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New discoveries fundamentally change understanding

**Biomarkers for early detection are the key to fighting Parkinson’s and Alzheimer’s**

Leading researchers from all over the world are meeting at the 13th International Conference on Alzheimer’s and Parkinson’s Diseases at the Austria Center Vienna to discuss degenerative diseases, their causes, diagnostic processes and therapeutic approaches.

Over the next five to ten years, researchers aim to use biomarkers to detect and treat degenerative brain diseases several years before typical symptoms even arise.

- Around **130,000** people in Austria suffer from **dementia** and **20,000** have Parkinson’s
- The number of cases of Alzheimer’s is increasing worldwide, and could reach **110 million** by 2050
- Disease caused by **environmental influences** as well as **genetic factors**
- Progression of the disease: protein deposits in the brain **associate with nerve cell dysfunction**
- Austrian researchers leading the way in detection: degenerative diseases affect not only nerve cells – supporting tissue known as glial cells can also be affected (ARTAG: aging-related tau astrogliopathy)
- Prevention of Alzheimer’s and Parkinson’s possible in the near future through innovative diagnostics

Around 130,000 Austrians are affected by dementia and the total is set to double by 2050. Cases of Parkinson’s are also on the rise, with 20,000 people currently affected in Austria. On average, patients are between 65 and 70 when these degenerative diseases are first detected. At present, medication only treats the symptoms of incurable brain disorders. So scientists at Vienna General Hospital are conducting research into biomarkers for early recognition and the development of neuroprotective therapies designed to tackle the diseases before initial symptoms emerge. Leading researchers from all over the world are meeting at the Austria Center Vienna for the 13th International Conference on Alzheimer’s and Parkinson’s Diseases to discuss degenerative diseases, their causes, diagnostic processes and therapeutic approaches.

**Environmental influences and lifestyle as triggers**

In addition to higher life expectancy and genetic predisposition, the increase in cases of Alzheimer’s – a form of dementia – and Parkinson’s is primarily attributable to environmental factors and lifestyle changes, explained Prof. Gabor G. Kovacs, who is
carrying out research into neurodegenerative diseases at the Medical University of Vienna’s Clinical Institute for Neurology (CIN), located at the MedUni Campus AKH. "Environmental influences include things like foods treated with pesticides and other microbial causes that are as yet to be determined. But fundamental lifestyle changes also have a strong influence on the development of degenerative brain disorders such as Alzheimer’s and dementia. **Preventive measures** that each individual can take themselves include regular exercise, social interaction and a balanced, low-sugar diet. These measures alone are thought to prevent almost 50% of new Alzheimer’s cases," he added.

**Degenerative modified proteins associate with nerve cell dysfunction**

The defining characteristics of Alzheimer’s and Parkinson’s are chiefly attributable to proteins, whose three dimensional structures misfold due to external or genetic influences. Known as **conformational change**, this process alters their function and they manifest in the form of harmful **protein deposits** on the outside of or inside **nerve cells**, causing **nerve cell loss**. Uncovering why these harmful deposits form out of the body’s own proteins is a focus of the Medical University of Vienna’s research.

**Identifying and treating early warning signs**

At the moment, both diseases are only detected and treated once the first symptoms appear; these include mobility issues in the case of Parkinson’s and memory problems with Alzheimer’s. However, global studies have shown that the majority of patients previously exhibited non-specific symptoms such as depressive disorders, constipation, a deteriorating sense of smell and sleep disorders. But Prof. Kovacs reassures: “This does not mean that anyone who has trouble sleeping from time to time is developing Parkinson’s. That said, these early signs can be seen as additional indicators in future. We are also performing research into **biomarkers** which could indicate the disease years before the first typical symptoms emerge. It has been shown that some neurodegenerative diseases affect peripheral organs, and not just the brain, as previously thought. Pathological proteins in the brain spread hierarchically. It can be reminiscent to a domino effect, with the change starting somewhere else in the body – in the case of Parkinson’s, a trigger for example in the gastrointestinal tract are currently under discussion – before spreading to the brain. Deposits accumulate over time and are associated with malfunctioning nerve cells in the brain. It is not until later that the first signs of the disease are seen."

**Biomarkers offer perspectives for preventive treatments**

The slow progression of the two diseases makes it possible to pinpoint their development at a very early stage: “Research is on the right track and I think that in 5-10 years’ time we will be in a position to identify the potential causes of Parkinson’s and Alzheimer’s and develop effective medications. Even though there will not be a panacea owing to the complexity of the diseases, we are trying to categorise patients in different groups with a view to developing more personalised therapies. At the Medical University of Vienna and worldwide, research is being conducted into **biomarkers** that are not only detectable in cerebrospinal fluid, but will also be identifiable in blood and urine in future. This means that the presence of altered..."
proteins could be determined using simple tests if a degenerative brain disease is suspected.” This form of diagnosis will help turn current symptomatic therapies into neuroprotective ones. Used in tandem with early detection, such therapies mean the disease can be identified and tackled before it progresses.

Austrian researchers are leading in description of additional forms of disease
Researchers at Vienna General Hospital at the Medical University of Vienna are not only leading the way in the field of biomarkers. Working together with international partners, the Clinical Institute for Neurology has described another degenerative illness. “We have determined that is it not just nerve cells that can become diseased; the supportive tissue known as glial cells can too. In cases of ARTAG (aging-related tau astrogliopathy) these cells are involved. In certain constellations we believe there is a connection with dementia. An international consensus study was organised by Austrian researchers to unify research into these changes. “Among other things, this will lead to better understanding of chronic traumatic encephalopathy – described a short time ago, the disease is very probably linked to microtrauma to the head and is also commonly associated with protein deposition in the glial cells.”

About the international ADPD conference
The International Conference on Alzheimer’s and Parkinson’s Diseases is taking place for the 13th time this year. Several thousand participants are expected at the Austria Center Vienna between 29 March and 2 April 2017 to compare notes on neurological diseases, with a primary focus on Alzheimer’s and Parkinson’s. The congress, which covers a broad range of aspects including fundamental research, diagnostics and therapy, will also be attended by high-profile representatives from industry.

About IAKW-AG
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