Victoria Zotter
Public Relations and Event Management

Medical University of Graz
Neue Stiftingtalstraße 6
8010 Graz
victoria.zotter@medunigraz.at

Press release
For immediate release

Understanding the aging brain: between forgetting, experience and new strength
Neuropsychology and neuroscience at the Medical University of Graz

Graz, 26 March 2026: Where did I put my keys? What's the name of that actress? For many people, such moments are part of growing older. They make us uneasy because changes in the brain affect not just individual functions but also the way we see ourselves. The field of neuropsychology and neuroscience/Neuropsychology and Neuroscience specialty area at the Medical University of Graz is concerned with cognitive changes in the course of aging and in neurological disorders such as Alzheimer's disease. The goal of research is early detection, better understanding and long-term prediction of changes in cognitive performance.

Research vision: a "digital twin" of the brain

Aging does not inevitably mean decline: "To understand the aging brain means to look at it holistically—what is normal with age and what is conspicuous?" explains neuropsychologist Marisa Koini of the Med Uni Graz Department of Neurology. The researcher studies structural and functional changes in the brain as it ages as well as biomarkers and their influence on cognitive abilities such as memory, attention or language. A special focus is on digital technologies, which in the future may help to detect cognitive changes earlier. The long-term goal of research is to develop a "digital twin" of the brain that takes into account biological factors—for example changes in the hippocampus—as well as lifestyle and environmental conditions, for example physical activity, sleep or air pollution.

Aging is individual and the brain remains adaptable

As people age, certain processes in the brain slow down. Information is processed a little slower, and names or terms do not come to mind right away. At the same time, many abilities remain stable or even continue to develop—for example, experiential knowledge, emotional stability or the ability to categorize complex situations. "Our brain remains malleable and adaptable into advanced age," stresses Marisa Koini. This ability is referred to as neural plasticity. It makes it possible for the brain to adapt to new requirements and sometimes to compensate for deficits.

Normal for one's age or pathological?

One of the most common questions is: Is this normal forgetfulness or the first signs of a disease like dementia? Occasional gaps in one's memory are part of healthy aging. The situation turns critical when memory problems significantly impact daily life, for example when a person cannot find their way in a familiar setting or daily tasks become increasingly difficult. In such cases, a

comprehensive neurological and neuropsychological assessment is conducted at the Department of Neurology at Med Uni Graz. Memory, attention, language and executive functions are some of the items investigated using standardized tests.

Lifestyle influences dementia risk

Studies show that numerous risk factors for cognitive decline can be influenced. These include lack of exercise, smoking, hypertension, diabetes, depression, social isolation or air pollution. These factors have an effect on cognitive reserve, or the resistance of the brain to age-related changes. "It's never "too late" to support the brain," says Marisa Koini. What is crucial is a combination of mental activity, exercise, social contact, sufficient sleep and a balanced diet. Activities that call for several skills at once are particularly effective, for example learning, planning and social interaction.

Digital technology for early detection

New technologies open up additional options for early detection of cognitive changes. Adaptive tests with AI analysis, eye tracking, wearables or virtual reality applications could provide important clues about incipient impairment in the future.
Med Uni Graz is involved as a project partner in the research project LETHE-AT, in which an interdisciplinary team is investigating whether lifestyle changes can lower an individual's risk for dementia. In the 18-month-long intervention study, a total of 100 participants will be accompanied at the Graz location. The objective is to develop an IT-based prevention program and new concepts for brain health services—next-generation memory clinics.

For further information and participation, visit: https://www.lethe.at/

Tips for a healthy brain

Even if aging processes in the brain cannot be completely prevented, everyone can actively contribute to "brain health." Even small changes in daily life can help strengthen cognitive reserve and maintain brain performance as long as possible. Marisa Koini summarizes the most important elements:

- Exercise: Regular physical activity promotes brain circulation and plasticity.
- Social contact: Proof exists that relationships and conversation protect against cognitive decline.
- Mental challenges: Learn something new and remain curious.
- Sleep and stress: Sufficient rest boosts memory and concentration.
- Diet: A balanced Mediterranean diet can help the brain.

Further information and contact
Marisa Koini
Department of Neurology
Medical University of Graz
T: +43 316 385 16537
E: marisa.koini@medunigraz.at

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Profile: Marisa Koini

Marisa Koini is a clinical neuropsychologist and associate professor at the Medical University of Graz and the Department of Neurology. In her scientific work, she deals with age-related and disease-associated changes in the brain, especially those associated with dementia and healthy aging. Her research and treatment mainly focus on dementia and healthy aging, functional and structural imaging of the brain and digital health applications. In addition, she examines the use of new technologies in dementia research and diagnostics for early detection and better understanding of cognitive changes, for example digital tests, innovative analysis procedures or other approaches from the field of digital health.