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Subject:	COMMISSION STAFF WORKING DOCUMENT Accompanying the Proposal for a COUNCIL RECOMMENDATION on measures to combat neurodegenerative diseases, in particular Alzheimer's, through joint programming of research activities

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COMMISSION STAFF WORKING DOCUMENT

Accompanying the

Proposal for a

COUNCIL RECOMMENDATION

on measures to combat neurodegenerative diseases, in particular Alzheimer's, through joint programming of research activities

{COM(2009) 379 final}

RATIONALE

This Commission Staff Working Document has been prepared as a background paper to the Commission's proposal for a Council Recommendation on Joint Programming in research on neurodegenerative diseases, in particular Alzheimer's disease. With the aim of clarifying the context of this proposal and to document and justify the added value of a joint European action in this field, it provides a first non-exhaustive picture of research on neurodegenerative diseases, in particular Alzheimer's disease, which is currently carried out or planned across Europe.

This first analysis illustrates the significant diversity of the research landscape on neurodegenerative diseases in Europe, in many of its aspects such as levels of investments, funding mechanisms, public-private involvement, priority themes, topics and approaches, etc, but it also highlights the potential for complementarity of current actions and initiatives.

This information – even though not exhaustive – provides a set of elements which outlines the reasons why a joint European approach in this area could contribute to increase the effectiveness of research on neurodegenerative diseases in Europe, open the path to potential therapies to the benefit of affected individuals and their families, and help to establish the rationale for the proposed Recommendation.

1. Introduction

In September 2008, the Competitiveness Council recognised the major societal impact of neurodegenerative diseases (ND), and in particular Alzheimer's disease (AD), in the context of an ageing society and adopted conclusions recommending the launching of a common European initiative in this field by bringing together Member States, the Commission and other stakeholders.

Stock taking of existing initiatives at national and European level in this field is necessary for streamlining the use of Europe's public R&D funds through enhanced cooperation and coordination between national public R&D programmes.

1.1 Definition

Neurodegenerative diseases are a heterogeneous set of chronic illnesses characterised by accelerated neuronal loss that leads to atrophy of the affected central or peripheral nervous system structures[1]. They are major contributors to long-term disability, with Alzheimer's disease (and related dementias), and Parkinson's disease (and atypical Parkinsonism's) being the most prevalent.

Alzheimer's disease is the most common cause of dementia in the EU (about 70% of cases)[2]. Dementia is a decline in mental ability that usually progresses slowly, in which memory, thinking, and judgement are impaired, and personality may deteriorate. It usually develops slowly, and affects mainly people aged over 60. It is one of the most important causes of disability in the elderly. Other common causes of dementia are the successive strokes which lead to multi-infarct dementia (about 30%), Pick's disease, Binswanger's disease, and Lewy-Body dementia.

Parkinson's disease is a slowly progressive neurologic disease caused by the degeneration of dopaminergic neurons in the basal ganglia. It is characterized by tremor at rest, slowing of voluntary movements, a gait with short accelerating steps, a fixed inexpressive face, peculiar posture and muscle weakness.

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1 Neurodegenerative diseases: neurobiology, pathogenesis, and therapeutics. M. Flint Beal, Anthony E. Lang, Albert C. Ludolph. Cambridge University Press, 2005.

2 http://ec.europa.eu/health/ph_information/reporting/docs/2006_dementiayearbook_en.pdf

Rarer neurodegenerative diseases include amyotrophic lateral sclerosis and other motor neuron diseases, Huntington's disease and other degenerative diseases with chorea, ataxias, prion diseases, iron and copper disorders, and mitochondrial diseases.

2. EC-funded actions on neurodegenerative diseases, in particular Alzheimer's

The European Commission is well aware of the importance of the social and health impact associated with ND, in particular Alzheimer's and other dementias. For this reason, the social, medical and research aspects of ND have been tackled via parallel actions in two major Community programmes: the Framework Programmes for Research and Technological Development and the Public Health programmes.

2.1 Research on neurodegenerative diseases in the 5th, 6th and 7th Framework Programmes for Research and Technological Development

In the 5th Framework Programme (FP5, 1998–2002) a total of approximately € 40 million (13 projects) was devoted to research on neurodegenerative disease supported under the Key Actions "The cell factory" and "Healthy ageing" within the "Quality of life and management of living resources" Programme.

In particular, FP5 supported the EUROPEAN ALZHEIMER'S DISEASE CONSORTIUM (EADC)[3], a network of 50 European centres of excellence from 14 different countries (DE, UK, NL, IT, CH, SE, BE, ES, FI, FR, RO, HE, DK, PT) working in the field of Alzheimer's Disease. EACD provides a setting in which to increase the basic scientific understanding of and to develop ways to prevent, slow, or ameliorate the primary and secondary symptoms of Alzheimer's disease. This is done by facilitating large Europe-wide research studies. EADC enjoys the privilege of complete independence and autonomy from the pharmaceutical industry whilst maintaining close working links with it. Two additional EU-funded studies, ICTUS[4] and DESCRIPA[5] stemmed from this project. In addition, the programme focussed particularly on early diagnosis and interventions[6], pathogenetic markers of the disease and quality of care.

Efforts in this area were significantly reinforced within the 6th Framework Programme[7] (FP6, 2002–2006), mostly under the thematic priority "Life Sciences, genomics and biotechnology for health". Out of an overall budget of approximately €256 million devoted to the area of brain research, more than €136 million went into research on ND. This represented a three-fold increase in this area when compared to the investment in the previous Framework Programme.

The 28 collaborative research projects supported in this field provide a comprehensive translational approach to the study of these diseases, spanning from the identification of responsible genes, basic molecular and cellular disease mechanisms to the validation of new surrogate markers and therapeutic drug targets via clinical trials for specific neurodegenerative diseases.

Around € 22 million were invested to understand basic pathological mechanisms such as neurodegeneration, abnormal protein aggregation, synaptic depression, and memory loss. An additional € 18 million were dedicated to the role and mechanisms of neuroinflammation in neurodegeneration.

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3 http://eadc.alzheimer-europe.org/introduction.html

4 http://eadc.alzheimer-europe.org/ictus.html

5 http://eadc.alzheimereurope.org/descripa.html;

6 http://cordis.europa.eu/data/PROJ_FP5/ACTIONeqDndSESSIONeq112482005919ndDOCeq844ndTBLeqEN_PROJ.htm

7 http://ec.europa.eu/research/fp6/index_en.cfm?p=0

More than € 40 million were devoted to research on Alzheimer's disease, through 9 collaborative transnational projects. Several of these projects have a strong translational cut and will develop new diagnostic and therapeutic tools. For instance, ADIT[8] (€ 7.5 million) aims at designing and testing of small molecule therapeutics for the treatment of Alzheimer's disease. Another project, PROMEMORIA[9] (€ 10 million), aims at validating cell-adhesion molecules as new treatments for impaired learning and memory processes, including Alzheimer's disease.

Parkinson's disease research received € 13.5 million in FP6, mostly focussing on developing biomarkers for early diagnosis of the disease. GENEPARK[10] is determining gene expression profiles specific for genetic and idiopathic Parkinson's disease (PD) patients to be used as non-invasive diagnostic tests. In a complementary approach, the INDABIP[11] project wants to identify biomarkers, in particular proteins, mRNA, miRNAs, differentially matured RNAs and methylated DNA, relevant for the early diagnostics of Parkinson's disease.

Good support was also provided to projects on rare ND, an area where integrated research at the European level brings a clear added value, in view of the low prevalence and broad genetic heterogeneity of these disorders and the difficulty of collecting sufficient number of patients to initiate large therapeutic studies and characterising the genetic factors underlying these diseases. 5 projects for an overall value over € 20 million were supported in this area. A representative example is EUROSCA[12], a € 10 million project aiming at developing a treatment for patients suffering from spinocerebellar ataxias (SCA), and establishing an international standard on the clinical evaluation of these diseases. Other ND addressed included motor neuron diseases (€ 6 million), prion diseases (€ 6 million) and retinal degeneration (€ 10 million).

FP6 allowed also tackling research fragmentation in this area, through both the Networks of Excellence (NoE) and ERA-NET funding schemes. The NoE NeuroNE[13] intends to overcome fragmentation through an integrated approach to functional genomics and proteomics as well as clinical studies on Alzheimer's disease, Parkinson disease, amyotrophic lateral sclerosis and Huntington disease, and aims at sharing tools and facilities. BrainNet Europe II[14] is a network of 19 brain tissue banks that collect high-quality human post-mortem brain tissue and foster research in the cellular and molecular basis of neurological and psychiatric diseases.

The ERA-NET, NEURON[15], focussed in the area of ND, including Alzheimer disease, with the aim of sharing information, identifying needs and devising joint initiatives. It includes 15 funding bodies from 11 Member States (AT, FI, FR, DE, IT, LU, PT, RO, ES, SE, UK) and 1 Associated State (IL). In January 2008 NEURON issued its first joint call for a bid of € 18.5 million. A second joint call was published in January 2009.

The European Research Area in Ageing (ERA-AGE)[16] ERA-NET, which comprises 12 national funding agencies, aims at promoting the development of a European strategy for research on ageing and, thereby at streamlining efforts in this field.

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8 http://www.aditproject.org/
9 http://plab.ku.dk/promemoria/
10 http://www.genepark.org/index.php
11 http://europabio.euproject.eu/index.php/kb_1/io_609/io.html
12 http://www.eurosca.org/
13 http://neurone.nuxit.net/
14 www.brainnet-europe.org
15 http://www.neuron-eranet.net/
16 http://era-age.group.shef.ac.uk/

Through the 7th Framework Programme[17] (FP7, 2007–2013) the European Commission has further reinforced efforts in the area of ND, with the two-fold objective of ensuring continuity with previous initiatives while introducing new ones. Continuity is emphasized in collaborative research where two specific activities on "Research on the brain and related diseases" as well as "Human development and ageing" are proposed. Within the brain research activity, which includes the area of ND, particular emphasis is placed on translational research, for bringing knowledge from bench to bedside and for development of new drug targets, including epidemiological and clinical trials.

Overall, 24 transnational collaborative projects for an overall value of € 94 million have been devoted to research on ND as a result of the first two calls for proposals in the Health Programme. Of this, € 24 million tackled specifically the field of Alzheimer's disease. They address, for instance, the biological basis of memory loss, the development of new tools for the delivery of large molecules to the brain, and look for new diagnostic tools and drug targets.

The project MEMSTICK[18] (€ 3 million), for example, is a spin-off of the FP6 project PROMEMORIA, and will continue investigating the role of synaptic cell adhesion molecules (CAMs) in memory loss, and the therapeutic value of targeting these CAMs to restore memory function and associated neurobiological mechanisms at the synaptic level. The € 3 million MEMOSAD project has similar aims but a different approach: it aims at defining the molecular mechanisms of amyloid beta- and tau protein-induced synaptotoxicity and at developing disease-modifying therapeutics for the prevention of memory loss in Alzheimer disease.

Research on Parkinson's disease has been well supported to date in FP7, with more than € 25 million awarded to 7 projects. The NEuroStemCell[19] consortium received € 11.6 million to foster successful clinical trials of stem cell therapy for Parkinson's (PD) and Huntington's (HD) disease. The goal is to compare different stem cell sources with respect to their capacity to generate mesencephalic dopaminergic and striatal GABAergic neurons suitable for neuronal cell replacement.

Similarly, the MOLPARK[20] project aims to define the basic cellular and molecular mechanisms underlying the generation, differentiation, survival and connectivity of nigrostriatal dopaminergic neurons and translate this knowledge into radically new therapeutic strategies for Parkinson's disease.

Last, but not least, the € 4 million REPLACES[21] project will use cortical striatal plasticity and its alterations in experimental Parkinson's disease to explore basic mechanisms of brain plasticity and repair and to translate the new generated knowledge into novel restorative therapeutic approaches. In particular, REPLACES address the potential restorative effects of either novel pharmacological treatments or neuronal transplants on the corticostriatal microcircuitry.

FP7 provided continued support to projects on rare neurodegenerative disorders. As example, the € 12 million OptiStem[22] project is to develop and implement efficacy of clinical trials with adult tissue stem cells for degenerative diseases of epithelia and skeletal muscle. The consortium will address not only issues related to basic biology of stem cells, but also transplantation related issues, such as

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17 http://cordis.europa.eu/fp7/home_en.html

18 http://www.memstick.org/

19 http://www.neurostemcell.org/

20 http://cordis.europa.eu/fetch?CALLER=FP7_PROJ_EN&ACTION=D&DOC=426&CAT=PROJ&QUERY=011aa1a07f7c:7356:0502e0e6&RCN=90184

21 http://cordis.europa.eu/fetch?CALLER=FP7_PROJ_EN&ACTION=D&DOC=1&CAT=PROJ&QUERY=011f65da5e55:791f:0a24a957&RCN=88492

22 http://cordis.europa.eu/search/index.cfm?fuseaction=proj.document&PJ_LANG=EN&PJ_RCN=10583318&pid=55&q=C7E41A2896B930F4ACFB6B666BB7A9C1&type=adv

engraftment, angiogenesis, tissue remodelling, immune response, and regulatory and ethical issues related to these novel procedures.

Furthermore, research on public health, including mental health, is included as a new area for health research. The activity entitled "Optimising the delivery of health care to European citizens" provides for European public health research to contribute to building the necessary basis both for informed policy decisions on health systems and for more effective strategies of health promotion, disease prevention, diagnosis and therapy.

To date, the 2008-2009 calls for proposals have addressed the impact of ageing resulting in projects that will carry out research on health systems and long term care of the elderly, organisation of dementia care, a road map for ageing research, ageing cohorts, and health outcome measures and population ageing for an overall value of € 32 million. As an example, Courage in Europe will enhance the scientific study of ageing by developing and validating a tool to measure health and health-related outcomes for an ageing population that offers objective and evidence-based prevalence trends and that relates these to both quality of life and well-being outcomes. This will provide better measurement instruments and methodologies for longitudinal and cross-population comparative analyses essential for evidence based policy making.

Another project, AHEAD III, has been specifically designed to provide evidence of the effects of degeneration of hearing in adults and particularly in the elderly, analyse costs associated with the implementation of integrated large scale programmes of hearing screening and intervention in the elderly, provide quality standards and minimum requirements for screening methods and related diagnostic techniques and develop guidelines and recommendations on how to implement successful screening programmes to be tuned to the local, social, and economical conditions of a country.

FP7 also proposes three new funding schemes which may offer additional possibilities for Alzheimer disease research: the European Research Council (ERC), the Joint Technology Initiative on Innovative Medicines (IMI) and the ERA-NET plus.

The first call for proposals of IMI will support 15 projects[23], including one aiming at predicting cognitive properties of new drug candidates for ND in early clinical development. PHARMA-COG[24] is a € 5 million project bringing together European experts in translational medicine, drug discovery and mathematical modelling. PHARMA-COG wants to accelerate the validation process by conducting parallel experiments in animals and human using a comprehensive and standardised battery of behavioural, neurophysiological, morphological/functional imaging, and biochemical endpoints. By the end of its 5-year duration, PHARMA-COG will have a) validated the tools necessary to streamline Alzheimer's disease drug discovery and accelerate effective medicine to patients, b) set the standard for European drug discovery providing optimised and validated protocols c) provided the infrastructure to sustain world class drug discovery in Europe and d) disseminate the obtained results from health professionals to patients.

2.2 Neurodegenerative diseases in the Public Health Programme

The Work Plan for 2005 for the implementation of the programme of Community action in the field of public health (2003-2008), included for the first time a specific reference to the need of information and definition of indicators on the prevalence, treatments, risk factors, risk reduction strategies, cost of illness and social support as well as what constitutes a "healthy brain lifestyle" related to Alzheimer's disease and other dementias.

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23 http://imi.europa.eu/docs/imi-1st-call-selected-projects-abstracts_en.pdf

24 http://imi.europa.eu/docs/imi-1st-call-selected-projects-abstracts_en.pdf

In October 2007 the Commission published the White Paper "Together for Health: A Strategic Approach for the EU 2008-2013", where healthy ageing is supported by taking action to promote healthy lifestyles, reduce harmful behaviours, and to prevent and treat specific diseases, including ND. The development of geriatric medicine needs to be actively promoted, with a focus on individualised care, palliative care and better understanding of ND such as Alzheimer's.

The launch of the "European Pact for Mental Health and Well-being" on 13 June 2008[25] was an opportunity to take into account the mental health dimension of neurodegenerative diseases and be used as a framework for raising awareness activities and the exchange of good practices in addressing Alzheimer's challenges.

The planned European Commission European Health Examination Survey (EHES)[26] will be able to provide, through its cognitive test module, strong predictive data on the validation of new criteria for early diagnosis of dementia and other neurodegenerative diseases. Here synergies will be sought with the 7th Framework Programme for Research (FP7)[27] in particular the Health Theme of the specific Programme "Cooperation".

The direct support to Non Governmental Organisations (NGOs) acting in the field of health care to neurodegenerative disease patients and their families, the organisation and the support to activities at home and in residential care, as well as the primary care and the hospital care, are under the responsibility of the Member States.

However, the Public Health Programme allows NGOs to apply for funds in several areas. Priority areas in dementia are those related to risk factors, risk reduction strategies, cost of illness, social support developing a healthy brain lifestyle, e-Health activities and supporting the exchange of information and experiences on good practice. The organisations are expected to reduce the differences in quality standards through increased cooperation and by exchanging knowledge and experience about the content and organisation of care.

In 1997 and 1998, the European Commission approved a budgetary line for the implementation of measures to help persons suffering from dementia and Alzheimer's disease and for those assisting them on a non professional basis. Several projects[28] were launched in areas such as: diagnosis and therapeutic, drug treatment to minimise common co-morbidities associated with dementia (e.g., depression), control distressing symptom, information and support to caregivers, ongoing support and counselling, end of life support and counselling in relation to palliative care, intermittent assistance with Activities of Daily Living (ADLs) or Instrumental Activities of Daily Living (IADLs), and full support to all ADLs and IADLs

A project on rare forms of dementia was part of the framework of the former EU Action Plan on Rare diseases[29]. The objective of the project was to build up a database of information about rare forms of dementia and to make this available to the general public by means of the existing Internet and Intranet portals of "Alzheimer Europe". A new classification system for these forms of dementia has been created.

Currently, there are several ongoing actions:

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25 http://ec.europa.eu/health/ph_determinants/life_style/mental/docs/pact_en.pdf

26 http://ec.europa.eu/health/ph_information/dissemination/reporting/report_en.htm

27 Decision No 1982/2006/EC of the European Parliament and of the Council of 18 December 2006 (OJ L412/1 30.12.2006) & Council decision No 2006/971/EC) of 19 December 2006 (OJ L54/30 22.2.2007)

28 http://ec.europa.eu/health/ph_projects/alzheimer_project_full_listing_en.htm

29 http://ec.europa.eu/health/ph_projects/2002/rare_diseases/raredis_2002_03_en.htm

EURODEM: European Community Concerted Action on the Epidemiology and Prevention of Dementia group[30]; EURODEM pools data on the prevalence of moderate to severe dementia in several European countries to produce a set of prevalence rates for men and women in nine different age groups.

EUROCODE: to develop strategies and mechanisms for preventing, exchanging information on and responding to non-communicable disease threats, including gender specific health threats and rare diseases. The project covers Alzheimer's disease, vascular dementia, dementia in Parkinson's disease, dementia with Lewy bodies, mild cognitive impairment, frontotemporal dementia and treatment of alcohol related dementia at all severities. This project will produce consensual prevalence rates, guidelines on diagnosis and treatment, guidelines on non-pharmacological interventions, risk factors and risk reduction and prevention strategies, an estimation of the socio-economic costs of Alzheimer's disease, and an inventory of social support systems.

The Commission services will continue to work towards reliable prevalence and incidence data according to age and based on the EUROCODE methodology. In particular, the Commission is working on actions under the Health Programme on better prevalence data and on studies on cohorts of patients or on subjects at risk as part of a longitudinal follow-up necessary for the detection of risk factors, intervention projects on the same factors and validation of new criteria for early diagnosis.

DEMENTIA IN EUROPE YEARBOOK. The 'Dementia in Europe Yearbook' it's an initiative of "Alzheimer Europe" with the support of the European Commission. It has been published for the first time in 2006 providing European overviews of the prevalence of dementia, the reimbursement systems for anti-dementia drugs and the provision of home care, as well as a detailed description of these findings for 31 European countries (27 Member States of the European Union, Iceland, Norway, Switzerland and Turkey). The 2007 release reveals the huge discrepancies that exist across Europe when it comes to the services that exist and the support provided by governments for people with dementia and their carers.

THE 'DEMENTIA CARER'S SURVEY'. This survey, which involved more than 1,100 carers from five European countries, was conducted by an alliance of Alzheimer's associations to investigate the state of dementia care, how carers cope with looking after someone with dementia, and the services made available to them. Overall, only 17% of carers considered that the level of care for the elderly in their country is good.

COMMISSION STUDY ON MORTALITY DUE TO ALZHEIMER'S DISEASE AND DEMENTIA. DG SANCO with the cooperation of Eurostat is doing an analysis of the mortality patterns due to Alzheimer's disease and other dementias for the period 1996-2007 in the 27 Member States. The purpose of the study is to have better data based on a comparable register, the causes of death certification statistics, about deaths due to these diseases, but also to verify the level of underestimation of deaths due to **AD** related to practices of codification not underlying AD as the main cause of death.

2.3 Neurodegenerative diseases in the ICT addressing Societal Challenges Programme

In addition, the "Action Plan for Ageing Well in the Information Society"[31] includes specific measures relevant for neurodegenerative diseases. These include the "Ambient Assisted Living Joint Programme"[32] using Art. 169, aimed at developing Information and Communications (ICT)-based solutions in support of an ageing population. This initiative is endowed with € 300 million for the period 2007-2013 and involves 20 Member States and 3 Associated States. Issues tackled include independent living, support for informal carers, safety and security, cognitive training and training interaction.

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30 http://www.pitt.edu/~super1/lecture/lec9341/021.htm

31 Communication on "Ageing Well in the Information Society", COM/2007/0332 final (14.06.07)

32 http://www.aal-europe.eu/

In the context of the Competitiveness and Innovation Programme, a specific call for proposals of the ICT Policy Support Programme for large projects has addressed ICT solutions in support of elderly people with cognitive problems was launched. As an outcome the projects Long Lasting Memories, ISISEMD[33] and SOCIABLE are being supported.

3. Non-EC funded, international funding initiatives on Alzheimer's disease and other neurodegenerative diseases

3.1 The International Consortium for Brain Mapping (ICBM)

ICBM[34] was constituted in 1993 thanks to the support of the National Institute of Mental Health (USA). The consortium consists of five core research sites, UCLA, Montreal Neurologic Institute, University of Texas at San Antonio, and the Institute of Medicine, Juelich/Heinrich Heine University - Germany, C. & O. Vogt Institute of Brain Research – Duesseldorf - Germany. In addition, data acquisition sites in Asia and Europe contribute to this international consortium. Other European partners are FIL, London, UK; Finnish Twin Registry, Helsinki, Finland; Univ. Caen, Caen, France; Univ. Med Centre Utrecht, Amsterdam, Netherlands.

The primary goal of the ICBM project is to build and expand the tools available to establish a reference system for structural and functional anatomy of the human brain at both macroscopic (in vivo) and microscopic (post mortem) levels. The project has created neuroinformatics tools for data sharing that allow laboratories worldwide to contribute data to a constantly evolving brain atlas.

3.2 INTERDEM – Early detection and timely intervention in dementia

The purpose of this network is to promote, develop and carry out research on early detection and psychosocial intervention in dementia, to build capacity and to develop a better understanding of the experience of people with dementia and their families, throughout Europe.

INTERDEM[35] is a network of researchers, practitioners, people with dementia and their carers who have a particular focus on early and timely support, psychosocial intervention and disability prevention in dementia, at the primary / community - specialist care interface. Most scientists are gerontological research-practitioners who focus on psychosocial (as opposed to neurobiological) approaches to the early recognition and intervention in dementia, throughout Europe. The network is dedicated to person-centred values and working together with people with dementia and their family carers, by placing them at the centre of research and practice and encouraging their active participation

Partners include the United Kingdom, Spain, The Netherlands, Belgium, France, Germany, Ireland, Italy, Portugal, Switzerland, Greece, Poland, Sweden, Austria, Denmark, Finland, China (plus Hong Kong). Each country has a named co-ordinator with some countries (such as the UK, Spain, The Netherlands and Italy), having a larger membership group than others. The network has been sponsored at national and international level, including the European Commission.

3.3 E-ADNI - The European Alzheimer's disease Neuroimaging Initiative: a pilot study of the European Alzheimer's Disease Consortium

The largest project on Alzheimer's disease currently under way worldwide is the US-based ADNI - Alzheimer's Disease Neuroimaging Initiative[36], co-sponsored by the NIH ($ 40 Million) and Industry

33 http://www.isisemd.eu/
34 http://www.loni.ucla.edu/ICBM/
35 http://interdem.alzheimer-europe.org/
36 http://www.adni-info.org

($ 20 Million). The Alzheimer's disease Neuroimaging Initiative (ADNI) aims to collect imaging and biomarker data to track the progression of the disease, and to validate these markers for use in AD treatment trials testing the efficacy of disease-modifying drugs.

In Europe, two related projects are currently under way. The Pilot European ADNI (E-ADNI[37]) supported by the US-based Alzheimer's Association (€ 230,000) aims at testing the feasibility of the ADNI markers in 6 European centres. The ENIR – Foresight Study for the Development of a European NeuroImage Repository[38] is supported by the European Commission (€ 150,000) and aims to design the infrastructure for centralized image collection.

The overall goal of the Pilot E-ADNI project is to demonstrate that a multicentre multinational study in Europe, similar to ADNI, is feasible. In particular it should demonstrate that the core ADNI methodology, i.e. standardized and centralized collection of MR imaging, clinical data, blood, and CSF samples can be adopted by European Centres of the European Alzheimer's Disease Consortium (EADC). Data will be collected from six investigational sites and 9 subjects will be involved to collect data at a single time point. Once collected by the participating centres, data and specimens will be sent to central repositories.

In Europe, 50 clinical and research centres (the European Alzheimer's Disease Consortium – EADC) are currently carrying out Europe wide clinical trials (Sanofi's Xaliproden and Neurochem's Alzhemed) which collect clinical, imaging, and biological information in a standardized fashion while harmonization and centralized collection are cared for by external agencies. Further evidence of coordinated multisite Alzheimer's disease studies in Europe include the German CompetenzNetwork, the Swedish network on Alzheimer's disease (BrainPower), and a multicentre FDG PET imaging study funded by the EC[39].

The Industry board funding the US-ADNI has expressed interest into a public-private partnership similar to the US-ADNI to fund an extension of the two ongoing European projects into a full scale European ADNI.

This pilot study is aimed to act as a springboard to prepare a more extensive longitudinal study in the EU as a companion or to complement the US-ADNI.

The centres – mostly from the EADC – taking part in the project have been selected based on scientific expertise, demonstrated activity within the consortium, and geographic representativeness.

4. Public funding going to fighting Alzheimer's disease and other neurodegenerative diseases in individual Member States

This document is by no means exhaustive but simply aims at providing an overview of data publicly available. Since it is recommended that a more detailed stocktaking be undertaken, it would be an important task for coordination and exchange of information among Member States, as they are the ones to have access to primary information on funding priorities, actions and infrastructures funded at national level.

4.1 Overview of public spending on neurodegenerative diseases for the year 2005

37 http://www.centroalzheimer.it/E-ADNI_project.htm

38 http://www.enir.eu

39 Herholz et al., Neuroimage 2002;17:302-16

In 2006, the Karolinska Institute and the Stockholm School of Economics, supported by the European Commission, performed a review of resources allocation to brain research throughout Europe[40]. The study results showed that the total spending on brain research in Europe in 2005 amounted to approximately € 4.1 billion, of which € 855 million came from the public sector (21% of total funding). The European Commission contributed € 94 million to this endeavour. Government funding constituted 78% of total public funding, while 22% came from charitable foundations. The European pharmaceutical industry spent approximately € 3.3 billion on brain research per year (range: € 2.7–3.9 billion), corresponding to 79% of the total funding for brain research in Europe. In contrast, in the US, about €6.1 billion came from public sources (93.5% government and 6.5% charities) and € 8.4 billion from industry funding (58% of the total funding).

The EU-15 countries accounted for 91% of total spending. Public funding for brain research varied between European countries, ranging from € 60 000 in Malta to € 312 million in the UK. Ireland had the highest level of public spending per inhabitant (€ 6.73), followed by the UK (€ 5.2) and Hungary (€ 2.7). The lowest level was found in Latvia (€ 0.14 per inhabitant). Hungary, the Netherlands, Norway, Sweden and France also had per capita spending above the European average, which was estimated at € 1.2.

The funding body which most contributed among government agencies, is the group of UK Research Councils (Medical Research Council, 62%; Biotechnology and Biological Sciences Research Council, 26%; Engineering and Physical Sciences Research Council, 9.5%; Economic and Social Research Council, 2.5 %.), which accounted for € 191 million (41.4% of the total reported government funding). Other substantial contributions were provided by the German Forschungsgemeinschaft (€ 39 million), the Bundesministerium für Bildung und Forschung (€ 25 million), the Hungarian National Office for Research and Technology (€ 28 million) and the Italian Ministry of Health (€ 25 million). The average reported spending by government agencies was € 5.7 million (excluding UK Research Councils), and 40% of the government agencies reported a research spending below € 1 million.

Basic research not related to specific disorders accounted for 47% of total spending, or € 598 million. 53% of the total research spending could be attributed to specific brain disorders. In particular, € 57 million went to for dementia and Alzheimer's disease, € 31 million to Parkinson's disease and € 17 million to multiple sclerosis.

In spite of substantial efforts at national and European level, the picture of support to ND research in Europe appears complex. This preliminary analysis shows the large variety of current financing systems, the diversity of research policies and organizational structures across Member States and the wide variation in the respective spending on neurodegenerative diseases research by different organisations and countries.

Coordination of national research efforts in this field at European level is far from being achieved. Key elements accountable for this situation include:

- The barriers between disciplines and fields of research, and the compartmentalisation of research activities. The knowledge needed to advance our understanding of the problem and its potential solutions, spans not only across broad and diverse range of disciplines and stakeholders, but across the different European countries.

- A major weakness is the missing linkages between basic, clinical and public health - social research, which leads to a limited integration of the existing or acquired basic knowledge into current clinical practice and care organisation and delivery.

[40] P. Sobocki et al (2006); Resource allocation to brain research in Europe – a full report; Eur. J. Neurosci 24(10): 1-24

- The implementation of these activities, mainly in a national context, reinforcing fragmentation and limiting the sharing of current best practices throughout the EU as regards to diagnosis, treatment and prevention.

Thus, despite the fact that a high volume of financial resources is used, and a substantial portfolio of initiatives is carried out by individual Member States, current efforts are not benefiting from the advantages that a coherent and coordinated approach would bring about.

Approaches at a macro level are the way to bridge the gaps in our understanding and actions. A few examples include the identification of best practice in early diagnosis of AD and related disorders as well as the use of existing interventions, which could be best achieved by the sharing of knowledge and efforts. Coordinated databases with relevant genomic information, banks of samples and tissues will be of course essential to this aim.

The development and validation of new therapies as well as the assessment of the effectiveness of current ones will require conducting large-scale clinical studies whose natural environment would be trans-country collaboration, in view of the very large number of patients of (more or less) different genetic background needed to be involved if meaningful results are to be expected.

Similarly, the launching and integration of large-scale population cohorts, databases and registries would be necessary in order to fully understand the role and contribution of genetics, nutrition, behaviour and other risk factors in the development of these diseases, and the place for prevention strategies. Fully understanding and exploiting the European diversity related to these risk factors could provide a competitive advantage with respect to a better understanding of the disease.

Standardization of diagnostic criteria and assessment tools throughout Member States would be essential if best practices and optimal clinical care are to be delivered across Europe.

By allowing the pooling of a critical mass of skills, knowledge and financial resources and by facilitating interdisciplinarity, a joint action would accelerate the provision of solutions to the medical and social challenges posed by these diseases.

A dedicated Joint Programming action in this politically and socially highly challenging area would capitalize on the existing structures and programmes, while avoiding unnecessary duplication of work, efforts and eventually resources, for the benefit of all European citizens. It would also help EU to develop a coherent approach in international cooperation on this topic with third countries of comparable demographic profile and facing the same issues, building on initiatives such as the European Alzheimer's Disease Neuroimaging Initiative[41] (pilot-ADNI) supported by the US National Institutes of Health.

[41] http://www.adni-info.org/index.php?option=com_frontpage&Itemid=1

ANNEX I

NATIONAL FUNDING INITIATIVES

AUSTRIA

The Federal Ministry for Science and Research[42] (BMWF) look at the main research aim at a sustainable increase of the R&D-level in Austria. Strengthening basic research will on the long run foster economic growth and prosperity. Moreover, research generally contributes to the cultural development of Austria's society, and the progress of science is considered an essential value.

The BMWF shares responsibility for the Austrian Science Fund[43] (FWF) with the Ministry of Transport, Innovation and Technology, and it funds a number of thematic and structural R&D programmes as well as measures developing human resources; it provides institutional funding for the Austrian Academy of Sciences and some non-university research institutions. The largest share of its budget are allocated to Austrian public universities via the General University Fund (GUF)

The largest share of BMWF's budget goes to the public universities, polytechnical colleges, to the Austrian Academy of Sciences and some other smaller institutions as well as to international organizations (e.g. CERN, ESO) as institutional block-funding. Moreover, competitive funding is allocated through a number of thematic research programmes, some of which are managed by external agencies, e.g. the Austrian Science Fund (FWF) and the Austrian Research Promotion Agency (FFG).Total annual budget in national currency €3,515.4m

FWF Austrian Science Fund

The Austrian Science Fund (FWF) is Austria's central funding organization for basic research. The purpose of the FWF is to support the ongoing development of Austrian science and basic research at a high international level. Overall, in 2008, the FWF granted € 164.4 million through different granting schemes. Of those, € 102.2 million were for the natural sciences (incl. Biology, 62.2 %) and € 18.5 million for medicine (11.3 %).

Funding schemes include support for: Stand-alone Projects –mostly basic research – for an overall value of € 89.9 million in 2008 (357 projects); Special Research Programs (SFB) designed to promote the creation of research networks in specific areas of research or at an individual university. In 2008, the FWF approved grants for two Special Research Programs with a total of 23 sub-projects. The overall volume of funding approved came to approximately € 11 million €.

The FWF also supports National Research Networks (NFN) aimed at developing nationwide research networks for collaborative multidisciplinary work on larger research projects in the medium term. In 2008, the FWF approved grants for two NFN and renewed three other ones. The overall volume of funding came to approximately 12 million €.

The FWF is also supporting International Programmes. In 2008, the FWF approved funding for a total of 27 projects, 12 of them in six ERA-Net calls, including NEURON. In 2008, the FWF also substantially expanded its activities in the field of bilateral research cooperation with Germany, Switzerland, Russia and China. The latter was focused in the areas of biology and medicine.

Austrian Research Promotion Agency (FFG)

This is the national funding institution for applied industrial research in Austria. It funds research and innovation via General Programmes, EU Preparatory Funding Programmes, Structural Programmes, and Thematic Programmes.

Vienna Biocenter Campus

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42 http://www.bmwf.gv.at/submenue/english/

43 http://www.fwf.ac.at/en/index.asp

The Research Institute of Molecular Pathology (IMP)[44] in Vienna is a basic biomedical centre sponsored largely by the pharmaceutical company Boehringer Ingelheim, and located in the Campus Vienna Biocenter (VBC). Their research spans a broad range of topics, including neurobiology, computational and structural biology, cell and developmental biology, epigenetics, immunology and disease mechanisms.

The Institute of Molecular Biotechnology (IMBA)[45] of the Austrian Academy of Sciences, sitting also in the Campus, is a basic research institute within the fields of molecular biology and biomedicine. IMBA's vision is to understand the fundamental molecular processes and their contribution to disease. Targeted areas of application include major disease areas such as neurodegenerative diseases and cancer.

The Gregor Mendel Institute, as well the spin-off Intercell or AFFiRiS, founded in 2003 and currently in the process of bringing a vaccine against Alzheimer's to market, sit also in the campus.

BELGIUM

Flanders Interuniversity Institute of Biotechnology

The Flanders Institute for Biotechnology[46] (VIB) is a research institute whose main objective is gathering innovative basic knowledge on the normal and abnormal or pathological processes occurring in a cell, an organ and an organism (humans, plants, micro organisms), using gene technological research. One of the key areas covered is neurobiology and Alzheimer's disease.

The VIB researchers work in research departments of four Flemish universities: Ghent University, K.U.Leuven, the University of Antwerp and the Vrije Universiteit Brussel.

The Department of Molecular and Developments Genetics concentrate on genetic diseases that manifest themselves as neuronal disease and cancer. This includes the areas of neuronal cell biology and cell transfer; neurogenetics; molecular neurobiology and neuronal communication.

The Department of Molecular Genetics[47] at the University of Antwerp focuses is specialized in the genetic analysis of complex neurological and neuropsychiatric diseases. Areas covered include in particular the genetics, genomics and neuropathology of the Alzheimer's and Parkinson's disease, attempting to find molecular mechanisms of protein aggregation in dementia.

Institute Borne-Bunge

The Institute Born-Bunge[48] is a research group affiliated with the University of Antwerp - UA (Belgium). The institute is devoted to the study of Alzheimer's disease and related conditions such as Parkinson's disease, as well as other brain disorders.

The IBB focuses at a better integration and correlation of fundamental, clinical and neuropathological data concerning neurological conditions employing molecular genetics, biochemistry, experimental analyses of behavioral alterations and computational neurosciences.

The IBB Biobank is a mutual initiative of the research units of the IBB department Neurology that is based upon the original brain bank.

Belgian Foundation for Alzheimer Research

The Belgian Foundation for Alzheimer research[49], a non profit organization, is devoted to support research in this field in Belgium. In the last 10 years it has supported 38 projects for an overall value of € 2,5 million. Awards range from € 40.000 to € 80.000 for a 2 years period.

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44 http://www.imp.ac.at/about-the-imp/

45 http://www.imba.oeaw.ac.at/

46 http://www.vib.be/VIB/EN/VIB+at+a+glance/

47 http://www.vib.be/Research/EN/Research+Departments/Department+of+Molecular+Genetics/Christine+Van+Broeckhoven/

48 http://www.bornbunge.be/

Free University of Brussels

The laboratory of general histology, neuroanatomy and neuropathology[50] at the Free University of Brussels (ULB) is devoted to research on Alzheimer's disease and LSA, in particular as regards their pathogenetic mechanisms using cellular and animal models.

Catholic University of Leuven

The laboratory of Experimental Pharmacology[51] at UCL devotes efforts to the study of the mechanisms underlying the formation and deposition of amyloid fibers in Alzheimer's disease as well as to investigate the catabolism of amyloid precursors.

University of Liege

The CNCM[52], Centre for Cellular and Molecular Neurobiology, gathers 8 research units devoted to the study of the development and function of the central and peripheral nervous system in physiological and pathological conditions. The research areas addressed amongst others the neurobiology of development, cellular and tissue biology and brain repair.

In addition, as part of its 2007 call for proposals, the Department for Research and Scientific Cooperation of the Wallon Region has awarded € 5 million (48 months) to the project NEUROCOM. This public-private collaboration between the Centre for Cellular and Molecular Neuroscience of the University of Liege and UCB PHARMA is aimed at developing new therapies for neurodegenerative disorders and epilepsy.

Programme of Excellence Marshall

A joint collaboration between the Catholic University of Leuven (UCL) and the Wallon Region, the Plan Marsall has recently launched the DIANE programme, focused on inflammatory mechanisms in neurological diseases, particularly tackling Alzheimer's disease and related disorders. The overall funding of this initiative is of € 25 million over 5 years, cost to be equally shared by both funders.

Main partners of this initiative include the UCL-FARL Laboratory of Experimental Pharmacology, the Unit of Neurochemistry[53] of UCL and the Laboratory of Physiological Chemistry[54] at UCL – BCHM.

BULGARIA

University of Sofia

The Department of Neurology[55] at Sofia University performs research in the field of neurodegenerative disorders. Main interests include Alzheimer's disease genotyping and therapeutic strategies and functional imaging of neurodegenerative disorders.

Foundation Compassion Bulgaria

The Foundation[56] is aimed at improving the quality of life for people suffering from Alzheimer and dementia in Bulgaria, by changing the current attitude and practices towards them and providing access to treatments and social help

CZECK REPUBLIC

Czech Science Foundation – GACR (Grantová agentura České republiky)

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49 http://www.tousconcernes.be/fr/fondation.cfm
50 http://www.ulb.ac.be/rech/inventaire/unites/ULB598.html
51 http://www.farl.ucl.ac.be/introfr.html
52 http://www.cncm.ulg.ac.be/en/home
53 http://www.md.uclouvain.be/
54 http://www.md.uclouvain.be/
55 http://www.kn.medfac-sofia.eu/ep_traykov_eng.htm
56 http://www.alzheimerbulgaria.org/

The Czech Science Foundation (GACR)[57], established in 1993, promotes progress over the whole range of basic research in the Czech Republic. In the period of 2003-2005 two projects were supported for a total amount of € 1 199 793.

The Czech Alzheimer Society[58], established in 1996, provides consultancy help and works in cooperation with clinical centres to ameliorate the life of affected patients

The Institute of Experimental Medicine (ASCR)

ENI-PRAGUE[59] is located at the Institute of Experimental Medicine (IEM), Academy of Sciences of the Czech Republic (ASCR) and belongs to the network of European neurosciences Institutes. The groups have developed particular expertise in magnetic resonance imaging, the use of stem cells and biopolymer hydro gels in the treatment of nervous tissue injury and degeneration, the real-time iontophoretic method of diffusion analysis, pre- and postsynaptic patch-clamp recordings of receptor activity, antibody development, and yeast two-hybrid systems.

The Institute also coordinates the Marie Curie Training Network "Axonal regeneration, plasticity and stem cells" (AXREGEN), aimed at understanding central brain damage and its potential mechanisms of repair, a key issue for neurodegenerative disorders.

CYPRUS

The Cyprus Institute of Neurology and Genetics

The Cyprus Institute of Neurology and Genetics[60] is a non-profit making institution. It provides specialized services and research in neurology, genetics, DNA forensics, molecular biology, histopathology and virology. Services and research aim towards early detection and prevention of disease, the provision of high quality medical services and improvement of the quality of life of the community. The Institute also provides for research and educational programmes on neurological and genetic conditions and all other aspects of molecular biology and genetics.

Areas addressed include neurological and genetic conditions such as muscular dystrophy, multiple sclerosis, epilepsy, chromosomal abnormalities and all other aspects of molecular biology and genetics such as thalasaemia, molecular virology, mental retardation, cardiovascular disease, stroke, cystic fibrosis and neurogenetics.

The neuroscience laboratory has been established in 2003 with the mission to develop internationally competitive basic and translational research focusing on disease models for neurological disorders in order to identify new therapeutic possibilities.

DENMARK

NeuroCampus Aarhus

NeuroCampus Aarhus[61] (NCA) is a crosscutting research cluster within neuroscience and cognition at the University of Aarhus (AU), supported by the Lundbeck Foundation, The Danish National Research Foundation, Aarhus University Hospitals, the Danish Ministry of Science, Technology and Innovation, and numerous industrial partners.

NeuroCampus Aarhus strives to understand normal brain function and its changes in neurological and psychiatric diseases. NCA comprise basic sciences ranging from neurogenetics, molecular and cellular neurobiology to clinical neuroscience, rehabilitation

57 http://www.gacr.cz/international.htm
58 http://www.alzheimer.cz/
59 http://www.iem.cas.cz/
60 http://www.cing.ac.cy/
61 http://www.neurocampus.au.dk/

research and cognitive neuroscience. NeuroCampus research has strong translational traditions, being partly embedded in the Aarhus University Hospital neurological hospital.

The CND Disease Modelling Group[62] focuses its efforts in the neurodegenerative process in synucleinopathies with a special focus in Parkinson's disease. The Neurodegenerative Disease Laboratory[63] (NDL) is interested in the processes that cause brain proteins to aggregate and thus partake in the development of late onset neurodegenerative diseases like Alzheimer's disease and Parkinson's disease. NDL is part of the Danish Innovation Consortium CureND, the Nordic Centre of Excellence in Molecular Neurodegeneration and the EU Network for Initial Training NEURASYNC and well as collaborating internationally on more Michael J Fox funded projects.

NeuroCampus includes the Centre of Functionally Integrative Neuroscience (CFIN), founded in 2001 as a Danish National Research Foundation Centre of Excellence within neuroscience. CFIN applies state of art imaging technologies to the study of neurodegenerative and psychiatric diseases.

Cure Neurodegeneration Denmark

Established in 2006, CureND[64] is a new public-private sector research consortium comprising Aalborg University and Wyeth Research, a division of USA's Wyeth Pharmaceuticals, whose objectives are finding cures for neurodegenerative diseases such as Parkinson's disease. The project has a budget of USD 7.5 million, of which USD 2.3 million comes from public sector grants and USD 5.3 million from Wyeth.

CureND research and company partners are the Department of Biotechnology, Chemistry and Environmental Engineering at Aalborg University, the Department of Health Science and Technology at Aalborg University, the Institute of Medical Biochemistry at the University of Aarhus, the Department of Molecular Biology at the University of Aarhus, the Parkinson's Disease Clinic at Aarhus University Hospital, Wyeth Research, Bioneer A/S and NemoMed A/S.

Main areas of research include proteomics-based identification of key features of early and late stage Parkinson's disease, development and characterization of suitable cell-based models of Parkinson's disease and brain-image analysis of Parkinson's disease patients to complement proteomics approaches.

University of Copenhagen and Copenhagen Brain Research Centre

The Copenhagen Brain Research Centre[65] is established as a platform for interdisciplinary collaboration in brain research with a high international impact. Its main objective is to perform research related to brain function in diseased, injured and normal states and to serve as a national centre for interdisciplinary brain research.

Partners include the Department of Medical Chemistry at the University of Pharmaceutical Sciences; H. Lundbeck A/S; the Danish Research Centre for Magnetic Resonance; the Hvidovre Hospital; The PET and Cyclotron Unit at Rigshospitalet, Copenhagen University Hospital; the Informatics and Mathematical Modelling Department at the Technical University of Denmark; the Neurobiology Research Unit of Rigshospitalet and the Department of Psychology, Faculty of Humanities at University of Copenhagen.

62 http://www.neurocampus.au.dk/menu47-en
63 http://www.neurocampus.au.dk/menu50-en
64 http://www.neurocampus.au.dk/menu55-en
65 http://cbrc.dk/

The Department of Neurosciences and Pharmacology[66] at the University of Copenhagen, focuses on research spanning from molecular pharmacology and cellular studies of nervous tissues to studies of the advanced functions and diseases of the nervous system.

It also includes the Neuroscience Centre at Rigshospitalet. This is composed of the Departments of Neuroanesthesiology, Neurology, Neurosurgery, Neurophysiology and Clinic for Spinal Cord Injuries. One of the main areas of focus of the Department of the Department of Neurology is dementias and cognitive disorders including patient databases. The Neurobiology Research Unit at Rigshospitalet,[67] addresses research areas such as the neuroimaging of brain disorders and the role of neurotransmission in the development of Alzheimer's and depression.

National Centre for Dementia Research and Education

The National Centre for Dementia an Education[68] was established in 2007, co-financed by the Ministry of Health and the "Helsefonden". It will run from 2007 to 2011 with an overall financial support of € 2,3 million. It includes the Memory Disorders Clinic, the Research and Development programme and the education and training programme.

Objective of the centre is to coordinate and strengthen dementia research in health care and treatment. Activities of the centre include amongst other taking part in the Danish Alzheimer Intervention Study[69] (DAISY) is a research program, which has the overall aim to improve the early social support to patients with dementia and their caregivers. Collaborators included the Institute for Health Care Research, the University of Southern Denmark, Odense, the Institute for Public Health, University of Copenhagen and the Alzheimer Association.

Lundbeck International Neuroscience Foundation

The Lundbeck International Neuroscience Foundation[70] and the Lundbeck Institute were established by Lundbeck A/S in 1997. The aim of this institution is to contribute through educational activities to improve the quality of life for patients suffering from neurological and psychiatric diseases. The Lundbeck Foundation made donations of DKK 281 million in 2007.

ESTONIA

Estonian Science Foundation Grants

The Estonian Science Foundation (ETF), established by the Estonian Government, is aimed at supporting the most promising research initiatives in all fields of basic and applied research. The ETF uses state budget appropriations to award peer-reviewed research grants to individuals and research groups on a competitive basis. Several projects are been supported in the area of neurodegenerative diseases, whose details can be found at the Estonian Research Portal[71]. The areas tackled include Alzheimer's amyloid beta peptides, in vitro tests fore screening, neurotoxic mechanisms in neurodegeneration.

Centre of Molecular and Clinical Medicine

The Centre of Molecular and Clinical Medicine at Tartu University[72] was established in 2001 to raise the strengths of Estonian medical research and to concentrate the skills and funds in a selected cutting-edge areas of medical research, neuroscience in particular. The Centre brings together ten of the best preclinical and clinical research groups from the University of Tartu and is considered as a centre of excellence within the FP7 REGPOT project: "Advancing scientific performance and regional potential of Estonian biomedical research, 2008–2011".

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66 http://cms.ku.dk/sund-sites/inf-sites/english/

67 http://nru.dk/research/groups/

68 http://www.videnscenterfordemens.dk/87we.aspx

69 http://daisy.servicestyrelsen.dk/wm140462

70 http://www.lundbeck.com/sustainability/lundbeck_institute/lu_inst/default.asp

71 https://www.etis.ee/index.aspx

72 http://biomedicum.ut.ee/cetm/?lang_id=4

Main research areas of investment include: the genetic, biochemical, and physiological factors contributing to mental and behavioural disorders (role of neuropeptides in behavioural and mental disorders, eating disorders, genomics of behaviour and mental disorders); the mechanisms responsible for neurodegeneration (brain bioenergetics, oxidative stress, neuroimmunology and inflammation); Interaction between genes and the environment in neurological diseases and the development of new therapies for neurological diseases (neuroprotectants, neuronal stem cells, probiotics).

FINLAND

Academy of Finland

The Academy of Finland supports substantial research efforts in this field as part of its national research strategy on centres of excellence in research and strategic centres for science, technology and innovation, as well as trough international collaboration schemes.

This includes the Centre of Excellence in Molecular and Integrative Neuroscience Research[73] (2008-2013). Research at this CoE focuses on the molecular and systems- level neurobiological mechanisms based on the effects of trophic factors in brain development, plasticity (learning and memory) and in the pathogenesis and treatment of diseases.

Scientists at the CoE are particularly interested on trophic factors, intracellular messenger cascades and ion transport proteins that regulate electrical and chemical signalling in brain cells and in neuronal networks and play a decisive role in diseases, such as Alzheimer's and Parkinson's as well as in the actions of medical substances used in the treatment of these diseases. The CoE aims to put its research results into practical use, especially in the prevention and treatment of neurodegenerative disorders. The CoE is made up of 7 research teams, with 3 participating institutes: the Institute of Biotechnology, the Neuroscience Centre and the Department of Biological and Environmental Sciences at the University of Helsinki. The CoE has a staff of 72.

The CoE in Research on Mitochondrial Disease and Ageing[74] (FINMIT, 2002-2007, 2008-2013) is made up of 4 research teams from IMT and the Research Programme of Molecular Neurology at the University of Helsinki The research involves 50 scientists from almost 20 different countries, and the leaders of the research teams represent four different nationalities. The CoE also has active research collaborations with cognate research teams in the UK, France, and the US, Canada, Japan and other countries. The network has been renewed for the period 2008-2013.

The Helsinki Brain Research Centre[75] (HBRC, 2002-2007) applies the latest methods of brain research to investigate the principles of cognitive brain function. HBRC serves as an umbrella for six research teams from two of the biggest universities and leading hospitals in the country. The purpose of the centre's research is to explore the foundations of learning, memory, attentiveness, emotions and language in the brain.

The Centre of Excellence in Systems Neuroscience and Neuroimaging Research[76] (2006-2011) is developing new brain imaging methods with the goal to provide more in-depth understanding of the functions of the human brain at the systems level. Researchers at the CoE study brain functions and their disorders in both adults and children. Coordination is ensured by the Helsinki University of Technology and the University of Helsinki.

Strategic Centres for Science, Technology and Innovation

The Academy of Finland contributes to the operation of the Strategic Centres for Science, Technology and Innovation[77] (CSTIs) by funding the high-level research within them that is carried out at universities and research institutes. The Strategic Centre for Health and Well-being launched its operations on 6 April 2009. The goal of the Strategic Centre is to improve the health and well-being of the individual. One of the areas selected focus are neurodegenerative and psychiatric diseases. The first three programmes of the SHOK will start at the beginning of 2010. The programmes will focus on

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73 http://www.aka.fi/en-gb/A/Science-in-society/Centres-of-Excellence-/Centres-of-Excellence-in-Research-in-2008-2013/CoE-in-Molecular-and-Integrative-Neuroscience-Research/

74 http://www.aka.fi/en-gb/A/Science-in-society/Centres-of-Excellence-/Centres-of-Excellence-in-Research-in-2008-2013/CoE-in-Research-on-Mitochondrial-Disease-and-Ageing/

75 http://www.hbrc.helsinki.fi/

76 http://www.aka.fi/en-gb/A/Science-in-society/Centres-of-Excellence-/Centres-of-Excellence-in-Research-in-2006-2011/CoE-in-Systems-Neuroscience-and-Neuroimaging-Research/

77 http://www.aka.fi/en-gb/A/Science-in-society/Strategic-Centres-for-Science-Technology-and-Innovation/

brain health and functional capacity, smart monitoring of individual health and well-being, and on obesity and related health challenges

International research programmes in neurosciences

The Research Programme on Neuroscience[78] (NEURO) is a four-year programme between Finland, Canada and China providing funding for cutting-edge neuroscience research in the participating countries. The programme involves 16 Finnish, four Finnish-Chinese and three Finnish-Canadian research projects. It provides simultaneous, coordinated funding for the projects during 2006–2009. One of the main areas addressed is the diseases of the nervous systems as well as the mechanisms of dysfunction and repair.

The programme is also aimed at strengthening collaboration with neuroscience research programmes and doctoral programmes in other countries. NEURO is funded by the Academy of Finland, the National Natural Science Foundation of China (NSFC) and the Institute of Neurosciences, Mental Health and Addiction (INMHA) of the Canadian Institutes of Health Research

Kuopio University

The Kuopio University campus in Finland hosts about 20 neuroscience groups and 5 graduate schools. The 2 major basic science facilities, the Sciences and the Neurobiology are located near the Department of Neurology in Kuopio University Hospital. The major research interests include studies on 3 neurodegenerative diseases such as Alzheimer's disease, epilepsy and stroke.

Kuopio University is also coordinating the Marie Curie Early Stage Researcher (EST) programme BIND[79] where over 20 senior investigators join their expertise to capitalize the benefits of synergy in methodology, infrastructure, data sharing, and research training.

The BIND (Biology of Neurodegenerative diseases) programme aims at 1) identifying novel molecular pathways mediating neurodegeneration and repair, 2) developing novel in vitro and in vivo models of human neurodegenerative disease, 3) identifying surrogate markers that predict the neurodegenerative process and its outcome, 4) searching for novel gene mutations linked to human neurodegenerative diseases and their function in the neurodegenerative process

The Department of Neurobiology[80] at the A.I Virtanen Institute for Molecular Science focuses especially on the neurobiology of diseases affecting the central nervous system (CNS), development of disease models and cellular signal transduction. The areas addressed include biomedical Nuclear Magnetic Resonance, cell biology, molecular brain research, molecular signalling and neurobiology of memory.

The Department of Neurology[81] at Kuopio University is a research centre for basic and clinical neurosciences. Researchers and staff are totalling 60.

Research focuses on the basic mechanisms, prevention, drug and clinical research of degenerative brain diseases, particularly Alzheimer's disease, stroke and epilepsy.

Most population-based surveys and drug trials are run at the Brain Research Unit[82]. This Unit has 20 years experience in the field of diagnosis, treatment and prevention of neurodegenerative and cerebrovascular disorders, particularly as regards studying the mechanisms of drugs in various model systems as well as in the preclinical phase, in studying the genetics and risk factors of complex diseases in large population-based cohorts, in developing biomarkers for neurodegenerative diseases and in conducting large-scale clinical trials. GCP level services for clinical pharmaceutical trials (I-IV phases) are also available.

78 http://www.aka.fi/Tiedostot/Tutkimusohjelmaesitteet/Neuro_esite_english.pdf
79 http://www.uku.fi/bind/
80 http://www.uku.fi/aivi/neuro/
81 http://www.uku.fi/neuro/
82 http://www.uku.fi/ktk/eng/bru/

Currently, a major focus in drug research in Alzheimer's disease is directed at agents with the potential effect of decreasing ß-amyloid accumulation and/or promoting its clearance. There are also facilities for genetics and biomarker analysis for searching new risk genes using single nucleotide polymorphism analysis and functional studies.

It also participates to the FP7 EU Project LipiDiDiet "*Therapeutic and Preventive Impact of Nutritional Lipids on Neuronal and Cognitive Performance in Aging, Alzheimer's disease and Vascular Dementia"*. This is based on previous observations that lipids change the risk for dementia. Especially some omega-3 lipids appear to lower the Alzheimer risk. Major aim of this endeavour is to increase the effectiveness of current therapies, particularly as regards disease prevention and treatment in early phases of the disease.

The Department of Neurology is also a partner of PredictAD[83], an EU project aiming at developing a standardised and objective solution that would enable an earlier diagnosis of Alzheimer's disease, improved monitoring of treatment efficacy and enhanced cost-effectiveness of diagnostic protocols.

Funded by the NOS-M Joint Committee of the Nordic Medical Research Councils, the Department of Neurology as well as the Virtanen Institute are part of the 2004-2009 network on Neurodegeneration - Nordic Centre of Excellence Programme in molecular medicine**.**[84] This network gathers 12 research groups from Denmark, Finland, Norway and Sweden and is coordinated by the Neuronal Survival Unit of the Wallenberg Neuroscience Centre at Lund University. Research is focused on Alzheimer's, Huntington and Parkinson diseases. Main aims are to address the role of protein aggregation and stress in neurodegeneration as well as the mechanisms of cell dysfunction and death in this process.

Helsinki University

The Research Program of Molecular Neurology[85] is one of the six Research Programmes of the Faculty of Medicine, Helsinki University, for 2007 - 2011. The programme goal is to clarify disease mechanisms underlying neurodegenerative and neuropsychiatric diseases. In particular, to address mitochondria in degenerative diseases, cell death and neuroprotection, disease and susceptibility genes for Alzheimer's and Parkinson diseases, as well as the study of disease mechanisms in cultured cells, animal models and in patients and their tissues. The programme offers also patient counselling for information on risk factors.

FRANCE

France is endowed with a comprehensive strategy in this area including a National Neuroscience Institute (2009), NPD programme of the National Research Agency and a National Research Foundation for Alzheimer's disease and related disorders.

The National Neuroscience Institute

The National Neuroscience Institute[86] located within the Institut National de la Recherche Médicale (INSERM), conducts research across a broad spectrum from basic research to disease-related science.

The National Research Agency

The National Research Agency[87] includes the following programme schemes:

- Non thematic / blue sky: Aims to support basic research characterized by novel approaches. Open without restriction of scientific areas of disciplinary fields. Could be public-public as well as public-private partnerships.

- Thematic: Focuses funding on identified questions that could concern societal, scientific and technological domains which can be either basic or applied.

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83 http://www.predictad.eu/

84 http://www.ncoe.eu/research.html

85 http://www.biomedicum.fi/index.php?page=279&lang=2

86 http://www.inserm.fr/en/instituts/neurosciences_neurologie_psychiatrie/index.html

87 http://www.agence-nationale-recherche.fr/Intl

- For public-private partnerships: Thematic programmes directed exclusively to public-private partnership aimed to promote transfer of technologies and valorisation of basic researches.

- Transnational: Thematic programmes open in collaboration with foreign funding agency.

Current initiatives on Alzheimer's disease research through the ANR programmes include:

- Basic research, trough the blue sky and young researcher's schemes

- Medical research, Neurological and psychiatric diseases trough the ERA-NET NEURON, aimed at promoting multidisciplinary approaches & partnerships between basic & clinical research

- Applied research, through Technologies health and assisted living (public-clinic-private partnership). This initiative intends to enhance quality of life and autonomy by developing solutions using molecular imaging, instrumentation, medical informatics, biomaterials and computer-aided technologies

The French National Plan for Alzheimer's disease and related disorders

The Plan[88] proposes 3 axes of action, 11 goals, 44 specific objectives and is endowed with an overall budget of € 1.6 billion over 5 years.

The 3 axes are: Medical and social segment (€ 1.2 billion); Healthcare segment (€ 200 million) and the Research segment (€ 200 million). The plan intends to provide an unprecedented research effort in the field of Alzheimer's disease and related diseases.

The main objectives of the plan are: to create a national and international dynamic for collaborative research fundamental to care, to use an attractive policy to bolster the network of public and private sector researchers, to establish highly capable fundamental clinical and para-clinical research infrastructures, to promote interaction with health industries to reduce development time.

The French Quebec-Canada collaboration

In addition, France through the INSERM[89] has a bilateral programme on neurodegeneration with Quebec- Canada. The joint financial contribution will be of € 700.000/year for France and 1.2 million/year Canadian dollars. Main objectives are to ensure scientific excellence, support innovative, cutting edge aspects of the proposed projects, benefit from the added value of partnership and address the likelihood to reach the stated objectives over 3 years. The five themes identified for the collaboration are biomarkers, animal models and preclinical studies, innovative therapeutic strategies, prevention and social and psychological research.

GERMANY

The main funding bodies in Germany include the Deutsche Forschungsgemeinschaft (DFG, budget of € 1.5 billion € in 2007), which supports bottom-up basic research and the Federal Ministry of Education and Research (BMBF) which has a top down approach, focussing on applied research. Its budget was of € 3 billion in 2008.

Institutional funding includes:

Universities

- 20 out of 36 Universities with medical faculties have a focus on neuroscience

- Clusters of Excellence in neurosciences at the universities of Tübingen and Berlin

Non-university research institutes

- Institutes of Max-Planck Society (MPG)

- Helmholtz Association (HGF)

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88 http://www.plan-alzheimer.gouv.fr

89 http://www.inserm.fr/en/index.html

- Wilhelm Gottfried Leibniz Association (WGL)

The BMBF[90] supports research on neurodegenerative diseases and dementias through different schemes. The Health Research programme for project funding of the Federal Ministry of Education and Research currently has a budget of circa € 150 million per year with an increasing tendency. On average about 20% of this budget is spent on neurosciences, neurology and psychiatry (with annual variation according to specific funding initiatives). One can differentiate between initiatives which are specific for research into neurodegenerative diseases, while others are "generic". In the latter, projects on neurodegenerative diseases can be applied for and will be selected along with other topics according to their quality these include:

Competence networks in Medicine

These networks are clinically oriented. The goal is connect research competences with care competences, to establish interdisciplinary national research networks and to integrate nationwide the clinical competences of research on a certain disease, in order to promote the transfer of knowledge form basic research to clinical application.

- Stroke (1999-2008, € 14.5 million)
- Parkinson‘s Syndromes (1999-2008, € 15.3 million)
- Dementia (2002-2009, € 12.9 million)
- Degenerative Dementias (2007-2010, € 11.6 million, envisaged until 2019, € 40 million)
- BrainNet (1999-2009, € 8.1 million)

National Genome Research Network (NGFN)

These projects are oriented towards the basic knowledge foundation of clinical problems. Molecular biology teams cooperate with clinical teams, to advance the understanding about healthy and patho-physiological molecular processes of the socio-economically important disease groups by using high throughput methods. There are currently several different relevant consortia

- Alzheimer‘s Disease (2008-2011, € 5.2 million)
- Parkinson‘s Disease (2008-2011, € 6.2 million)
- Neurodegeneration (2008-2011, € 5.9 million)

Generic funding measures comprising neurodegeneration

- Stem cells (2008-2011, € 10 million)
- Regenerative Medicine (2005-2011, € 30 million)
- Molecular diagnostics (2006-2011, € 20 million)
- Innovative Therapies (2005-2013, € 60 million)
- Innovative methods for drug development (2007-2012, € 23 million)
- Molecular imaging (2008-2014, € 45 million)
- Clinical trials (2005-2018, € 120 million)
- GoBio (10 yrs, € 140 million, transfer from academia into spin-offs)
- BioPharma (5 yrs, € 100 million, public-private partnerships)
- Nursing Research (2004-2010, € 1.5 million)
- Health in Old Age (2008-2011, € 17 million)

[90] http://www.gesundheitsforschung-bmbf.de/_media/Roadmap-Bericht.pdf

In addition, the BMBF has recently established the National Centre for Neurodegenerative Diseases (approx € 50 million/year is envisaged) together with the Helmholtz Society. The core institute is located in Bonn, satellites in Göttingen, Magdeburg, Munich, Rostock/Greifswald, Tübingen and Witten-Herdecke. Main areas of research include etiopathology, prevention, and diagnosis, therapies, health care and nursing.

Project funding within the programme on "Forschung an Fachhochschulen" of the Federal Ministry of Education and Research

In Germany there is a second type of University ("Fachhochschule") which covers more applied disciplines and education of students. BMBF manages a programme to foster research at these university-ties. Within this programme "Forschung a Fachhochschulen", a funding initiative is planned, which focuses on social innovation for quality of life in old age. The purpose is foster research how to in-crease quality and efficiency of care and the life situation of elder and chronically ill responding to changes in demand and requirements in the disciplines "Social Work", "Public Health" and "Nursing Research", which can contribute significantly to ameliorate life of elder persons.

"Leuchtturm Demenz " of the Federal Ministry of Health

The BMG has launched a call for proposals on health care research on Alzheimer's disease and related dementias on the following four domains (2009-2010, € 13 million, 14 projects): 1. interventions in therapy and care, effectiveness during everyday care 2. Evaluation of care infrastructures 3. Ensuring evidence based care 4. Evaluation und promotion of targeted education of personnel

Alzheimer Forschung Initiative e.V. (AFI)

Established in 1995 it is the largest private sponsor for AD research in Germany. AFI is interested in funding causal, diagnostic and clinical research for AD. 66 projects from German universities and public bodies were funded with a total amount of € 3,625 million since 1995. In 2005/2006: 5 projects from German universities were funded with a total amount of € 318.000, 2 projects were funded in France with a total amount of € 80000 to support European research and the French sister organisation. In 2007, 8 projects were funded for € 480.000. For the 2006-2009 period, 13 projects were funded for a total amount of € 797 000.

GREECE

The General Secretariat for Research and Technology (GSRT)[91], at the Greek Ministry of Development, is the central agency for the administration of the Greek R&D and Innovation system. The GSRT is responsible for drawing up and implementing a national R&D and Innovation strategy.

The national research programmes implemented by the GSRT, together with the EU R&D programmes are the main sources of funding for R&D in Greece. One of these programmes, the Operational Programme "Competitiveness" 2000-2006 utilises European Social Fund and focuses on sectors which are expected to generate long-term growth for the Greek economy. One of the actions is devoted to "Health - Biomedical Research, Diagnostic & Therapeutics Procedures".

The objective of this programme is to promote collaborations between business enterprises and research entities with regard to long-term research and technological development projects, aiming at producing innovative products or services. The Programme supports both basic and industrial research in the areas of diagnosis, treatment, molecular and pathogenetic mechanisms and biomedical technology. 21 projects are financed for an overall budget of € 11,9 million. Total project budget will range between € 587,000 and € 500,000, for a length up to 36 months.

Greek Association for Alzheimer's Disease and Relative Disorders

[91] http://www.gsrt.gr/default.asp?V_LANG_ID=2

The Greek Association of Alzheimer Disease and Relative Disorders[92] is a non-profit organisation founded in 1995 by relatives of patients suffering from the Alzheimer Disease as well as by medical professionals and other stakeholders. The association promotes scientific research as well as raises awareness on the need to incorporate best available therapies into current clinical practice.

Athens Association of Alzheimer's Disease and Related Disorders

The Athens Association of Alzheimer's Disease and Related Disorders is a non-profit organisation founded in 2002 by dementia patients' relatives, doctors, psychologists and other relevant health care professionals. The Association aims at promoting awareness, care and support for everyone in anyway related to the disease. In February 2009, the Association launched the "Greek Alzheimer's Initiative", a signature - collection campaign. This should be the first step towards a national action plan against Alzheimer's disease.

Stavros Niarchos Foundation

The Stavros Niarchos Foundation[93], an international philanthropic organization, supports charitable activities in four primary areas: arts and culture, education, health and medicine, and social welfare. The Foundation makes grants to not-for-profit organizations throughout the world. Since its inception in 1996, the Stavros Niarchos Foundation has provided total grant commitments of US$ 361,254,582 (19% to health and medicine) with 1,647 grants in 86 nations around the world to various not-for-profit organizations.

Since February 2007, a Dementia Day Centre for patients suffering from dementia and their families has opened in Athens. The Centre is supported by both the European Social Funds and the Greek Ministry of Health, and managed under the responsibility of the Athens Association of Alzheimer's Disease and Related Disorders. Aims include training, help and support of patients suffering from Dementia (cognitive training, physical exercise, occupational therapy, art therapy; education and support of carers; advocacy of patients' and carers' rights and needs; increase of public awareness.

Institute of Organic and Pharmaceutical Chemistry (IOPC)

Established in 1979 as the Centre for Organic Chemistry[94] to pursue research in organic and organometallic chemistry, in 2003 the Institute incorporated research on structure-based drug design into its field of activities. Much of the Institute's research is focused on combating illnesses and conditions including multiple sclerosis and neurodegenerative diseases.

The Laboratory for Molecular Analysis (LMA) carries on research in the rational design of novel drugs for illnesses like neurodegenerative diseases. It recently received a € 1,125 million award for infrastructure on the "Design and Synthesis of Bioactive Molecules" programme by the Greek Ministry of Development, which will reinforce current efforts in this area. Support research in this area such important research.

IOPC has been awarded Excellence in Research on "Novel strategies against neurodegeneration (2002-2005) by the Greek General Secretariat of Research and Technology, and recently received a grant of € 1.125 million for infrastructure on "Design and Synthesis of Bioactive Molecules" (2005-2008) by the Greek Ministry of Development.

EURODESY[95] is a European Research Training Site for the "Design and Synthesis of Novel Neuroprotective and Hypoglycaemic Agents". It focuses on the development of new agents for potential therapeutic intervention in neurodegenerative diseases and type 2 diabetes mellitus.

HUNGARY

Hungarian Scientific Research Fund

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92 http://www.greeceindex.com/greece-health/greece_health_voluntary_alzheimer_institute.html

93 http://www.snf.org/

94 http://www.eie.gr/nhrf/institutes/iopc/index-en.html

95 http://www.eie.gr/nhrf/institutes/iopc/eu-projects/eurodesy/overview-en.html

For the period 2002-2007 this institution supported 4 projects in the field of Alzheimer's disease for an overall amount of € 451 680.

National Office for Research and Technology (NKTH)

NKTH[96] is responsible for implementing the government's science and technology policy. Its duties are to provide a new framework for the national innovation system and to promote research and development that will boost Hungarian economy.

To create a predictable environment for the exploitation of R&D results, the Research and Technology Innovation Fund has been recently established. The Fund is managed by NKTH. The goal of NKTH is to provide sufficient funding for innovation programmes that aim to create innovative services and products.

Mecenatúra Calls (Part of the Albert Apponyi Programme)

This programme aims at supporting individual investigators to present their results on Alzheimer's disease at national and international conferences.

Széchenyi Action, National Research and Development Programmes

The programme aims at supporting One project (Application of PET minicamera; additional aim to distinguish between Alzheimer and other diseases showing similar symptoms like AD) was supported with 200 000 000 Ft = 847 817 Euro (at the rate of 31/12/2002) in 2002

Péter Pázmány Programme for Regional Knowledge Centres (RKC)

The main goal of the Péter Pázmány Programme is to establish Regional Knowledge Centres (RKC) to exploit research and development results in close cooperation with the industrial sector. The task of the supported Knowledge Centres is to transfer R&D results to marketable new products and technologies.

One of the supported centres is the Szeged Neurobiological Knowledge Centre (DNT), which has been awarded a 1.7 billion Forints subsidy for 4 years, to establish amongst other a project the mechanisms underlying the development of neurodegenerative disorders as well as the development of compounds with neuroprotective effects.

Institute of Experimental Medicine of the Hungarian Academy of Sciences

The scientific activity of the Institute of Experimental Medicine[97] is dedicated exclusively to biomedical research. The major focus of research is on neurosciences including studies on mechanisms of synaptic and non-synaptic neuronal transmission, processes of learning and memory, central regulation reproduction, metabolism and stress behaviour and neurodegenerative diseases, in particular Alzheimer's and their modelling.

The Institute hosts the Neuroscience Department of the Pazmany Catholic University and runs a PhD programme in neurosciences with the Semmelweis University. The Institute is also coordinator of the EURO-EURO-NETWORK EU Centre of excellence.

Semmelweis University

Semmelweis University[98] is the largest health care institution in Hungary. Major efforts of this institution are devoted to research on neurosciences.

Current research activity of Semmelweis University in the field of neurosciences comprises anatomical, physiological, pharmacological, biochemical and behavioural approaches. Main topics of the research groups supported by standard funding of the Hungarian Academy of Sciences include – besides several others – studies on neural plasticity in the cerebellum, cortex and thalamus, functional anatomy and physiology of the visual cortex, computer simulation models of neural networks, neurotransmitter systems in the human brain, etc. Further research projects funded by the University

96 http://www.nkth.gov.hu/english

97 http://www.koki.hu/main.php?folderID=922

98 http://www.sote.hu

and external grants deal with vestibular coordination, synaptic plasticity in relation to motivation, learning and memory, neural regeneration, functional neuroanatomy of the spinal cord and pain mechanisms, infobionics, etc. Clinically oriented research programs relevant to sleeping disorders, psychosomatic problems and psychotic conditions are also being carried out.

One of the most extensive platforms for neuroscience research at Semmelweis University is provided by the Szentágothai János Knowledge Centre[99] which focuses on neuroscience and drug development. Recognised as a regional centre of excellence it consists of 14 research groups from Semmelweis University, the Institute of Experimental Medicine of the Hungarian Academy of Sciences and from the Faculty of Informational Technology of the Pázmány Péter Catholic University. Main research topics include Alzheimer's disease, Parkinson disease, oxidative stress and neuroprotection and cognition.

Other institutions working in the field of neurodegenerative diseases, in particular Alzheimer's include the University Medical School of Debrecen and the Medical School of Pécs University.

ITALY

Italy, through specific programs of the Ministry of Health[100], the Ministry of Labour, the Ministry of Research[101] has devoted in the last 10 years strong efforts to the area of Alzheimer's disease and other dementias promoting basic and applied clinical research either by financing Universities and Clinical Research Institutes or by yearly calls for proposals under the helm of different institutional agencies including the Superior Institute of Health, The National Research Council (PRIN, FIRB, Progetti Strategici, Progetti Finalizzati, Progetti Ordinari, Progetto Giovani) for an overall annual amount of € 30 million.

The Cronos Project was launched by the Ministry of Health in 2000. Endowed with a budget of € 40 million Euro it allowed the setting-up of 500 Alzheimer Evaluation Units with the specific aim of diagnosing and treating dementia. The initiative has allowed to improve diagnostic skills and to offer patients and caregivers a site for pharmacologic and non-pharmacologic treatment.

In 2002, a Commission for the study of Alzheimer's disease was established by the Ministry of with the objective of developing a precise strategy for the maintenance of residual health in demented people and promote interventions for the amelioration of health and quality of life of patients with Alzheimer's disease. Such Commission is still active as a Centre for the Development of Concerted and Integrated Actions directed to the Regions in order to rationalize and establish plans for the improvement of Health and Social Care of patients and caregivers.

In 2008, the Ministry of Labour has sponsored a specific program under the helm of the Health Superior Institute (ISS) to provide for a state-of-the art of the situation of the national network of care including the development of guidelines for the implementation of a National Program of Integrated Management of dementia.

Italy is also endowed with several centres of excellence in the field of neurodegenerative diseases field including the San Raffaele Institute of Milan, the Istituto Neurologico Besta of Milan, the Institute Mario Negri of Milan, the Istituto Sacro Cuore Fatebenefratelli of Brescia, the Istituto Santa Lucia of Rome, the INRCA of Ancona, and the Neuromed Institute of Isernia.

IRELAND

Almost €100 million in age-related disease and care research is currently supported in this country. This includes the following initiatives:

99 http://www.nkth.gov.hu/english/regional-knowledge/szentagothai-janos-080519

100 http://www.ministerosalute.it

101 http://www.miur.it/DefaultDesktop.aspx

- **Trinity College Institute of Neurosciences** (TCIN)[102]: launched in 2000, Ireland's largest neurosciences institute, €28m government funding, plus Glaxo SmithKlein investment of €14.6 million for Alzheimer's.

- **UCC Biosciences Institute**[103]: built in 2002, its mission is to deepen the understanding of disease mechanisms, to develop new therapies, to explore linkages between food and health and to promote health through diet. € 4 million are devoted to the area of neurosciences.

- **University College Dublin**[104], Applied Neurotherapeutics group, which has received from the Science Foundation Ireland (SFI) a € 7.7 million award together with the Neuroscience Discovery Group of Wyeth Research to support to support research into the treatment of illnesses that include Alzheimer's Disease, schizophrenia, and depression.

- **The Irish Longitudinal Study on Ageing**[105] (TILDA): launched by the Ministry of Health in 2006, to study a representative cohort of at least 8,000 Irish people over the age of 50 charting their health, social and economic circumstances over a 10-year period.

The study is being carried out by Trinity College Dublin in collaboration with an inter-disciplinary panel of scientific researchers, with expertise in various fields of ageing, from Dundalk Institute of Technology (DKIT), Economic and Social Research Institute (ESRI), National University of Ireland Galway (NUIG), The Royal College of Surgeons in Ireland (RCSI), University College Cork (UCC), University College Dublin (UCD) and Waterford Institute of Technology (WIT). Funding was provided by Atlantic Philanthropies (€ 1.3 million) and Irish Life (€ 4 million).

- **Technology Research for Independent Living**[106] (TRIL): launched in 2007, and an academic/industry partnership the TRIL Centre is a coordinated collection of research projects addressing the physical, cognitive and social consequences of ageing. The TRIL Centre's mission is to discover and deliver technology solutions which support independent ageing, ideally in a home environment. Funding is provided by the company Intel and IDA (Investment Ireland) for an overall value of € 25m over 3 years.

- **Health Research Board**[107]

This is the lead agency supporting and funding all areas of health research in Ireland. With 30 Researcher-led projects and programmes there is over € 13 million awards for neurodegenerative disease research. The research funded spans a broad area of neurodegenerative disease, from palliative care to novel therapies. It also includes a fund of € 4.2 million for a PhD programme hosted by TCIN addressed to training the future research generation.

LATVIA

The Latvian Institute of Organic Synthesis[108] was founded in 1957 as a unit of the Latvian Academy of Sciences. The Institute is involved in the fundamental studies in the field of organic chemistry, molecular biology and bio-organic chemistry. The other direction of the Institute's work is drug research in view of potential medical and agricultural applications. The Institutes performs also clinical trials in areas such as Alzheimer's disease and vascular dementia. It also participates to the EU project DeZnIT. The main objectives of DeZnIT program are to develop new drug design technology specifically focused on the family of zinc metalloenzymes and to use this technology to identify new candidate drugs.

LITHUANIA

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102 http://www.tcd.ie/Neuroscience

103 http://bsi.ucc.ie

104 http://www.ucd.ie/conway/research/integrativebiology/appliedneurotherapeuticsresearchgroup

105 http://www.tilda.tcd.ie

106 http://www.trilcentre.org

107 http://www.hrb.ie/

108 http://www.osi.lv/index.php?v=1&pos=1

As part of the HAPPIEE study (Health, Alcohol and Psychosocial factors In Eastern Europe) funding by the WE) funded by the Wellcome Trust, Lithuania is participating to a large cohort population screening (over 7000 people aged 45-72 years) which amongst other issues includes also the assessment of the cognitive functions. Screening included blood sampling and DNA extraction.

The Lithuanian States Science and Studies Foundation is supporting since 2008 2 projects on the generation of novel methods for the early detection of pathogenic oligomers of amyloid B in biological fluids (blood and cerebrospinal fluids). Lithuania is also collaborating to the transnational collaborative effort "Kaunas Health Ageing Study: late life mental health" (started also 2008), aiming to determine the prevalence of dementia and depression and their related risk factors. Other partners include London King's College Institute of Psychiatry and Oslo University College in Norway, who is coordinating these efforts.

The University Clinics of Neurology at Vilnius and Kaunas are also taking part in clinical studies aimed at designing and validating a novel battery of cognitive testing.

LUXEMBOURG

The programme PROVIE[109] (Research into the medical aspects of ageing) programme is one of the multi-annual programmes of the National Research Fund[110] (NRF) which supports public research.

Its purpose is to study the epidemiological, psychosocial and biological aspects of the neurodegenerative diseases of old age in Luxembourg and view them against the broader European canvas. The objectives of the programme are: 1) to improve the skills of the biomedical community in Luxembourg and the transfer of knowledge concerning pathologies linked to ageing of the brain; 2) to correlate medical, epidemiological, psychosocial and biological aspects; 3) to improve the prevention of cerebrovascular accidents (strokes); 4) to acquire innovative detection methods for neurodegenerative diseases and other diseases in the elderly.

Research areas addressed include: basic research and technology transfer, study of the risk or protection factors, primary and secondary prevention and clinical and epidemiological aspects of these diseases.

MALTA

Malta Dementia Society - The Malta Dementia Society[111] was established in September 2004 and is affiliated to Alzheimer Europe. It aims are to encourage and promote the best methods of care, education and treatment of persons with dementia and related disorders generally throughout the Maltese islands and elsewhere as well as to provide and furnish support, help, assistance and information to the families, relatives and friends of persons with dementia and related disorders. They are also in charge of training of caring personnel as well as to promote fund raising

Zammit Clapp Hospital - An autonomous publicly funded hospital specializing in Geriatric Medicine under the responsibility of the Hospital Management Committee and the Foundation for Medical Services, The Zammit Hospital[112] strives to provide a service of excellence according to each patient's medical condition and needs, regarding assessment, management and general rehabilitation, through an interdisciplinary approach. It is endowed with on-going in-patient, out-patient and Day Hospital services of acute and rehabilitative nature. The hospital plays an important role in the comprehensive system of care for the elderly in the country

The University of Malta, Faculty of Medicine and Surgery[113] supports also research on the neuropharmacology and neuropathology of Alzheimer's disease.

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109 http://www.fnr.lu/SIML_FNR/Channel/FNRen.nsf/fs_Root?OpenFrameset

110 http://www.innovation.public.lu/html/portal/EN/81/85/99/C50/

111 http://www.maltadementiasociety.org.mt/

112 http://www.sahha.gov.mt/pages.aspx?page=15

113 http://www.um.edu.mt/

Malta Council for Science and Technology - The National Research and Innovation (R&I) Programme[114] 2008 is a funding programme for research and innovation projects in the fields of science and technology and will be managed and administered by the Malta Council of Science and Technology. Applications are called in 4 main areas: ICT, Environment and Energy, Health and Biotech and Manufacturing. One of the seven projects supported this year aims at identifying neuroprotectants from marine and terrestrial plant extracts in neurodegenerative disorders of the amyloid type[115].

NORWAY

In Norway, research on neurodegenerative diseases, in particular Alzheimer's disease is significantly funded by the Research Council of Norway[116] and performed in universities and Centres of Excellence. Projects in this area can be supported through the Council's Independent Basic Research Projects (researcher initiated) - Biology and biomedicine (FRIBIO) programme, as well as a specific Clinical Research programme which aims at supporting large clinical trials and covers, among other subjects, geriatrics.

A major performer in this area is the Center for the Biology of Memory (CBM), which is part of the Centre of Excellence scheme of the Norwegian Research Council and closely linked with the Kavli Institute for Systems Neurosciences[117] in the Norwegian University of Science and Technology. The scientific goal of the CBM is to understand the biological processes behind memory with the view, among other objectives, to determine how a disruption of the processes may lead to various forms of neurological disease or psychopathology.

Another important actor is the Centre for Molecular Biology and Neurosciences[118] (CMBN) of Oslo University, another Council's Centre of Excellence. In order to exploit the ideas developed in conjunction with this CoE project, it signed a letter of intention with GlaxoSmithKline and other investors groups. Teams are also working on these topics in the Rikshospitalet[119], Oslo, and the Akershus University Hospital[120].

Alzheimer's and Parkinson diseases, as well as epilepsy, are studied in the Nordic Centre of Excellence in Neurodegeneration, a Nordic Network funded, among other contributors, by the Nordic Medical Research Councils, which is co-coordinated by the Wallenberg Neuroscience Centre at Lund University and comprises 12 teams from Sweden, Finland, Denmark, and Norway.

Dementia (including Alzheimer's disease) and Parkinson's disease is also subject of the "TrønderBrain" Survey implemented by the Norwegian University of Science and Technology[121] in the Trøndelag region. The Research Council of Norway supported the establishment of this project in 2003 through the Age Research Programme, and currently supports it through the NevroNor programme. The project "TrønderBrain" is cooperation between several research groups at the University Hospital of Trondheim (St. Olav's Hospital) and the Department of Neuroscience, Norwegian University of Science and Technology. Because the population in the counties of North and South Trøndelag of central Norway has been relatively stable over several centuries, this will hopefully make it easier to identify inherited factors that contribute to the development of various forms of dementia and other progressive, neurodegenerative diseases.

The University Hospital of North Norway and the Norwegian Foundation for Health and Rehabilitation implement "The Dementia Study" in Northern Norway, a Clinical Trial with donepezil

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114 http://www.mcst.org.mt/

115 http://www.mcst.gov.mt/files/uploaded/R&I-2008-068-NeuroAmyloid.pdf

116 http://www.forskningsradet.no/servlet/Satellite?c=Page&cid=1177315753906&p=1177315753906&pagenam

117 http://www.ntnu.no/cbm/

118 http://www.cmbn.no/

119 http://www.rikshospitalet.no/ikbViewer/page/no/pages/hygiene/english?p_dim_id=32373

120 http://www.med.uio.no/ahus/english/

121 http://www.ntnu.no/dmf/research

superimposed on a non-medical intervention with cognitive and social stimulation therapy in rural community medical practice.

POLAND

NENCKI Institute of Experimental Biology

One of the main five Departments of this reputed Institute, the Department of Molecular and Cellular Biology[122] is involved in research on neurodegenerative diseases. This includes the areas of signal transduction processes leading to cell proliferation and differentiation; neural plasticity; learning and memory formation as well as neurodegeneration; regeneration, plasticity and ageing.

The Institute also participates to several EU projects including AXREGEN (Axonal regeneration, plasticity and stem cells, Marie Curie Initial Training Network); MARK-AGE (European study to establish Biomarkers of Human Ageing); MEMSTICK (Synaptic mechanisms of memory loss: novel cell adhesion molecules as therapeutic targets) PLASTICISE (Promotion of plasticity as a treatment of degenerative conditions).

Institute of Pharmacology

Part of the Polish Academy of Sciences, the Institute of Pharmacology (IF)[123], through its center of excellence on neuro- and psychopharmacology, devotes particular efforts to the area of neurodegeneration research. The areas covered include research on the role of neurotransmitters in neurodegenerative diseases' development, the establishment of animal models for these diseases as well as the role of neurotoxic substances on the development of neurodegeneration.

International Institute of Molecular and Cell Biology

The International Institute of Molecular and Cell Biology, through its Laboratory of Neurodegeneration[124] is studying the molecular mechanisms involved in learning and memory, as well as in neurodegeneration. Major efforts are being devoted to the identification of mutations in Alzheimer's disease and the search for biomarkers and therapeutic targets for this disease and related disorders.

Mossakowski Medical Research Centre Polish Academy of Sciences

The Mossakowski Medical Research Centre of the Polish Academy of Sciences is focused on fundamental and clinical research in the areas of neurophysiology, neuroimmunology, neurochemistry, neuropathology, neurology, neurosurgery, experimental transplantology, endocrinology and cellular biology. Research on neurodegenerative disorders is one of the key areas of investment.

PORTUGAL

Alzheimer Portugal

Alzheimer Portugal[125] is a non-profit organization established in 1988. It provides awareness, information and research, support and advocate for people with dementia and caregivers and at creating models of care.

Centre for Neurosciences and Cell biology

The Centre of Neurosciences and Cell Biology[126] at the Coimbra University is part of the Network of European Neuroscience Institutes (ENI). The CNC is also involved in collaborations between the Portuguese government and the Massachusetts Institute of Technology (MIT) and Harvard Medical School (HMS). Neurosciences and disease[127] , and in particular neurodegenerative diseases, is one of its six areas of investment. Specific areas tackled include: mitochondrial dysfunction, neuronal death and neuroprotection, mechanisms of disease(s) and brain repair.

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122 http://www.nencki.gov.pl/en/working_groups/index.html

123 http://www.if-pan.krakow.pl/ifpan/dept/npsych.html

124 http://www.iimcb.gov.pl/kuznicki_lab.php

125 http://www.alzheimerportugal.org/clientSite/

126 http://www.cnbc.pt/

127 http://www.cnbc.pt/research/research01.asp

The Institute participates also to two Biomedical Inter-Institutional Research Programme (CNC, HUC, CHC, IPO) on "Neurology research: studies on neurodegenerative disorders" and "DNA investigation in Neurodegenerative Disorders"

Champalimaud Foundation Neuroscience Programme

Starting in 2007, the Champalimaud Foundation of the Gulbenkian Institute for Science[128] specifically supports a research programme in Neurosciences, aimed at unraveling the neural basis of behavior. The program is embodied to several research groups, working in close interaction with the broad-based research biology and biomedicine conducted at the IGC.

Instituto de Medicina Molecular

Located in the campus of Lisbon Medical School, the Instituto de Medicina Molecular[129] (IMM), established in 2001, is an Associate Laboratory of the Portuguese National Ministry of Science, Technology and Higher Education (MCTES). Neurosciences research is one of its key areas of investment. The Cellular and Molecular Neurosciences Unit focused on the understanding of the molecular mechanisms which lead to neurodegeneration in diseases such as Parkinson's, Huntington's, or Alzheimer's disease.

The Dementia Research Group of the Clinical Neurology Research Unit is particularly interested in the clinical, neuropsychological and imaging characterization of the initial phases of AD. The Clinical Neuropharmacology Group aims to contribute to the development of effective and safe therapeutic interventions for neurodegenerative diseases through the establishment of optimised methodologies and infrastructures for the assessment of the clinical impact of these measures. The Genomics of Complex Disease laboratory focuses on understanding the genetic architecture of complex diseases such as Parkinson's disease.

ROMANIA

The Romanian National Authority for Scientific Research (**ANCS)**[130] - Ministry of Education and Research- is the major source of financing research projects by the National Plan for Research, Development and Innovation.

The VIASAN- Life and Health research programme promotes and sustains the basic, strategic and applied research for understanding the pathological mechanisms, treatment and prevention of diseases with a great impact in the population, for the harmonisation of best quality care, and for increasing the level of health in Romania.

Neurosciences is one of the areas of investment within the VIASAN programme and addresses, amongst others, the study of the cellular mechanisms of neurodegenerative diseases, the molecular mechanisms involved in cellular senescence and degeneration..

CEEX is a national program for excellence in research, accorded by the same national organisms.

The **National Council for Scientific Research** (CNCSI)[131] is also national funding agency, targeting neurosciences research.

National Neuroscience Society of Romania and the **Centre for Excellence in Neuroscience "Carol Davila" University of Medicine and Pharmacy Bucharest**

The project "The development of a European Network for the investigation of interneuronal and neuroglial relations in energetic stress, neurodegenerative diseases and ageing, aiming the development of new therapeutic strategies" in collaboration with European partners from UK and Germany was financed by the **CEEX** program of the Romanian Ministry of Education and Research. Other basic and clinical neurological research projects are financed by **VIASAN** program.

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128 http://www.igc.gulbenkian.pt/

129 http://www.imm.ul.pt/indexi.html

130 http://www.ancs.ro/

131 http://www.cncsis.ro/index.php

National Institute of GERONTOLOGY and GERIATRY 'ANA ASLAN'

Within the National Plan for Research, Development and Innovation, the Institute is performing fundamental and applicative research, under the coordination of the Academy for Medical Sciences, within the field of ageing pathology.

"The Day Hospital for the Diagnosis and Treatment of Memory Impairments" was founded by the "Ana Aslan" International Academy of Ageing in Romania. This study, which actively screened for MCI patients using international criteria for diagnosis, is the first descriptive study in East-European countries on MCI.

Alzheimer Romania[132] is a member of the international associations Alzheimer's Groups European Organisations and Making Dementia a Public Health priority.

In 2006, and with the support of Pfizer, Alzheimer Romania organized the campaign "Don't forget those who forget". The role of this campaign was to inform and educate Romanian people regarding problems concerning Alzheimer's disease and to increase the trust of people into specialized medical consultation. Novartis Pharma supported a project for helping families of patients affected by Alzheimer's disease.

Hoffman- La Roche initializes in 2009 a clinical trial:" A dose-ranging, randomized, double-blind, placebo-controlled study of the effect of RO5313534, used as add-on therapy to donepezil, on cognitive function in patients with mild to moderate symptoms of Alzheimer's disease".

SOCODOR Center for Research and Treatment of Alzheimer Disease is the first center created in Romania in 2009 with an investment of 5 million euro. It will be supported by the collaboration with Hungarian and Canadian partners and also by the Romanian Ministry of Health which will finance the expensive treatment of the patients.

CONEURAL Centre for Cognitive and Neural Studies[133] focuses on three main research directions: recording and analysis of electrophysiological data, development of advanced tools for data analysis and modelling of neuronal processes, issues ranging from mechanistic levels, of rhythm generation, up to the level of human cognition.

Two scientific projects are financed by **CNCSI** – Romanian National Council for Scientific Research. Another project intended to strengthen the collaboration between Coneural and Max Planck Institute for Brain Research in Frankfurt (MPI), established a direct and close collaboration with the Neurophysiology Department of the MPI. There are numerous projects ongoing that will include the study of temporal structure in neuronal activity, funded by Max Plank Society from Germany.

SLOVAKIA

Slovakia has a national comprehensive Alzheimer's disease network constituted by the Institute of Neuroimmunology[134] of the Slovak Academy of Sciences, the Slovak Alzheimer's society, the MEMORY Foundation[135] and the MEMORY Centre-Psychiatric Ambulatory Care Centre[136].

The Institute of Neuroimmunology was established in 1996 with support from the MEMORY Foundation. The Institute studies neuroscience at various levels, from a) molecular level, to b) cellular level, to c) systems level up to d) cognitive level and uses its observations and findings for searching the underlying causes of neurodegenerative diseases with focus on Alzheimer's disease and related neurodegenerative disorders (tauopathies) and prion diseases. The Institute is coordinator of the Centre of Excellence for Alzheimer's disease and related disorders.

132 http://www.alz.ro/
133 http://www.coneural.org/
134 http://www.niu.sav.sk/index.php?id=33&lang=en
135 http://www.alzheimer.sk/
136 http://www.alzheimer.sk/

It is responsible for the genetic analysis of patients with early onset forms of Alzheimer disease, manages the Slovak Brain Bank and is the national reference laboratory for Transmissible Spongiform Encephalopathies (TSE).

The MEMORY Centre – Alzheimer Diagnostic Centre is a fully integrated platform for Alzheimer's disease patients and their relatives. The Centre contains also a Psychiatric Ambulatory Cancer Centre, opened in 2002 by the MEMORY Foundation is a specialised facility for the prevention, diagnosis and education for AD.

SLOVENIA

Forget-me-not

"Forget-me-not[137]", the Alzheimer's Disease and Related Disorders Association of Slovenia , established in 1997, is a non-governmental organisation aimed at raising awareness of all forms of dementia and other mental disorders encountered in old age. Its goals include organising support for caregivers, promoting training of staff, developing a network of medical practitioners interested in mental health of the elderly, encouraging further knowledge development in this area, cooperating with similar foreign organisations.

University medical centre Ljubljana

The University Medical Centre Ljubljana[138] (UMC) is a public health care institution providing medical services at the secondary and tertiary level. The UMC is the leading medical institution in Slovenia and one of the largest hospitals in central Europe. As the main training base for the Faculty of Medicine in Ljubljana, the UMC effectively combines clinical work with education and research. The Department of Neurology is a teaching, research oriented clinical hospital located in Ljubljana and one of the largest centre dedicated to improving neurological health in the country.

Jozef Stefan Institute

The Department of Biochemistry[139] of the Jozef Stefan Institute performs substantial research in the area of proteases and their role in neurodegenerative disorders, as well as in the development of amyloid fibres and their role in neurodegenerative disorders.

Ad-Futura – Science and education Foundation

The Ad-Futura[140] foundation encourages networking among people involved in education and research, and by providing financial support enhances the mobility of knowledge, ideas and people within the society. The foundation allocates its financial support to extraordinary researchers, faculty and secondary school students from abroad for the purpose of education and research in Slovenia. Part of the funds is also available to Slovene citizens for the purpose of acquiring additional knowledge abroad. In 2005, the Foundation granted 360 scholarships.

SYNAPSA

SYNAPSA[141], the Slovenian Neurosciences association is responsible for advancing neurosciences knowledge in Slovenia. It facilitates multidisciplinarity and cooperation with similar national and international organizations. It organises each 2 years an international conference around a specific theme. The 2009 conference will address memory.

137 http://www.ljudmila.org/~zzppd/adrda.htm
138 http://www3.kclj.si/ang/index.php
139 http://bio.ijs.si/prot/prot_en/index.htm
140 http://quark-magazine.com/pdf/quark07/114ADFUTURA.pdf
141 http://www.sinapsa.org/en/mission.php

National Research and Development Programme (NRDP)

The current NDRP programme[142] (2006-2010) gives a special emphasis to technical natural sciences and biomedical research. It different areas are implemented through the Slovenian Research Agency[143]. For the period 2004-2008, Slovenia has devoted 72,3 and 73 full-time equivalents (FTE) to medical and biotechnological sciences, respectively.

SPAIN

Spain has established in 2007 the Network of Biomedical Research on Neurodegenerative Disease[144] (CIBERNED) under the initiative of the Insituto de Salud Carlos III[145] (ISCIII). 62 research groups belonging to Spanish Science and Technology System (universities, hospitals, public research organisms). Financial support was of € 8 million in 2007.

The areas of research include: the molecular pathology of Alzheimer (mechanisms of neurodegeneration, neuroprotection and new therapies in AD); diagnosis, treatment and prevention of dementias (genetic epidemiology, animal and cell models in AD); cell therapy in Parkinson disease; neural circuits in Parkinson; neuromuscular pathologies; molecular pathology of Huntington disease.

The Network of Biomedical Research on Mental Health[146] (CIBERSAM) was also established by the ISCIII in 2008 and endowed with a financial support of € 3,4 million for the 2008 fiscal year. It includes 25 research groups and addresses research areas such as depression, schizophrenia, bipolar disorders and other disorders. It also has a Brain Bank Platform in psychiatric diseases.

The Health Research Funding Agency[147] (FIS), managed by ISCIII, has supported over 36 projects on Alzheimer disease and other dementias in the past 4 years with an overall budget of €3.8 million.

The Ministry of Science and Innovation[148] has supported 21 Research projects on Alzheimer and related dementias in the period 2007-2009. Overall budget is of € 2.8 million.

The ISCIII'S CIEN FOUNDATION (Centre for Research on Neurological Diseases): provides € 0.7 million/ year and the Queen Sofia FOUNDATION provides € 0.5 million/ year to support the Alzheimer's Disease Project[149] at the Alzheimer's Disease Research Unit (UIPA) of the Foundation. Areas and facilities supported include medical assistance, coordination of research programmes, brain banking, and imaging platform. Priority lines for 2006-2010 are: research on early diagnosis of AD – MRI, biomarkers, molecular and cell biology in AD – β-amyloid peptide, tau; ageing and risk factors for AD; translational research in AD; assignment of resources and quality of care for AD patients

Up to € 2,5 million/year is devoted to neurodegenerative disorders research through regional funds.

SWEDEN

Swedish Brain Power

Brain Power[150] is a programme issued in 2005 that entails co-operation between the Invest in Sweden Agency, the Knowledge Foundation, the Swedish Foundation for Healthcare Sciences and Allergy Research (the Vårdal Foundation), the Swedish Foundation for Strategic Research, the Knut and Alice Wallenberg Foundation and VINNOVA. The programme aims to develop a new holistic concept for integration and co-operation within a number of R&D areas that are important to the diagnosis and treatment of neurodegenerative diseases. This national consortium is led by the Karolinska Institute

142 http://www.sycp.si/sycp/Policy_Overview_RTD.wlgt
143 http://www.arrs.gov.si/en/dobrodoslica.asp
144 http://www.ciberned.es/default-en.aspx
145 http://www.isciii.es/htdocs/en/index.jsp
146 http://www.cibersam.es/opencms/opencms/cibersam/?idioma=en
147 http://www.isciii.es/htdocs/en/investigacion/investigacion_presentacion.jsp
148 http://web.micinn.es/contenido.asp?menu1=1&menu2=1&dir=01_Portada/01-Ministerio/01-Ministra
149 http://www.fundacioncien.es/ponencias/Research%20Unit%20for%20AD%20-PMM.pdf
150 http://www.swedishbrainpower.se/eng/index.htm

and was allocated SEK 100 million over 5 years. It includes 50 ongoing research projects and 80 researchers. The programme is now undergoing its mid term evaluation.

The Swedish Dementia Registry, Svedem

Svedem[151] was started by the initiative of Swedish Brain Power. It now holds basic data about over 4.000 dementia patients around Sweden. 61 care units have become members of Svedem, 21 of those are health care centres and one is a municipality.

Svedem is a national quality registry on the dementia care in Sweden. The aim is to develop the dementia care and create a more even care quality over the country.

Stockholm Brain Institute

Established in 2007, the Stockholm Brain Institute is a consortium for Cognitive and Computational Neuroscience, joining three leading Swedish Universities; Karolinska Institutet, Royal Institute of Technology and Stockholm University, gathering 80 scientists and 11 research groups. SBI has been granted 100 million Swedish Crowns from VINNOVA and the Swedish Research Council. Matching funds are expected from collaboration with industry.

Areas tackled include: 1) to integrate expertise in cognitive, computational, and neural sciences in order to understand the human brain from genes to behaviour, 2) to explore the neurobiological processes leading to cognitive dysfunctions in several brain disorders such as Alzheimer's and 3) to develop biomarkers to detect and monitor the pathological processes underlying these disorders, as well as to develop new principles for prevention and intervention.

Karolinska Institute

The Karolinska Institute provides a comprehensive effort in the field of neurosciences, through its Departments of Neurosciences, cell and molecular biology, physiology and pharmacology and clinical neurosciences.

The Department of Neurosciences[152] incorporates research groups dealing with different aspects of the function of the nervous system, both under normal conditions and during different diseases. Alzheimer's diseases and dementia is also one of the 8 specific areas addressed by the Department.

Basic research carried out is aimed at understanding the functional role of various neurotransmitters and neuropeptides, the ionic and biochemical mechanisms involved and the molecular basis of transmitter release. Extensive research is also carried out on the regulation of nerve cell growth and factors involved in neuronal regeneration and degeneration, and which are important in conditions such as Parkinson's disease and Alzheimer's disease. Karolinska Institute also conducts more clinically orientated research into specific diseases, such as Parkinson's disease, psychiatric diseases

The Department of Neurobiology, Care Sciences and Society[153] (NVS) is responsible for one third of KI's clinical neuroscience research with a focus on dementia and intellectual failure for other reasons.

University of Lund

NeuroLund[154] is a scientific platform established at the University of Lund focusing on the brain and its related diseases. The goal is to develop new treatments for diseases such as Parkinson's, Alzheimer's, Parkinson's, brain damages after stroke and depression. Neuroprotection, cell replacement and gene therapy approaches for these diseases are amongst the expected outcomes.

NeuroFortis at the Wallenberg Neuroscience Centre[155] is a joint effort between four research teams in the field of brain damage and repair. The program explores novel mechanisms of neurodegeneration

151 http://www.ucr.uu.se/svedem/
152 http://ki.se/ki/jsp/polopoly.jsp?d=21984&l=en
153 http://ki.se/ki/jsp/polopoly.jsp?d=5528&l=en&fromnode=5478
154 http://www.med.lu.se/neurolund
155 http://www.med.lu.se/neurofortis

and maladaptive plasticity in animal models of neurodegenerative disease or ischemic brain injury, and aims at devising novel treatment strategies based on disease intervention, cell replacement and functional restoration.

SWITZERLAND

There are several layers of funding provided by the Swiss National Science Foundation (SNSF)[156] in support of research on neurodegenerative disorders. This includes supporting investigation-initiator projects but also providing support through targeted programmes such as the National Targeted programme on "stems cells and regenerative medicine" or the network of National Competence Centres in Research.

NCCR Neuro: Neural Plasticity and Repair

The NCCR Neural Plasticity and Repair programme[157] (2001-2012), is managed by the University of Zurich in collaboration with ETH Zurich and part of a large-scale research initiative of the Swiss National Science Foundation aiming at establishing and funding a national network of National Competence Centres in Research. It consists of 8 main programmes, one of them addressing specifically Alzheimer's disease

The focus of its research is on the restoration of function after damage or disease of the nervous system. The NCCR will elucidate the basic cellular and molecular mechanisms of regeneration, plasticity and functional repair of the damaged nervous system. Using animal models as an intermediate step, novel approaches for therapies of human diseases will be developed with emphasis, amongst others, on Alzheimer's disease and multiple sclerosis.

Neuroscience Centre Zurich

The Neuroscience Centre of Zurich[158] (ZNZ) is a joint competence centre of ETH and University of Zurich. About 100 basic, clinical and applied research groups cover the entire spectrum of neuroscience ranging from molecular and cellular processes in the brain over physiology and diseases of the nervous system to computational modelling and psychology. The areas addressed include, for instance, research on ageing and disorders of the nervous system, molecular and cellular neuroscience, development and regeneration. Research on neurodegenerative disorders is comprehensively addressed through many angles.

National Research Programme on stem cells and regenerative medicine

Part of the National Research Programmes for targeted research of the Swiss National Science Foundation this programme starting January 2009 aims at giving a boost to basic research on stem cells and regenerative medicine, in particular areas such as Parkinson's disease and other neurodegenerative disorders. The overall financial support will be of CHF 10 million for 5 years.

Many private Swiss foundations, including the Roche and Novartis foundations fund applications for Alzheimer disease–related projects. Swiss academic researchers are also financially supported by their home institutions, the cantonal universities and the two Federal Institutes of Technology in Zurich and Lausanne. To support the transfer of knowledge between businesses and universities, and to foster the translation of innovative research into product development, the Swiss Confederation's innovation-promoting agency supports research and development programs jointly done by universities, young entrepreneurs and industry.

In addition, many start-up and biotechnology companies including Cytos, Esbatech, AC Immune and The Genetics Company are involved in developing diagnostics and therapeutics for Alzheimer disease.

156 http://www.snf.ch/E/Pages/default.aspx

157 http://www.nccr-neuro.uzh.ch/description

158 http://www.neuroscience.ethz.ch/

THE NETHERLANDS

National Dementia Programme – LeARN

The Dutch Alzheimer Association EINDE[159] has made huge strides in helping to implement a National Dementia Programme, to which it contributed with an overall support of € 2.8 million for the period 2004-2009. In 2002, the Ministry of Health, Welfare and Sport asked the association and the Netherlands Institute for Health and Welfare to develop a nationwide programme to improve dementia care from a client perspective. Now, improvement teams are in operation in 58 regions across the country, and families themselves have been involved in coming up with priorities for local improvement plans.

The Centre for Translational Molecular Medicine[160] (CTMM) is dedicated to the development of medical technologies that enable the design of new and "personalized" treatments for the main causes of mortality and diminished quality of life, amongst them neurodegenerative diseases. It is a public-private partnership that comprises a multidisciplinary group of parties – universities, academic medical centres, medical technology enterprises and chemical and pharmaceutical companies

The LeARN project[161], "In vivo molecular diagnostics in Alzheimer's disease", aims at developing new instruments with which to make an earlier and more reliable diagnosis of AD during life and create the conditions for an effective evaluation of novel medication therapies of AD patients. Overall funding is € 8 million for the period 2008 – 2012. Coordination is ensured by Leiden University Medical Centre.

This will be achieved by developing: 1) new imaging techniques that will use ultra-sensitive MRI and PET to visualize 'senile plaques' in the brains of AD patients, 2) new technologies that allow visualization of glutamate neurotransmitter molecules as well as the receptors to which glutamate molecules bind and 3) novel technologies that allow for the identification and quantification of biomarkers for AD in cerebrospinal fluid. The project will also study the mechanism of action of potential novel drugs through the development of essential biomarkers. In addition, the diagnostic tools listed above will be tested for their (additional) value in the diagnostic process of AD patients

Pearlstring

String-of-pearls is a joint infrastructure to collect and access the patient data and biomaterials of at least eight patient categories, one of them being dementia. The consortium is composed of the eight University Medical Centres (UMC's), joined in the Dutch Federation of University Medical Centres (NFU), which provide most tertiary care in The Netherlands. The programme on dementia and neurodegenerative disorders, Pearstring[162], which is mainly focussing on establishing a bio banking infrastructure for AD is endowed with an overall budget of € 8 million for the 2008 – 2012 period.

Top Institute Pharma

Founded in 2006, TI Pharma[163] is a collaborative structure consisting of industrial and academic research teams. TI Pharma conducts cross-disciplinary research and trains their personnel in improving the efficiency of the entire drug discovery and development process.

TI Pharma is conducting a project on "Parkinson's disease and Alzheimer's disease: from disordered human brain targets to novel therapeutics". The objectives of this project are the identification and validation of potential drug targets, the provision of novel cell and animal models as well as clinically validated biomarkers directly relevant for development of early diagnosis and treatment of Parkinson's disease and Alzheimer's disease. The initiative is supported for an overall value of € 6 million for the period 2008 – 2011.

159 http://www.dementieprogramma.nl/

160 http://www.ctmm.nl/pro1/general/home.asp

161 http://www.ctmm.nl/pro1/general/start.asp?i=4&j=1&k=0&p=0&itemid=73

162 http://www.parelsnoer.org/page/De-Parels/Neurodegeneratieve-hersenziekten

163 http://www.tipharma.com/pro1/general/home.asp

The consortium consists of the partners DNage BV, Erasmus MC (University Medical Centre Rotterdam), Leiden University Medical Centre, the Netherlands Brain Bank, the Netherlands Institute for Neuroscience, Solvay Pharmaceuticals, the University Medical Centre Utrecht, Utrecht University, VU University Amsterdam and the VU University Medical Centre.

Dutch funding for Alzheimer's related research includes the following additional projects and initiatives:

- Neuro-Bsik Mouse Phenomics[164], which address research on mouse models of neurological disorders (€ 13,1 million, 2003-2009)

- Brain and Cognition[165], focused on cognition research (€ 7,5 million, 2008-2011)

- Netherlands Consortium for Health Ageing - Genomics Initiative[166], addressing genes in healthy ageing (€ 12,5 million, 2008-2012)

- National Programme on Care for the elderly[167], addressing the improvement of care in elderly populations (€ 80 million, 2008-2011)

- Priority Medicines for the elderly, focused on drugs for older elder population.

UNITED KINGDOM

Neurodegenerative diseases research initiatives in the United Kingdom include:

National Dementia Strategy – developed by the Department of Health[168] and addressing 3 key themes:

- Raising awareness

- Early diagnosis and intervention

- Improving quality of care

MRC Strategic Review of Neurodegeneration[169] – published in 2008, the review formulated strategic advice to the MRC on:

- Changes in health need

- New scientific opportunities

- The most important research and training questions that the MRC/UK could address. The report made three central recommendations: to strengthen biological research into disease origins and mechanisms, to improve training and critical mass, to provide support for a strategic co-ordinated network that would address the key barriers to progress in the field.

MRC/Wellcome Trust Call in Neurodegeneration

In October 2008 WT/MRC[170] launched a £30M joint call focussed on advancing the understanding of biological processes underpinning neurodegenerative diseases. The aims of the call were to:

- Create consortia comprising leading UK groups, which could include international researchers and pharma

- Facilitate the use of interdisciplinary approaches to address key gaps in our knowledge of the biological basis of neurodegenerative diseases

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164 www.neurobsik.nl

165 http://www.nwo.nl/nwohome.nsf/pages/NWOA_7BBK4H

166 http://www.genomics.nl/GenomicsCentres/Health/NCHA.aspx

167 http://www.nationaalprogrammaouderenzorg.nl/

168 http://www.dh.gov.uk/en/index.htm

169 http://www.mrc.ac.uk/Utilities/Documentrecord/index.htm?d=MRC004898

170 http://www.wellcome.ac.uk/Funding/Biomedical-science/Grants/Other-initiatives/WTX050533.htm

- Catalyse the development of new approaches for effective diagnosis and therapeutic interventions

Dementias and Neurodegenerative Diseases research Network (DeNDRoN)

The **DeNDRoN**[171] network was established in September 2005 as part of the UK Clinical Research Network, with the objective to facilitate clinical trials and research through enhancing NHS research infrastructure and increase collaborative working between academics, clinicians, patients, carers and research funders.

It builds on strengths already present in the UK as well as increasing general capacity in the field of neurodegeneration.

Lifelong Health and Wellbeing Initiative (LLHW)

LLHW[172] is a cross-council programme which was part of the UK Research Councils' ongoing commitment to support ageing-related research. This programme encompasses research that addresses health and wellbeing throughout the whole life course

The aims of LLHW are:

- Targeting factors that may be major determinants of health and well being in later life
- Identifying and developing effective interventions
- Informing policy and practice including the development of services and technologies to support independent living
- Establishing and strengthening multi-disciplinary teams to drive innovative research

New UK Strategy for Brain Banking

Led by the Medical Research Council for the UKCRC

Key recommendations: UK brain banking activity should be organised into a network that has a central coordination centre; Brain Banks UK that is independently constituted and funded. There is a proactive strategy to collect controls through the medico-legal system – call for existing banks to expand activity

Main aims:

- Facilitate sharing of brain tissue donations
- Provide easily available, high quality, fit-for-purpose control and disease tissue
- Ensure high quality tissue samples suitable for molecular genetic DNA-based studies, RNA analyses, proteomics expression profiling, target validation…
- Promote the establishment of new brain tissue resources – normal control tissue, psychiatric and other rarer CNS disorders requiring tissue based research
- Accelerate the accumulation of samples from rare conditions
- Reduce the administrative load on local banks

171 http://www.dendron.org.uk/

172 http://www.mrc.ac.uk/Ourresearch/Priorities/LLHW/MRC005933