BDNF has neuroprotective properties. It helps protect neurons from damage in conditions like oxidative stress, neurotoxicity, and inflammation.

**Exercise and Brain Health:** Physical exercise increases the production of BDNF, which is one of the reasons why regular physical activity is beneficial for brain health and cognitive function.

**Role in Neurological Diseases:** Decreased BDNF levels or activity have been observed in neurodegenerative diseases like Alzheimer's disease and Parkinson's disease.

**Synaptic Transmission:** BDNF plays a role in regulating synaptic transmission and is important for long-term potentiation (LTP), a mechanism for strengthening synapses that is key to forming memories.

## Low BDNF and Long COVID Syndrome

Long COVID, or post-acute sequelae of SARS-CoV-2 infection (PASC), encompasses a range of symptoms that persist for weeks or months after the acute phase of the infection has resolved. These can include fatigue, brain fog, memory issues, and other cognitive impairments. BDNF is a pivotal regulator of neuroplasticity and fundamentally improves brain abilities such as memory, consciousness, and cognition. Multiple studies have addressed altered concentrations of BDNF in neurological complications of COVID-19 patients along with respiratory tract infections induced by both viral and bacterial pathogens.
Low serum BDNF levels correlate with severe SARS-CoV-2 infection and Long COVID Syndrome. Additionally, BDNF levels are restored during recovery.

## Low BDNF and Neuroinflammation

Neuroinflammation involves the activation of the brain's immune cells, leading to the release of inflammatory cytokines and other substances that can be harmful to brain tissue. Prolonged neuroinflammation is associated with various neurodegenerative diseases, such as Alzheimer's and Parkinson's disease, and can exacerbate their progression. Chronic inflammation in the brain impairs cognitive functions, mood regulation, and overall brain health. Low levels of BDNF exacerbates neuroinflammation. BDNF typically provides neuroprotective effects, and its deficiency can leave neurons more vulnerable to inflammatory damage. Both reduced BDNF and increased neuroinflammation are features of many neurodegenerative diseases. The combination can accelerate neuronal damage and cognitive decline. Neuroinflammation negatively affects neuroplasticity, a process heavily dependent on BDNF. Reduced BDNF in an inflamed neural environment further impairs the brain's ability to form and maintain synaptic connections.

## Low BDNF and Neurodegenerative Diseases

Low levels of Brain-Derived Neurotrophic Factor (BDNF) have been significantly linked to the development and progression of neurodegenerative diseases. BDNF plays a crucial role in the survival, maintenance, and growth of neurons, and its deficiency have profound effects on brain health. Low BDNF levels are associated with neurodegenerative diseases such as Alzheimer's Disease, Parkinson's Disease, Huntington's Disease, Amyotrophic Lateral Sclerosis, and Multiple Sclerosis.

## Low BDNF and Cognition & Memory

BDNF is essential for , the ability of synapses to strengthen or weaken over time. This plasticity is crucial for learning and memory formation. Low BDNF impairs synaptic plasticity leading to difficulties in learning new information and forming new memories. BDNF is important for overall cognitive function, including executive functions like problem-solving, planning, and attention. Low BDNF levels can lead to a decrease in cognitive flexibility and processing speed.
**Age-Related Cognitive Decline:** BDNF levels naturally decrease with age, which contributes to age-related cognitive decline. Lower-than-average BDNF levels in older adults can be associated with a greater risk of cognitive impairments.

# Low BDNF and Neuroplasticity

Low levels of Brain-Derived Neurotrophic Factor (BDNF) have a significant impact on neuroplasticity, the brain's ability to form and reorganize synaptic connections in response to experience, learning, or following injury. BDNF is a key molecule involved in various aspects of brain function, including learning, memory, and the overall health of neurons.

**Effects of Low BDNF on Neuroplasticity**

1. **Impaired Learning and Memory:** Reduced BDNF levels can lead to difficulties in learning and memory because of the diminished capacity for synaptic plasticity.
2. **Reduced Synaptic Efficacy:** Low BDNF levels can result in weaker synaptic connections, making it more difficult for neurons to communicate effectively.
3. **Decreased Neuronal Survival:** Without adequate BDNF support, neurons may be more susceptible to damage and death, which can negatively impact the overall neural network and its plasticity.
4. **Compromised Recovery from Brain Injury:** BDNF plays a role in the brain's ability to recover and reorganize after injury. Low levels can hinder this recovery process.

# Low BDNF and Mood Disorder

Low levels of Brain-Derived Neurotrophic Factor (BDNF) have been significantly linked to mood disorders. BDNF is a key protein involved in the health and function of neurons in the brain, and its role in mood regulation is critical. Here's how low BDNF levels are related to various mood disorders:

**1. Major Depressive Disorder (MDD)**

Reduced BDNF Levels: Numerous studies have found that patients with major depression often have lower serum and brain levels of BDNF.

Symptom Severity: The severity of depressive symptoms has been correlated with the degree of reduction in BDNF levels.

Treatment Response: Antidepressant treatments have been shown to increase BDNF levels, which is thought to be part of their therapeutic action.

**2. Bipolar Disorder**

Mood Episodes: Fluctuations in BDNF levels are observed during different mood states in bipolar disorder, with lower levels typically noted during depressive phases.

Neuroprogression: Chronic bipolar disorder can lead to neuroprogression, a progressive change in brain structure and function, where BDNF dysregulation plays a role.

**3. Anxiety Disorders**

Generalized Anxiety and PTSD: Studies suggest that alterations in BDNF expression are also associated with anxiety disorders, including generalized anxiety disorder and post-traumatic stress disorder (PTSD).

Stress Response: BDNF is involved in the brain's response to stress, and dysregulation in its signaling pathway can exacerbate anxiety symptoms.

# Addressing BDNF Deficiency

1. **Physical Exercise:** Physical exercise is a potent stimulator of Brain-Derived Neurotrophic Factor (BDNF) production. Engaging in regular physical activity has been consistently shown to increase BDNF levels, which can have numerous benefits for brain health and function.
    a. **Types of Exercise that Increase BDNF**
        i. **Aerobic Exercise:** Activities like running, swimming, cycling, and brisk walking are particularly effective at increasing BDNF levels.
        ii. **Resistance Training:** Strength training exercises also contribute to the upregulation of BDNF.
        iii. **High-Intensity Interval Training (HIIT):** Short bursts of intense exercise followed by rest periods have been shown to boost BDNF.
2. **Diet and Nutrition:** Diets rich in omega-3 fatty acids, antioxidants, and other nutrients influence the production of Brain-Derived Neurotrophic Factor (BDNF), promoting brain health and cognitive functions. While no food directly contains BDNF, some nutrients can stimulate its production or support the pathways involved in its synthesis. Here are some foods and nutrients that are known to help increase BDNF levels:
    a. **Omega-3 Fatty Acids**
        i. Sources: Fatty fish (like salmon, mackerel, sardines), flaxseeds, chia seeds, walnuts, and algae oils.
    b. **Flavonoids**
        i. Sources: Berries (blueberries, strawberries, blackberries), dark chocolate, green tea, and citrus fruits.
    c. **Turmeric (Curcumin)**
        i. Sources: The spice turmeric, commonly used in curry powders.
    d. **Whole Grains**
        i. Sources: Oats, barley, brown rice, whole wheat, and quinoa.
    e. **Leafy Greens and Cruciferous Vegetables**
        i. Sources: Spinach, kale, broccoli, and Brussels sprouts.
    f. **Eggs**
        i. Sources: Particularly the yolks.
    g. **Nuts and Seeds**
        i. Sources: Almonds, walnuts, sunflower seeds, and pumpkin seeds.
    h. **Probiotic and Fermented Foods**
        i. Sources: Yogurt, kefir, kimchi, sauerkraut, and kombucha.
3. **Stress Reduction:** Chronic stress can negatively affect BDNF levels; managing stress through techniques like mindfulness and therapy can be beneficial.
4. **Adequate Sleep:** Quality sleep is essential for reducing stress and has been linked to higher BDNF levels. Establishing a regular sleep routine and addressing sleep disorders can be beneficial.
5. **Cognitive Training:** Engaging in activities that challenge the brain (like puzzles, learning new skills) may help boost BDNF levels.

For Patients: To schedule a Nutrition Consultation, please email us at nutritionconsultation@longevitylabdx.com.

For Providers: For access to references and clinical publications, please email us at support@longevitylablabdx.com or call us at 281-369-9471.