Crossing borders to accelerate diagnosis of neurodegenerative diseases

Neurodegenerative diseases of the Central Nervous System are affecting 50 million people worldwide. The forecast is that these numbers will steeply increase due to the aging population.

These diseases are difficult to diagnose, due to a substantial clinical overlap and to there are no clear clinical symptoms at their onset. The vast majority of them are diagnosed based on clinical symptoms, since there is a paucity of tests to show the pathology of these diseases before death. Consequently, patients get their neurological diagnosis relatively late. This is especially bad since, in terms of pathology, these diseases start years or even decades before symptoms become clear. To achieve an early, prodromal diagnosis, is mandatory in order to develop adequate disease-modifying treatments. This is of utmost importance since the brain tissue can only be very limitedly repaired. Thus, prevention of further damage is a key factor.

Fig. 1. Steps in biomarker development process.

Clearly, there is a strong need of diagnostic tests for each neurodegenerative disease. For this, a good option is to apply body fluid analysis. Body fluid analyses in the laboratory are widely used in medicine, guaranteeing precision, continuous implementation and cost effectiveness. More and more options are available to measure disease molecules in the fluid surrounding the brain, the so-called cerebrospinal fluid (CSF). For example, several acute inflammatory brain diseases can be tested in this fluid. Another example is the analysis of specific Alzheimer proteins. This analysis is now part not only of research criteria, but also in clinical routine setting, to diagnose this disease. There are also very exciting recent developments showing that brain diseases might be monitored via blood tests.

Unfortunately, in other neurodegenerative diseases, such tests are still insufficient.

Experts in the fields have a long tradition of collaboration in public funded international projects

(e.g. by the European Union). Enthusiastic about the results accomplished by open collaboration they decided to base the 'Society for CSF analysis and Clinical Neurochemistry' in 2016. This Society aims to accelerate the development of tests in body fluids, so urgently needed for neurological diseases.

These experts want to collaborate to develop such tests together. For this, they decided that it is important to standardise their way of treating CSF and blood samples, from collection to analysis. In this way, they can compare the results obtained in their patients with each other. Very importantly, they can now merge their cohorts of patients biobanked locally. This leads to studies that are large enough to draw robust conclusions whether a novel test will work. In addition, within the Society they want to develop roadmaps on how novel tests should be evaluated. Also, they want to develop better technologies for the identification of novel tests in body fluids. This is possible by merging their experiences and expertise. The Society also established training programs for young scientists and has regular meetings. There is considerable interest in these activities: the second scientific meeting in 2018 attracted double the number of researchers! They started with a focus on Alzheimer's disease and other dementias, Parkinson's disease, Multiple Sclerosis and Amyotrophic Lateral Sclerosis; now, they wish to extend further to psychiatric diseases, inflammatory diseases of the central nervous system.

All these activities should improve knowledge and awareness about importance, complexity and future therapeutical strategies against neurological diseases of the Central Nervous System.

Charlotte E Teunissen [1], ***Markus Otto*** [2], ***Kaj Blennow*** [3,4], ***Lucilla Parnetti*** [5]
[1]*Neurochemistry Lab and Biobank, Dept of Clinical Chemistry, Amsterdam Neuroscience, Amsterdam University Medical Centers, VU University Amsterdam, The Netherlands*
[2]*Department of Neurology, University of Ulm, Ulm, Germany*
[3]*Clinical Neurochemistry Laboratory, Sahlgrenska University Hospital, Mölndal, Sweden*
[4]*Department of Psychiatry and Neurochemistry, Institute of Neuroscience and Physiology, the Sahlgrenska Academy at the University of Gothenburg, Mölndal, Sweden*
[5]*Center for Memory Disturbances, Lab of Clinical Neurochemistry, Section of Neurology, Department of Medicine, University of Perugia, Italy*

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