

Thyroid and Brain Health: The Connection between Hypothyroidism and Cognitive Decline

Antonella Neves*

Department of Neuroscience and the Center for Neuroendocrine Studies, Columbia University, Broadway, NY, USA

Introduction

The thyroid gland, responsible for regulating metabolism through the production of thyroid hormones, plays a crucial role in maintaining overall health, including brain function. Hypothyroidism, a condition characterized by insufficient thyroid hormone production, has long been linked to a variety of cognitive impairments, ranging from mild memory issues to more severe forms of cognitive decline. As thyroid hormones are essential for the proper functioning of the brain, their deficiency can disrupt neuronal communication, impact neurotransmitter regulation and interfere with processes like neuroplasticity and synaptic function. The connection between hypothyroidism and cognitive decline is an area of increasing concern, particularly in aging populations, where both thyroid dysfunction and cognitive impairments are prevalent. While the symptoms of hypothyroidism are often first recognized as fatigue, weight gain, or depression, its effects on cognition are increasingly being acknowledged as a significant aspect of the condition. Understanding how hypothyroidism contributes to cognitive decline can provide insight into potential therapeutic approaches and underscore the importance of early diagnosis and treatment. This introduction will explore the relationship between hypothyroidism and cognitive health, examining how thyroid hormone deficiency may influence brain function and contribute to neurodegenerative changes [1].

Description

Hypothyroidism, a condition where the thyroid gland produces insufficient thyroid hormones, can significantly impact brain health and cognitive function. Thyroid hormones are essential for the normal development and function of the brain, as they regulate processes like neuronal growth, myelination and the modulation of neurotransmitters. When thyroid hormone levels are low, these processes can be disrupted, leading to various cognitive issues, including memory impairment, concentration difficulties and slower mental processing. Research suggests that hypothyroidism may contribute to cognitive decline, particularly in older adults and is often associated with symptoms that overlap with other neurodegenerative conditions like dementia. In some cases, untreated hypothyroidism has been linked to an increased risk of conditions such as Alzheimer's disease and other forms of cognitive dysfunction. Even mild cases of thyroid hormone deficiency can lead to noticeable declines in cognitive performance, often manifesting as brain fog, forgetfulness and difficulty in multitasking. The impact of hypothyroidism on the brain is thought to be due to several factors, including reduced metabolic activity in brain cells, altered blood flow and imbalances in neurotransmitters like serotonin and dopamine. Additionally, thyroid hormone receptors in the brain are involved in neuroplasticity, which is the brain's ability to adapt and reorganize, further illustrating the importance of thyroid function for cognitive health [2].

***Address for Correspondence:** Antonella Neves, Department of Neuroscience and the Center for Neuroendocrine Studies, Columbia University, Broadway, NY, USA, E-mail: neves.antonella@uniconolumbia.ny.edu

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Hypothyroidism, a condition characterized by an underactive thyroid gland that produces insufficient thyroid hormones, has been closely linked to cognitive decline and various neurological symptoms. Thyroid hormones play a crucial role in brain development and function, influencing processes such as neurotransmitter regulation, neuronal growth and synaptic plasticity. In the case of hypothyroidism, the decreased levels of thyroid hormones can result in cognitive disturbances, including memory problems, difficulty concentrating and slowed mental processing. These cognitive impairments are often subtle in the early stages but may become more pronounced over time if the condition remains untreated. Research has shown that hypothyroidism can contribute to conditions like depression and anxiety, further complicating cognitive function. In severe cases, prolonged hypothyroidism may lead to more significant cognitive decline and is sometimes referred to as "myxedema madness," where patients exhibit confusion, disorientation and even psychosis [3].

The relationship between hypothyroidism and cognitive decline is thought to be mediated through several mechanisms, including altered brain metabolism, reduced neurogenesis and disruptions in the blood-brain barrier. The thyroid hormone receptors are widely distributed throughout the brain, including in regions responsible for memory, learning and emotional regulation, such as the hippocampus and prefrontal cortex. Additionally, thyroid hormones have a protective effect against oxidative stress and inflammation, both of which can contribute to neuronal damage. When hypothyroidism is left untreated, these processes can lead to long-term cognitive deficits. However, timely and effective treatment with thyroid hormone replacement therapy can often reverse or significantly improve cognitive symptoms, highlighting the importance of early diagnosis and management. Diagnosis of hypothyroidism typically involves blood tests to measure thyroid hormone levels and the presence of thyroid antibodies [4].

In addition to memory and concentration issues, individuals with hypothyroidism may experience a general slowing of mental and physical responses, which can affect their daily functioning. The connection between thyroid dysfunction and cognitive health is particularly evident in older adults, where subclinical hypothyroidism may increase the risk of developing dementia or Alzheimer's disease. Studies suggest that proper thyroid hormone levels are essential for maintaining synaptic function and neural communication, which are vital for cognitive performance. Furthermore, untreated hypothyroidism may exacerbate other age-related cognitive conditions, making it crucial to address thyroid imbalances early. Continued research into the intricate connection between thyroid hormones and brain health could lead to better prevention and treatment strategies for cognitive decline associated with thyroid dysfunction. Treating the condition with thyroid hormone replacement therapy can often reverse many of the cognitive symptoms associated with the disorder. However, early detection and appropriate management are key to preventing more severe cognitive impairments. Understanding the connection between hypothyroidism and cognitive decline can help improve clinical approaches to both thyroid health and brain health, ultimately leading to better outcomes for affected individuals [5].

Conclusion

In conclusion, hypothyroidism is closely linked to cognitive decline, as insufficient thyroid hormone levels can disrupt essential brain functions, impair memory and contribute to slower mental processing. The brain relies on thyroid hormones for proper development, neurotransmitter regulation and neuroplasticity and deficiencies can lead to noticeable cognitive impairments, especially in older adults. Early diagnosis and effective management of

hypothyroidism through hormone replacement therapy are crucial in preventing or reversing cognitive symptoms. Understanding the connection between thyroid function and brain health highlights the importance of monitoring thyroid levels, particularly in those at risk, to preserve cognitive function and improve overall quality of life.

Acknowledgement

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Conflict of Interest

None.

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