Brain BRIDGE

Dr Dieter Grossegger, director of Dr Grossegger & Drbal GmbH, on the pioneering work the BRIDGE project into Alzheimer's is conducting in Austria

The Austrian Research Promotion FFF (Forschungsförderungs-gesellschaft) BRIDGE project ties together AIT (Austrian Institute of Technology), the main medical universities in Austria (Vienna, Graz, Linz, Innsbruck), and an Austrian company specialising in neurophysiology (Dr Grossegger & Drbal GmbH, Vienna). The mutual goal of the project is the research and development of a non-invasive, cost-effective electroencephalography (EEG) method for reliable prediction of the progression of the disease of individuals with Alzheimer-Dementia and identification of rapid cognitive decliners.

As the population in Europe ages at an accelerated rate with increasing average life expectancy, our society faces veritable challenges. With ever increasing effectiveness of medical intervention, we have ended up at a somewhat paradoxical situation: the unquestionable benefits of sophisticated healthcare are counterbalanced by increased health risks of old age. As always, we have to deal with the consequences of our actions. Backing up will not be an option with mass appeal. Changes in lifestyle (nutrition, physical and mental exercise, reduced stress) are promising countermeasures probably requiring a generation's lifespan or more to show significant relaxation. In a technology-driven society the hope rests on technology to offer effective answers.

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Focusing on the pressing problem of mental fitness with old age, 'Alzheimer's' is the buzzword of exponentially-increased media coverage in age-related publications. Deliberately or by chance, fear seems to be a driving force. A responsible approach however should focus on objective presentation of the challenging facts and political action to develop co-ordinated plans to counteract the issues. While many research projects are on-going, to date not even the causes of Alzheimer's are well understood. In essence, our society's health approach is primarily based on pharmacological intervention. It appears as if everyone is waiting for the pharma industry to find a solution. To solely rely on big companies – and the key pharma companies are big – may serve them but not necessarily the overarching public interest (as in the case of the H1N1 virus). The proposal is to supply funding for and develop unbureaucratic calls for interdisciplinary research projects on a European scale involving universities, specialised research institutions, and small- to medium-sized specialised companies.

The FFF offers such a programme locally in Austria, called BRIDGE. As suggested by the name, the programme intends to offer a 'bridge' from basic research to industry funding by intensified co-operation. The goals are:

- Further development and utilisation of basic research findings for commercial applications;
- Intensification of research co-operations amongst science and economic partners;
- Facilitate access to scientific research for small- and medium-sized businesses;
- Promote transfer of researchers from universities to commercial research (dissertations, postdocs);
- Intensify research output in high level industrial research and experimental development and also in the area of innovation of social and economy sciences and services.

The BRIDGE programme promotes individual projects with predominantly basic science proximity already showing a realistic exploitation potential to allow one or more companies to co-finance and accompany the project.

The project leader is the Neurological University Clinic, Graz. The basis of their work in Alzheimer's-related research, are studies investigating cognitive healthy and pathological ageing. The foundation of these studies started in 1991 surveying inhabitants of Graz including neuroimaging and neuropsychological testing. These studies resulted in one of the largest population-based databases worldwide investigating the complex relationships between vascular factors, primary degenerative processes and cognition. This impressive work resulted in more than 150 original research papers in many of the top international medical journals.

The second main focus of the department in Graz deals with the implementation and co-ordination of a prospective Austrian dementia register. This register compiles the existing diagnostic and

therapeutic practice and also the social care for 3,000 patients with dementia in the non-institutionalised sector in Austria. This is in co-operation with 15 other centres covering the whole of Austria. In addition to demographic data and data on therapy, economic aspects of patients and caregivers are registered.

Additional medical research partners participate in this multi-centre, longitudinal study at the neurology departments of the university clinics in Vienna, Innsbruck, and Linz.

The AIT Austrian Institute of Technology, Austria's largest non-university research institute, is among the elite European research institutes that specialise in the key infrastructure issues of the future. AIT provides research and technological development to realise basic innovations for the next generation of infrastructure-related technologies in the fields of health and environment, energy, mobility and safety and security. These technological research areas are supplemented by the competence in foresight and policy development. AIT researches and develops sophisticated algorithms extracting valuable information on cognitive decline of patients participating in the study.

The commercial partner Dr Grossegger & Drbal GmbH supplies the EEG and specialised test equipment for this study. Potential insights and achievements of this project will be integrated into marketable products by the commercial partner for distribution and licensing. One of the goals is a scientifically validated and documented neuropsychological study design and a computer-based EEG procedure, allowing the separation of patient groups of 'rapid decliners' from such patients with stable, mildly progressive development of the Alzheimer's disease.

Since Alzheimer's patients cannot be seen as a homogenous group we expect additional insight into the characteristics of stable MCI (mild cognitive impairment) and AD (Alzheimer's disease) also in the presence of concomitant diseases.

This project is designed to run for three years which will result in significant amounts of data on more than 200 patients constituting a valuable basis for further Alzheimer's research for the scientific partners.

This research project requires a substantial deepening of the co-operation between scientific partners in neurology and neuroinformatics and the commercial partner. Further, hopefully inter-European, follow-up projects could accelerate the mutual efforts to find effective solutions and therapies as an answer to the Alzheimer's threat.

Dr Grossegger & Drbal GmbH

Since the mid-1980s the Vienna-based company has developed and supplied electro-diagnostic products for neurology/neurophysiology and sleep-labs. The company did pioneering work in the field of brain mapping and was one of the very first internationally to develop and market a completely PC-based paperless digital EEG system, which was partly funded by the Austrian Research Promotion FFF. Today the company offers the complete product range for electro neurodiagnostics. These products marketed under the alpha-trace label include:

- VideoEEG (time-synchronised EEG and video) for routine EEG and epilepsy monitoring;
- Evoked and event-related potentials (AEP, VEP, SEP, etc.);
- Nerve conduction studies (NCS);
- Electromyography (EMG);
- Polysomnography (sleep studies);
- Alpha-trace NeuroSpeed Software with specialised modules for EEG/EP/EMG analysis.

Recent research projects:

- Neurofeedback and learning (joint project with the Department for Neurology, General University Hospital, Vienna);
- Development of personalised spike detection algorithm for epilepsy patients (together with AIT-Austrian Institute of Technology, Vienna).

Dr Dieter Grossegger
Director
B.E.S.T Medical Systems
Dr Grossegger & Drbal GmbH
tel: +43 1 368 1797
office@alpha-trace.at
www.alphatrace.at