

Scientists convene in Vienna to discuss the cause of Alzheimer's disease.

On the 27th of November scientists from across Europe will discuss the latest research results on the molecular mechanisms underlying dementia.

The current findings as to how these diseases are caused will significantly contribute to better diagnosis, treatment and prevention in the future. This conference is the culmination of the EU funded research project DEVELAGE, which for three years has investigated the causes of Alzheimer's and other dementias.

An estimated 8 million patients in Europe suffer from dementia, with this number expected to rise as a result of an ever increasing life-expectancy. Thus, dementia has become a serious problem with dramatic repercussions on our society and health systems resulting from the involved nature of patient care and the fact that there is currently no treatment to halt the progress of the condition. It is therefore of the utmost importance that scientists and physicians work together to translate the latest findings from basic research into new treatments and prevention schemes. The EU-funded project DEVELAGE brought together an interdisciplinary network of international expertise and succeeded in gaining important insight into the early pathological processes of Alzheimer's disease. The approach of the DEVELAGE project is unique in comparing the molecular mechanisms of brain development and ageing to understand how Alzheimer's disease progresses from very early stages.

At the beginning of the project, DEVELAGE posed a seemingly simple question, namely, to distinguish between the brain of a healthy individual and that of a patient with dementia. Recognising the difference was more difficult than expected as many typical structures, such as the amyloid plaques, that occur in Alzheimer's disease also occur in the brains of healthy elderly people. Prof. Gabor Kovacs, the coordinator of the DEVELAGE project, from the Medical University of Vienna stated „It is very difficult to define the border between normal and pathological brain ageing“. We know that a critical step in the development (pathogenesis) of neurodegenerative diseases is the molecular processing of damaged proteins. The more efficiently our brains dispose of these molecules, the less likely harmful structures are to accumulate. Based on the findings of the Vienna-Transdanube Ageing Study (VITA), Prof. Kovacs and his group were able to characterise a group of individuals who demonstrated normal brain ageing. In the DEVELAGE project they have compared this group to individuals with Alzheimer's disease in search of a protective factor. This work also has the potential to inform the development of personalised therapy.

The DEVELAGE consortium was also interested in understanding what happens in the brains of aged individuals in the years preceding the development of clinical symptoms related to Alzheimer's disease. The studies carried out by the Isidro Ferrer group at the University of Barcelona identified: a major shift in brain energy metabolism; increased oxidative stress damage; altered composition of lipids and an altered neuroinflammatory and immune response preceding the outbreak of symptoms. These findings have provided novel targets for therapeutic strategies geared to delay and curb the progression of common neurodegenerative processes in old age.

The European team of researchers found that epigenetic processes could potentially be the key to preventing neurodegenerative diseases. Epigenetics describes transferable (heritable) processes of gene expression that are not based on changes to the DNA sequence. This was shown by studies on experimental models of Alzheimer's disease performed by Sigfrido Scarpa's group at the Sapienza University of Rome, in which they showed the influence of gender on these mechanisms. In addition, the integrative approach used by Jean-Michel Verdier's group at the Université Montpellier 2 and Elke Zimmermann's group at the Stiftung Tierärztliche Hochschule in Hannover to further characterise an experimental model of ageing, will lead to novel possibilities for the modelling of ageing in humans and the exploration of new avenues for therapeutic invention in related ageing disorders such as Alzheimer's disease.

The group of Homa Adle-Biassette at Laiboisière Hospital (Université Paris Diderot) in Paris have made significant steps towards the better understanding of the development of the hippocampus and

the entorhinal cortex, which are crucial structures for human memory and involved in Alzheimer's disease. The potential link between brain development and ageing were emphasised by the studies of Eleonora Aronica's group at the Amsterdam Medical Center. They provided evidence that pathways, which are important for the developing brain, can be altered in epilepsy or Down syndrome and also contribute to the pathogenesis of Alzheimer's disease.

Prof. Kovacs and his team have organised a symposium for the culmination of the DEVELAGE project. "We will present our results, and I am sure that we will have very fruitful discussions about the importance of our data for therapeutic approaches. It was a great honour to coordinate this project and I would be happy when we could continue to meet regularly for a symposium in order to support the cooperation and exchange that we have developed".

The DEVELAGE symposium "Linking Pathways in the Developing and Ageing Brain with Neurodegeneration" will be held, in cooperation with the applied doctoral programme Clinical Neurosciences (CLINS), at the Medical University of Vienna on the 27th November.

About the DEVELAGE project:

The research project DEVELAGE investigates the early pathological processes of Alzheimer's disease, which are of importance in the effort towards improving the diagnosis and treatment of the condition. The project is coordinated by the Institute of Neurology at the Medical University of Vienna and brings together eight partners from six European countries. The project brings together experts in the fields of brain development and brain ageing in respect to Alzheimer's disease. The aim of the project is to characterise the molecular mechanisms in the brain that play a role in both the early stages of brain development and the ageing process. Through an understanding of these mechanisms the DEVELAGE project aims to identify the early pathological processes that are of importance in the development of Alzheimer's disease. DEVELAGE received a grant of 2.99 million Euros for three years as a collaborative project of the Seventh Framework Programme of the European Union und Grant Agreement FP7-HEALTH-2011-278486.

The project partners comprise of seven Universities and an SME:

Medizinische Universität Wien (Austria) – Gabor G. Kovacs, MD PhD
Fundacio Privada Institut d'investigacio biomedical de Bellvitge (Spain) – Isidro Ferrer, MD, PhD
Academisch Medisch Centrum (The Netherlands) – Dr. Eleonora Aronica
Università degli studi di Roma la Sapienza (Italy) – Prof. Sigfrido Scarpa
Stiftung Tierärztliche Hochschule Hannover (Germany) – Prof. Elke Zimmermann
Université Montpellier 2 (France) – Prof. Jean-Michel Verdier
Institut National de la Santé et de la Recherche Médicale (France) – Homa Adle-Biassette, MD, PhD
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