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## ADHD may be associated with an increased risk of dementia

An adult brain affected by attention deficit disorder with or without hyperactivity (ADHD) presents modifications similar to those observed in individuals suffering from dementia. These are the findings of a study conducted by the Geneva University Hospitals (HUG) and the University of Geneva (UNIGE) which shows that, compared with healthy individuals, patients with an ADHD diagnosis have more iron in certain regions of their brain along with higher levels of neurofilaments<sup>1</sup> (NfL) in their blood. These markers have been consistently reported to be characteristic of old age-related dementias such as Alzheimer's disease and can be measured in its early stages. The study confirms that ADHD may be linked to an increased risk of developing dementia later in life and it provides first evidence for a neurological mechanism possibly involved. This significant step forward is described in the journal [\*Psychiatry and Clinical Neurosciences\*](#).

ADHD is a frequent neurodevelopmental disorder that affects about 3.5% of adults according to a 2008 World Health Organization (WHO) study. It is characterized by an inability to maintain attention along with inappropriate levels of hyperactivity and impulsivity. Although symptoms generally manifest during childhood and significantly affect educational development and social interactions, its effects can persist and adversely affect daily functioning in adult life.

Old age-related dementias affect about 55 million people globally, with almost 10 million new cases each year according to WHO statistics from 2023. Alzheimer's disease represents 60 to 70% of these dementia cases.

"Recent epidemiological studies show that adults suffering from ADHD have an increased risk of dementia at an advanced age, but the mechanism through which ADHD constitutes a risk is not known," states Professor Paul G. Unschuld, Head of the Division of Geriatric Psychiatry of the HUG, Associate Professor in the Department of Psychiatry at the UNIGE Faculty of Medicine and the initiator of the study

### Iron and neurofilaments as indicators

The research team used an advanced brain imaging method, known as quantitative susceptibility mapping (QSM) through magnetic resonance imaging (MRI) to examine iron content in the brain of 32 adults between 25 – 45 years of age affected by ADHD and 29 healthy individuals in the same age bracket. Neurofilament light chain protein (NfL) levels in the blood of the participants were measured in parallel. The results of the study reveal notable differences in iron distribution in several regions of the brain of the individuals affected by ADHD. Furthermore, a significant association was established between iron levels in the precentral cortex and NfL levels in the blood.

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<sup>1</sup> Neurofilaments (NfL) are the main structural proteins of neurons and are biomarkers of neurodegeneration.

Iron plays an essential role in normal brain functioning, but its excessive accumulation may cause neuronal damage and lead to neurodegenerative diseases such as Alzheimer's disease. "Excess iron in certain regions of the brain is often observed and is associated with increased oxidative stress that furthers neuronal degeneration," specifies Professor Paul Unschuld. In parallel, the NfL is an indicator of neuronal damage in the brain, more specifically of neuronal axons which are essential for nerve transmission. High blood levels of NfL reflect axon damage in the brain. Consequently, an increased brain iron and NfL levels may indicate an underlying neurodegenerative pathology and an increased risk of neurodegenerative dementia at old age.

These results confirm that a link exists between ADHD and an increased risk of dementia at old age and identify first neurological mechanism.

### **The importance of early detection and management of ADHD**

These discoveries pave the way for new research into understanding why persons with ADHD may be at increased risk of dementia. Professor Paul Unschuld believes that the information provided by this study "will enable targeted prevention strategies to be developed to reduce the risk of dementia in persons affected by ADHD. This is especially important since there is a well-known correlation between lifestyle and altered iron levels in brain. To achieve this, additional longitudinal studies are required in order to determine if a reduction of iron levels in the brain is a potential treatment pathway for preventing dementia at an advanced age in persons with ADHD."

Furthermore, the relationship between ADHD and dementia underlines the importance of early detection of these diseases. It also highlights the importance of proactive management of ADHD in adults, not only to improve quality of life for individuals but also to prevent long-term consequences on cognitive health.

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