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Press release  
For immediate publication

### **Med Uni Graz scientists identify biomarkers for frontotemporal dementia NMR spectroscopy allows classification of diseases that are difficult to diagnose**

Graz, 23 January 2023: Researchers at the Medical University of Graz and in the United Kingdom have investigated which metabolic disturbances in the brain occur in frontotemporal dementia (FTD). Their new findings may help distinguish between this disease, which is difficult to diagnose, and other age-related illnesses. These research findings were recently published in the internationally recognized journal *Progress in Neurobiology*.

#### **Dementia and old age: Enormous rise in cases**

Dementia is a clinical syndrome characterized by severe cognitive decline that tremendously restricts the life of the individuals it affects. The number of people diagnosed with dementia doubles every 20 years and is projected to reach more than 65 million in 2030. There are currently more than 110,000 people with dementia in Austria. No effective treatment is available. Frontotemporal dementia (FTD) is the second most common type of dementia after Alzheimer's disease and an umbrella term for a group of neurodegenerative disorders that manifest themselves in progressive deficits in behavior, speech and executive and motor function. FTD is one of the most common types of dementia worldwide with early onset before the age of 65. Life expectancy after symptoms occur is estimated to be 3 to 13 years and is negatively affected by muscular atrophy as an accompanying illness.

#### **Frontotemporal dementia: New diagnostic methods required**

Since individuals with FTD have symptoms similar to those of Alzheimer's disease and are commonly misdiagnosed, there is a great need to identify biomarkers to distinguish FTD from Alzheimer's and other types of dementia and furthermore to differentiate between subtypes of FTD.

Biomarkers for these diseases are also important in order to find new methods for (early) detection and treatment of genetic and age-related dementias and to better understand the causes of aging.

In a recently published paper, main authors Fangrong Zhang and Anastasia Rakhimbekova of Tobias Madl's working group at the Gottfried Schatz Research Center at Med Uni Graz and Tammarnyn Lashley of University College London shed light on how metabolic disturbances in the brain occur in FTD and Alzheimer's disease. The international team showed that metabolic products in human brain tissue can be investigated post-mortem using nuclear magnetic resonance spectroscopy (NMR) and that changes in the concentrations of specific metabolic products make it possible to

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differentiate between FTD and its subtypes as well as Alzheimer's disease.

### **Arginine methylation—A new therapeutic goal in treating FTD?**

In the course of this research, Tobias Madl's group found out that disorders in endogenous modification of proteins suggest that so-called arginine methylation is a driver of FTD and might be a promising therapeutic goal. In arginine methylation, methyl groups (one carbon atom and three hydrogen atoms) are added to a protein and may result in a change in its function. Tobias Madl enthusiastically reports: "Furthermore, our study serves as a *proof of concept* for our future plans to intervene in metabolic pathways as part of therapy and to clarify the relationships between metabolism, FTD and Alzheimer's disease." Extensive studies to better understand the basics of FTD and Alzheimer's disease are in progress.

### **Innovative research networks at Med Uni Graz**

Changes in metabolic products in human brain tissue were discovered post-mortem with metabolomics, a method based on nuclear magnetic resonance (NMR). "In recent years, metabolomics has become established at Med Uni Graz as part of the interuniversity Integrative Metabolism Research Center (iMRC)," explains Tobias Madl. It is the only place in Austria to apply it, which makes it easier to combine basic research in biomedicine and clinical research in a translational approach.

With their paper published in the internationally recognized journal *Progress in Neurobiology*, the scientists were able to show that NMR spectroscopy facilitates the discovery of biomarkers for the diagnosis of neurodegenerative diseases and that it is important to better understand age-related illnesses and to develop new pharmacological strategies. "The investigation of neurodegenerative diseases with NMR spectroscopy is now being expanded as part of an extensive study," says Tobias Madl with an eye to the future.

### **Further information and contact**

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### **Profile: Tobias Madl**

Tobias Madl is a researcher and the head of the Integrative Structural Biology and Metabolomics research unit at the Gottfried Schatz Research Center for Cell Signaling, Metabolism and Aging at the Medical University of Graz.

### **Link to publication**

Brain regions show different metabolic and protein arginine methylation phenotypes in frontotemporal dementias and Alzheimer's disease  
<https://www.sciencedirect.com/science/article/pii/S0301008222001861?via%3Dihub>