

# Netherlands Brain Bank

## Progress Report 2005-2006





# **Netherlands Brain Bank**

**Progress Report 2005 - 2006**

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*Print: Gildeprint bv, Enschede*

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# Introduction

It is with great pleasure that I present the 2005/2006 Progress Report of the Netherlands Brain Bank (NBB).

The recent period has been extremely turbulent for the NBB. For many years the NBB was a department of the Netherlands Institute for Brain Research (NIBR), an institute of the Royal Netherlands Academy of Arts and Sciences (KNAW). However, in 2006 the NIBR merged with the Netherlands Ophthalmic Research Institute (NORI), another institute of the KNAW and situated next door to the NIBR. After the merger, the NIBR and the NORI together formed the Netherlands Institute for Neuroscience (NIN). As a consequence, Dick Swaab stepped down as director of the NIBR and as director of the NBB. Dick Swaab is the founder of the NBB and has guided the NBB for more than 20 years. He remains, however, available as advisor of the NBB. During the merger, Jos Jacobs, the then director ad interim of the NIN, briefly (February to August 2006) managed the NBB. Another major consequence of the merger was the departure of Rivka Ravid to become a scientific advisor affiliated to the KNAW. Rivka Ravid has been the coordinator of the NBB almost since the start of the NBB. Under her management and the professional guidance of Prof. Swaab, the NBB developed into one of the world's leading Brain Banks.

It is a great honor for me to have succeeded Dr. Ravid as head NBB as of August 2006. Together with a fantastic team of NBB staff members we have professionalized NBB procedures to optimize the transparency and accountability with respect to the entire process of brain banking - from the procurement, handling and storage of tissue to the distribution of tissue to researchers. To ensure the high scientific quality of the research projects and a justifiable distribution of tissue, all applications for tissue are now reviewed by a scientific committee. A scientific advisory board that will guide the NBB's strategic decisions will be installed shortly. We have drawn up a material transfer agreement to ensure the rights and obligations of the NBB as well as those of the recipients of tissue. New informed consent forms are under review of the medical ethical committee of the VU Medical Centre. The NBB has a new website ([www.brainbank.nl](http://www.brainbank.nl)) which contains updated informational brochures that may be downloaded. We trust that these changes will further increase the quality and efficacy of our procedures and services.

I express my gratitude to the KNAW, Stichting MS Research, Internationaal Parkinson Fonds, Parkinson Patiënten Vereniging and Hersenstichting Nederland, as well as to private contributors, whose financial support makes the work of the NBB possible.

I would also like to thank the members of the autopsy team, the autopsy assistants and the neuropathologists for their willingness to perform autopsies at all times of the day and night.

Last, but certainly not least, I thank the donors, without whom the NBB would, quite simply, not exist.

Inge Huitinga

Amsterdam, 21 September 2007







# The Netherlands Brain Bank

The Netherlands Brain Bank (NBB) was founded in 1985 by prof. D.F. Swaab, Netherlands Institute for Brain Research (now Netherlands Institute for Neuroscience (NIN)), together with prof. F.C. Stam (†, Neuropathology Department of the Vrije Universiteit medical center, VUmc). The NIN is an institute of the Royal Netherlands Academy of Arts and Sciences (KNAW).

The NBB was founded to provide research groups with well-documented high quality post mortem brain tissue of Alzheimer patients and controls and has since grown into an internationally highly appreciated Brain Bank that provides tissue and CSF of many brain diseases and controls to many researchers all over the world. Facilitating the research of Alzheimer's disease (AD), Parkinson's disease, multiple sclerosis and several other brain disorders is still one of the major goals of the NBB.

There are a number of animal models to study AD and other disorders and these models have provided much insight into the possible mechanisms underlying neurodegenerative processes. However, it is of the utmost importance to validate the mechanisms and targets found in these experimental animal studies in the human brain. Also, the pathology in the human brain differs in crucial aspects from the pathology seen in animal models, and the diversity of the various neuropathological processes in combination with aging and genetic predisposition warrants the study of the brain tissue of patients with these diseases.

While they are still alive, NBB donors give their informed consent for the use of their brains and medical records for research purposes, which saves valuable time once the donor has passed away. It enables rapid transportation of the donor to the VUmc and guarantees extremely short post mortem delays, ranging from 2 to 8 hours. The Netherlands is a relatively small country, which allows the NBB to perform all autopsies in one place by one team. In close collaboration with the department of Pathology of the VUmc, all NBB autopsies are performed at the VUmc according to a fresh dissection protocol. Furthermore, the brain tissue is dissected according to a special protocol, so that the researchers get exactly those anatomical structures they need for their research. Because of this procedure, the tissue is of extremely high quality and suitable for sensitive techniques for genomic and proteomic analyses, stainings and post mortem cell and tissue cultures.

Tissue provided by the NBB has contributed to a better understanding of the functioning of the human brain and possible causes of diseases (see Publications). The NBB anticipates that this progress will lead to more efficient prevention and, ultimately, to treatment for these diseases.

During the autopsy, following a standard protocol, the brain is immediately dissected into approximately 70 different structures. In addition to brain samples we also collect ventricular CSF to measure the pH of the brain and for subsequent investigation of biological markers and other compounds present in the CSF in various disorders. Part of the tissue is frozen immediately and stored at -80 °C. The -80 °C freezers of the NBB have a liquid nitrogen backup system and are carefully monitored to assure temperature maintenance. Automatic signal alarm systems are used to quickly react to possible temperature drops. Besides the structures that are dissected for scientific research, at least 14 other brain regions are fixed in formalin, further processed and stained by a number of histological or immunohistochemical stainings for diagnostic purposes.

When the clinical diagnosis is MS, a different protocol is used. The brain is cut into coronal slices of 1 cm and, in cooperation with the Department of Radiology of the VUmc, some of these slices are scanned using MRI to identify and dissect macroscopically invisible MS lesions. These lesions are split in half; one half is frozen and the other fixed. In addition, macroscopically visible lesions are dissected.

On the basis of the examination of the histological or immunohistochemical stainings the neuropathologist writes a neuropathological report, which states the findings and ultimate diagnosis, which can be related to the clinical diagnosis.

The diagnosis is sent to the patient's physician as well as to the various research groups. The neuropathology reports are produced in a highly standardized format, which in turn significantly increases the user-friendliness of such reports for international investigators.

The NBB collects a comprehensive medical history from each donor after autopsy and tries to include as much relevant information as is available on chronic and acute diseases and their course, medication used, alcohol and drug abuse and smoking habits. All medical records are secured with an informed consent of the donor and next of kin, which is requested in advance, together with the informed consent for performing the autopsy. It goes without saying that the confidentiality of the patient data is maintained at all times.

Once the diagnosis is complete, the specimens are shipped on dry ice (for frozen

samples) or in vacuum sealed plastic (for fixed samples) to the researchers. The shipped samples are always accompanied by the neuropathological report, an anonymized summary of the donor's medical history and a printout with specifications on major items such as age, gender, brain weight, post mortem delay, pH (measure for agonal state), time of death and a list of the anatomical structures acquired from the donor.

Safety measures are of paramount importance for the protection of NBB employees and investigators using brain bank specimens. Fresh human post mortem tissues and fluids may contain highly infectious agents and have the potential risk of carrying diseases that are transmittable to other humans. All specimens are treated by the NBB as if they carried such a transmittable disease and are thus handled very carefully because some extremely hazardous agents (viruses, prions) are very stable. The NBB does not perform any autopsies of known HIV or Creutzfeldt-Jakob patients. All the investigators who receive NBB tissue are explicitly informed about the possible risks of infection and asked to apply all necessary safety precautions when processing the samples.

The results of the research performed with NBB material appear in publications in various scientific magazines, sometimes years after the donation has taken place. For an overview of the most recent publications based on scientific research performed on material distributed by the NBB, please take a look at the publication list of 2002-2006.

### **Neuroimmunology Group**

Apart from being the head of the NBB, Dr. Inge Huitinga is also team leader of the Neuroimmunology Group at the NIN, that studies endocrine regulation (glucocorticoids and estrogen) of neuroinflammation in multiple sclerosis, immune suppressive systems in the CNS and genotyping of neuropathology.



# Donor Recruitment

The NBB is one of the very few brain banks in the world with an active donor program, which means that the NBB actively tries to motivate people with neurological, psychiatric and neuroendocrine disorders as well as healthy individuals to register at the NBB, thereby giving informed consent to the NBB to perform a rapid autopsy after death and to donate brain tissue for scientific research to excellent researchers around the world. The donors also give permission to the NBB to collect medical information from their physicians after they have passed away. Currently, approximately 1900 living donors with a variety of disorders are registered at the NBB.

The key to finding potential donors is to inform as many people as possible about the work of the NBB. The wish to donate one's brain for scientific research is often present, but the question is how to go about arranging this.

## **Physicians**

One way to get in contact with potential new donors is through doctors. In the past, employees of the NBB have visited many nursing homes. By providing information about the work of the NBB to the doctors working at these homes we have succeeded in motivating many of them to inform patients and their family members about the existence and work of the NBB. It is very important to have a solid cooperation with the nursing homes. Many of our donors are living in a nursing home when they pass away. Only after death of natural causes has been certified by a medical doctor may the body be moved to a hospital. It is crucial that the physicians are aware of the importance of the work of the NBB in order for them to do post mortem examinations as soon as possible, even if it is in the middle of the night. Furthermore, we need their cooperation in retrieving the necessary medical information about our donors.

At this moment we have a loyal group of nursing home physicians and nurses, but also several neurologists who educate their patients about the possibility of donating their brain to the NBB.

## **Patient meetings**

Another way to increase the number of donors is by directly contacting the potential donors themselves. We achieve this by visiting patient meetings and giving presentations about the NBB. These meetings are often relatively small, say 30-40 people with

a particular neurological disease, who meet every so often to share their experiences. When visiting this type of meeting we normally bring along a scientist who is an expert in the field of the relevant disease and who performs scientific research with the help of NBB tissue. By showing them what kind of research is undertaken to find a cure or medicine for their illness with our help and telling them how to register as a brain donor, we hope to recruit more donors.

At larger patient meetings (often with a variety of neurological or psychiatric disorders) we are represented by an information stand. At these meetings people can ask us all sorts of questions about what it entails to be a brain donor. Besides our normal brochures we usually bring some hand-outs with information on specific neurological, psychiatric, or endocrine diseases.

In 2005 and 2006 we visited the following patient meetings:

- |                   |   |
|-------------------|---|
| 6 October 2005    | The NBB was present with an information stand at the Publieksdag of the Hersenstichting Nederland (HSN) in Utrecht.     |
| 3 December 2005   | We gave a presentation at a meeting for Parkinson patients in Best.   |
| 1 April 2006      | We visited the information stand of the Alzheimer and multiple sclerosis patient day at the VUmc in Amsterdam.          |
| 18 May 2006       | We gave a presentation at the MS patient meeting in Alphen aan den Rijn.  |
| 23 May 2006       | We gave a presentation at the MS patient meeting in Gouda.  |
| 19 September 2006 | Prof. Swaab gave a lecture on dementia and the NBB at the Alzheimer cafe in “De Die” home for the elderly in Amsterdam. |
| 5 October 2006    | The NBB was present with an information stand at the Publieksdag of the HSN in Utrecht.                                 |
| 21 November 2006  | We gave a presentation at the family evening at ‘Mariahoeve’ home for the elderly, location “De Mantel” in Voorburg.    |

## Articles

Every now and then a feature article about the NBB is published in a patient magazine or newspaper. In December 2006 we published an article in ‘Papaver’, a patient magazine for patients with Parkinson’s disease. This led to a significant increase in the number of registered donors with Parkinson’s disease (see Table 1).



**Table 1** Registrations of new donors with Parkinson's disease in the last years

| Year                 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007* |
|----------------------|------|------|------|------|------|------|------|-------|
| New PD registrations | 4    | 5    | 13   | 7    | 12   | 24   | 14   | 21    |
| Mean (2000-2006)     | 11.3 |      |      |      |      |      |      |       |

\* Until March 31<sup>st</sup> 2007

## Controls

By informing patients and their physicians we mainly reach patients with neurological and psychiatric diseases, but healthy control donors, too, are crucial for conducting good scientific research. Therefore we specifically request the families of the patients to register as donors as well.

## Phone and e-mail

We deal with many questions by potential donors and physicians by phone or e-mail. We also send out information material, consisting of a brochure, the NBB registration forms, and two large feature articles about the NBB.

## The World Wide Web

Nowadays the internet is very popular among patients trying to learn more about their illness. By making sure that the NBB is mentioned on the websites of the various patient organisations, we try to enhance public awareness on the importance of brain donation. Furthermore, the website of the NBB has recently been updated ([www.brainbank.nl](http://www.brainbank.nl)).

## Future plans

A major goal is to increase the number of donors. We are currently creating a promotional DVD about the NBB to recruit MS donors. Furthermore, we intend to increase the number of articles about the NBB in patient magazines, newsletters and on websites. The NBB will prepare annual newsletters to inform the registered donors on the progress within the NBB and on the scientific output achieved with the material provided by the NBB.

While recruiting donors, the NBB will pay special attention to Parkinson's disease, multiple sclerosis, Huntington's disease, Alzheimer's disease and psychiatric disorders like depression, schizophrenia and various addictions.

Some disorders severely compromise someone's capacity to make his/her own decisions. Examples are dementia/Alzheimer's disease, some forms of psychiatric disorders or mental retardation, such as severe types of Down's syndrome. According to the Dutch Civil Code, persons reasonably unable to determine their will are incompetent to give informed consent. When a representative of the incompetent person (next of kin or designated representative) is allowed to make decisions on behalf of the incompetent person this is called authorization.

Scientific research into neurological, psychiatric or neuroendocrine disorders that result in permanent incompetence, is of great importance for a better understanding of the causes, pathogenesis and progression of these diseases. Such scientific research is not possible without making use of human tissue. For this reason the NBB not only registers donors on the basis of informed consent, but also on the basis of authorization. The registration of an incompetent donor at the NBB will take place only after incompetence has been confirmed by the physician in attendance.

Even though most psychiatric patients are able to give informed consent, they are often reluctant to register as donors at the NBB. The NBB will therefore also approach psychiatrists and psychiatric nurses and try and convince them of the importance of brain donation.





# BrainNet Europe II

The Brain Net Europe II, also known as a BNE Consortium, is a ‘Network of Excellence’ established in the 6th Framework Programme of Life Sciences of the European Commission.

The BNE Consortium consists of 19 brain banks across Europe. BNE is funded by the European Commission in order to carry out work with regard to its objectives. The objectives of BNE II are, among other things:

- harmonization of neuropathological diagnostic criteria in Europe
- development of gold standards for quality, safety and ethics for obtaining and handling of human tissue
- sharing of knowledge and dissemination of the information to the neuroscientists and the general public

Each Consortium member is assigned a certain amount of work (a so-called ‘workpackage’) and is granted a share of the communal funding for that particular part of the work. The Netherlands Brain Bank is a longstanding member of the BNE Consortium and an active participant designated to carry out work with regard to the ethical and legal issues in brain banking and recruitment of donors (donor programs). Additionally, the technicians and the neuropathologist working for the NBB are actively involved in other workpackages concerning neuropathological trials, in order to standardize, harmonize and optimize the diagnostic techniques.

## **Workpackage ‘Legal and ethical issues in Brain Banking’**

The legal and ethical issues in brain banking are numerous. Research with human tissue, genetic research and post mortem removal of organs have given rise to many controversies in the media and posed many dilemmas in the fields of law and ethics. Due to the relative novelty of these issues, the law is often lacking in clear instructions and unambiguous guidelines.

As the leader of the workpackage on legal and ethical issues, the NBB has been working on a series of documents that should provide a general ethical framework (Consortium level) and could function as a guideline on the level of the individual organization (Brain Bank level). The NBB has tried to set up a structure which focuses on globally accepted bioethical principles and international doctrine. For this purpose a BNE Code of Conduct has been drafted by the NBB. This Draft Code of Conduct, which covers basic legal rules and bioethical principles involved in

brain banking, has been based on various sources available in the field of bioethics. Such sources include laws, regulations and guidelines (Declarations, Conventions, Recommendations, Guidelines and Directives) issued by the international governmental and non-governmental key organizations, such as the Council of Europe, European Commission, World Medical Association and World Health Organization.

The Code of Conduct addresses such fundamental topics as the rights of the persons donating their tissue, the obligations of the brain bank with regard to respect and observance of such rights, informed consent, confidentiality, protection of personal data, collections of human biological material and their management, and transparency and accountability within the organization of a brain bank. As the Code of Conduct only sets a framework of ground rules and general principles, more concrete guidelines are intended to be included in another document called the Brain Bank Regulations. To support the daily practice and compliance with the above-mentioned documents, the NBB has also started drafting a set of model forms and contracts which are indispensable in the daily practice of any well-established brain bank. These forms and contracts include Informed Consent forms, Material Transfer Agreements and Confidentiality Agreements.

### **Workpackage 'Donor program'**

A Brain Bank cannot exist without donors of tissue and fluids for scientific research. Every person has the right to decide voluntarily whether or not he or she wishes to contribute to scientific research in such a way. A decision to post mortem donation of brain tissue is a dignified choice, which gives hope for future generations of patients with untreatable neurological diseases.

The NBB has a long standing history of donor recruitment and one of the most successful running donor programs in Europe. The NBB actively informs and motivates people to donate their brain tissue for scientific research after death. The NBB has accumulated a great deal of experience on the best ways to approach the public for the purpose of donor recruitment, and aims to share this with the members of the BNE consortium. In collaboration with other participating BNE brain banks the NBB is designated to set up a general guideline on establishing and maintaining a successful donor program and best practices in donor recruitment.

Many tasks and objectives of this workpackage are interconnected with the workpackage on ethical and legal issues. An informed consent, for example, is not feasible if the appropriate information is not provided to the person concerned.

## **Funding of NBB activities within BNE**

The tasks of the NBB within the BNE Consortium are quite extensive. Part of the received funding is allocated for subcontracting on advisory work with regard to legal matters. In order to acquire advice and guidance in the field of health law, privacy legislation, intellectual property and legal knowledge with regard to biobanks for research purposes, the NBB is advised by prof. J.K.M. Gevers of the University of Amsterdam, Law Faculty, Department of Health Law.

## **Conclusion**

As a leader of the BNE workpackages, which concern many sensitive issues, the NBB has been intensively engaged in reviewing and adjusting its own policies and standard operating procedures. Considerable progress has been made with establishing a clear ethical code of conduct and improving the transparency of the organization. The NBB aims at achieving the highest standards of conduct, so that it can be regarded as a role model.

## **BNE II Publications**

- Alafuzoff, I., Pikkarainen, M., Al Sarraj, S., Arzberger, T., Bell, J., Bodi, I., Bogdanovic, N., Budka, H., Bugiani, O., Ferrer, I., Gelpi, E., Giaccone, G., Graeber, M. B., Hauw, J. J., Kamphorst, W., King, A., Kopp, N., Korkolopoulou, P., Kovacs, G. G., Meyronet, D., Parchi, P., Patsouris, E., Preusser, M., Ravid, R., Roggendorf, W., Seilhean, D., Streichenberger, N., Thal, D. R., and Kretzschmar, H. Interlaboratory comparison of assessments of Alzheimer disease-related lesions: a study of the BrainNet Europe Consortium. *J.Neuropathol.Exp.Neurol.* 65[8], 740-757. 2006.
- Ferrer, I., Armstrong, J., Capellari, S., Parchi, P., Arzberger, T., Bell, J., Budka, H., Strobel, T., Giaccone, G., Rossi, G., Bogdanovic, N., Fakai, P., Schmitt, A., Riederers, P., Al Sarraj, S., Ravid, R., and Kretzschmar, H. Effects of Formalin Fixation, Paraffin Embedding, and Time of Storage on DNA Preservation in Brain Tissue: A BrainNet Europe Study. *Brain Pathol.* 30-4-2007.
- Schmitt, A., Bauer, M., Heinsen, H., Feiden, W., Falkai, P., Alafuzoff, I., Arzberger, T., Al Sarraj, S., Bell, J. E., Bogdanovic, N., Bruck, W., Budka, H., Ferrer, I., Giaccone, G., Kovacs, G. G., Meyronet, D., Palkovits, M., Parchi, P., Patsouris, E., Ravid, R., Reynolds, R., Riederer, P., Roggendorf, W., Schwalber, A., Seilhean, D., and Kretzschmar, H. How a neuropsychiatric brain bank should be run: a consensus paper of Brainnet Europe II. *J.Neural Transm.* 114[5], 527-537. 2007.



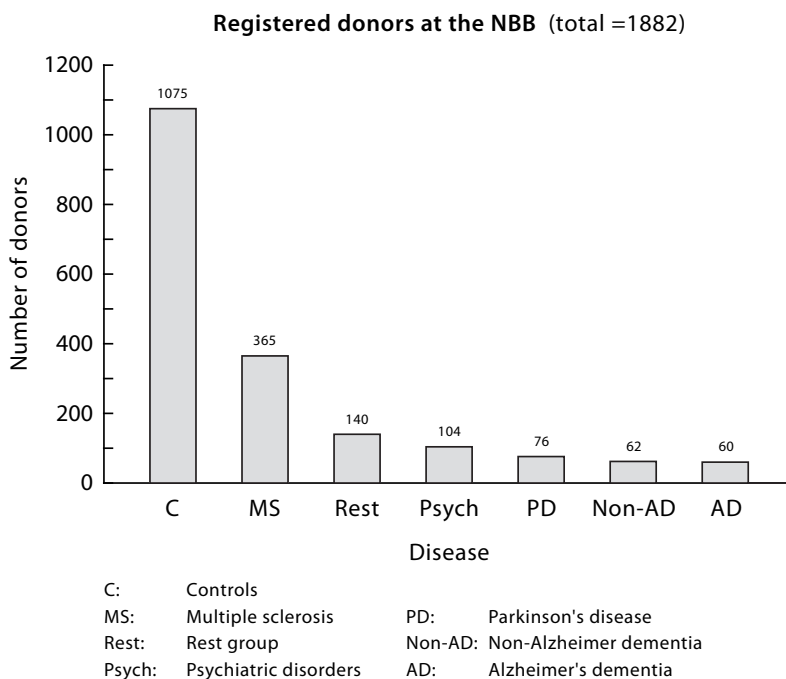


# Facts & Figures

## Donors

On January 1st 2007, the NBB donor register counted 1882 registered donors. Figure 1 shows that these are healthy donors ('controls') and donors with neurological, psychiatric or neuroendocrine disorders.

Donors register at the NBB by filling in our registration forms. These may be requested at the NBB or downloaded from our website. In 2005 we sent out 150 information packages, containing the registration forms, an information leaflet and 2 feature articles on the NBB, to physicians and potential donors. In 2006 the NBB sent out 430 information packages. This is a significant increase, which can be explained by the increased efforts of the NBB to actively recruit donors. Interestingly, of the total number of registered donors, the number of female donors is remarkably larger than the number of male donors (65,4% versus 34,6%).



**Figure 1** Total number of registered donors on January 1<sup>st</sup> 2007

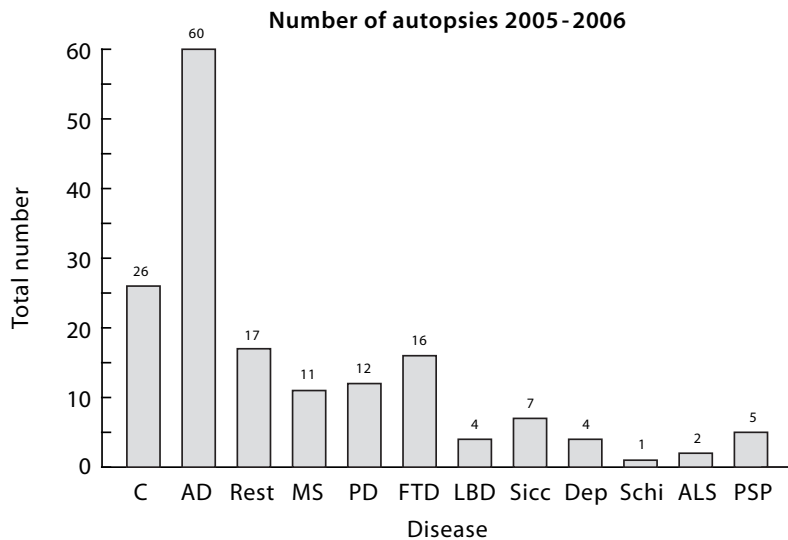
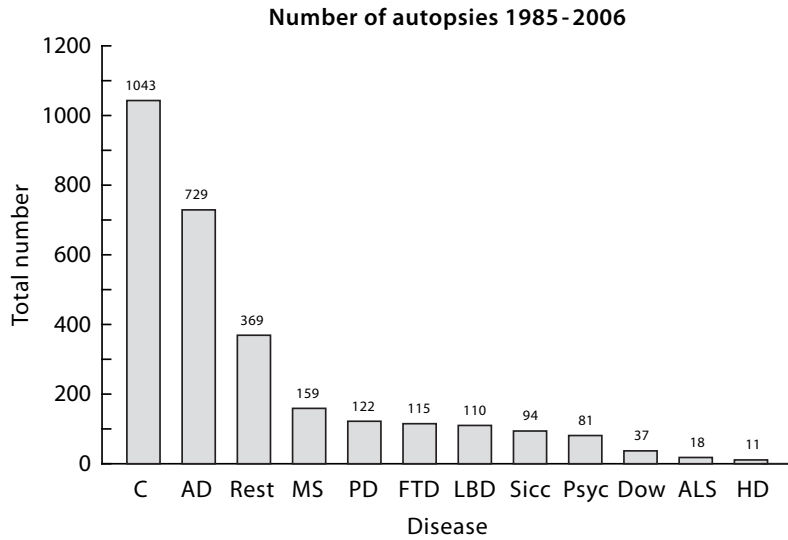
Table 2 gives an overview of the donor registrations in the past two years, divided by disorder. Please note the large number of multiple sclerosis donors that registered during this period. Due to the fruitful cooperation between the NBB and the Foundation MS Research, many people with MS became aware of the possibility to donate their brain for scientific research. Also, the number of Parkinson's disease registrations is relatively high compared to previous years. This is a result of various presentations at patient meetings and an article on the NBB in a Parkinson patient magazine. Furthermore, the number of cases of Pick's disease is worth mentioning. Due to the participation in clinical trials on Pick's disease in the Erasmus MC in Rotterdam, many patients and their relatives decided to donate their brain.

**Table 2** Total number of donor registrations per brain disorder in 2005 and 2006

|  |    |
|--|----|
| Alzheimer's disease                    | 54 |
| Amyotrophic lateral sclerosis          | 1  |
| Controls with epilepsy                 | 7  |
| Controls                               | 69 |
| Depression                             | 9  |
| Myalgic encephalomyelitis              | 4  |
| Migraine                               | 5  |
| Multiple sclerosis                     | 60 |
| Parkinson's disease                    | 38 |
| Pick's disease/Frontotemporal dementia | 30 |
| Progressive supranuclear palsy         | 11 |
| Schizophrenia                          | 3  |
| Vascular dementia                      | 6  |
| Other diagnoses                        | 30 |

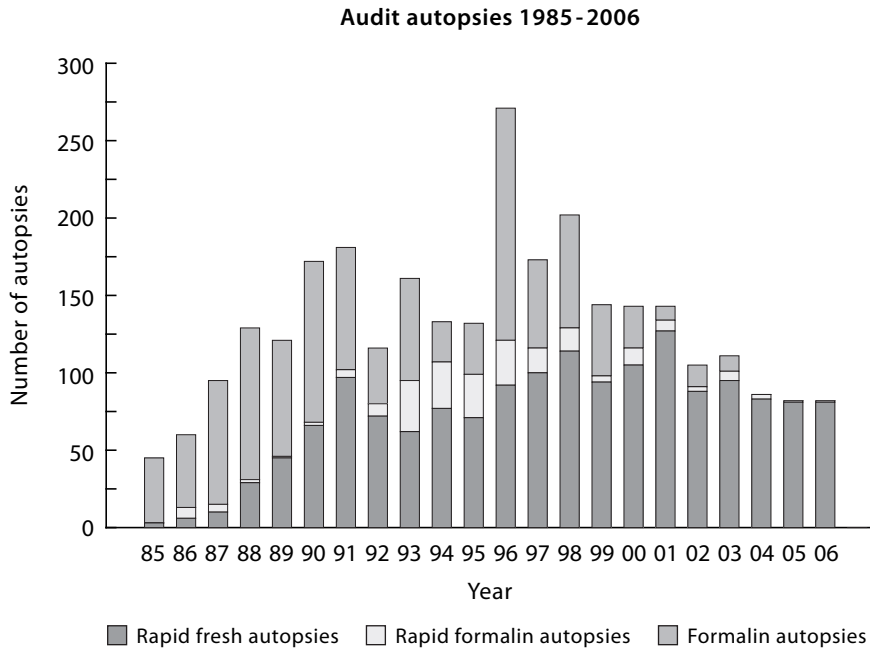
## Autopsies

Since 1985 the NBB has performed 2882 brain autopsies. The total number of autopsies in 2005/2006 was 165 (see Figure 2). Figure 3 shows the number of autopsies since the start of the NBB, broken down by type of autopsy. Even though the total number of autopsies has declined, the NBB managed to keep the number of rapid fresh autopsies relatively stable over the last five years. The NBB prefers to perform fast autopsies, at which, besides formalin treatment, the tissue is also frozen immediately without fixation. This ensures that the quality of the tissue is guaranteed in the best way. The decrease in the number of autopsies is in line with the overall decline



|                              |  |                                     |
|------------------------------|--|-------------------------------------|
| C: Controls                  | LBD: Lewy body disease                   | Dep: Depression                     |
| AD: Alzheimer's dementia     | Sicc: Senile involutive cortical changes | Schi: Schizophrenia                 |
| Rest: Rest group             | Psyc: Psychiatric disorders              | PSP: Progressive supranuclear palsy |
| MS: Multiple sclerosis       | Dow: Down's syndrome                     |                                     |
| PD: Parkinson's disease      | ALS: Amyotrophic lateral sclerosis       |                                     |
| FTD: Frontotemporal dementia | HD: Huntington's disease                 |                                     |

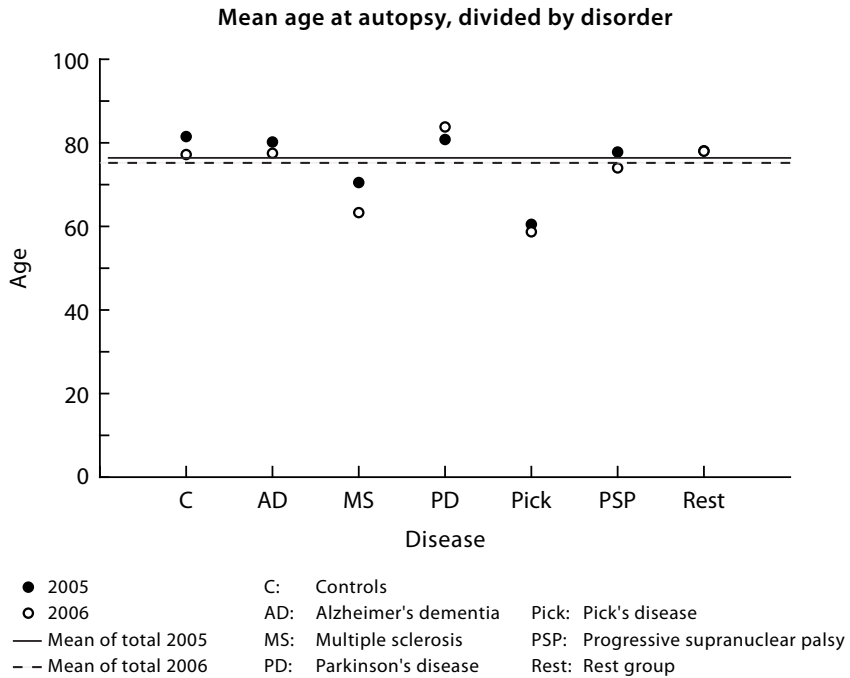
**Figure 2** Total number of autopsies, divided by disorder



**Figure 3** Overview of the total number of autopsies per year, specified by type of autopsy

in the number of autopsies in the past couple of years. This is a phenomenon seen in most brain banks all over the world. The cause, however, is not clear.

The mean age at time of death is shown in Figure 4. Please note that the mean ages of Pick’s disease and multiple sclerosis are significantly lower than those of controls (resp.  $p < 0.000$  and  $p < 0.002$ ). These data confirm that multiple sclerosis and Pick’s disease have an increased risk of a short life expectancy.

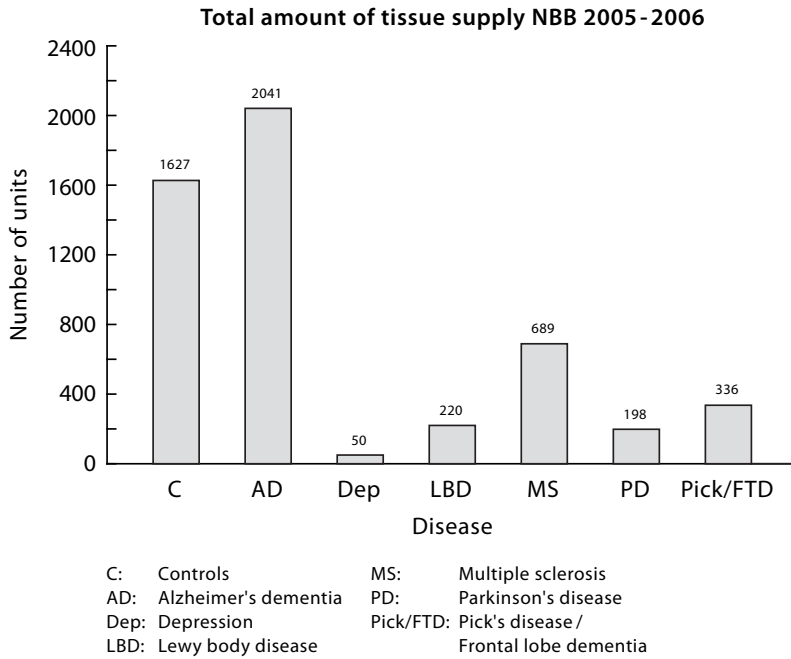


**Figure 4** Mean age at time of death

## Samples

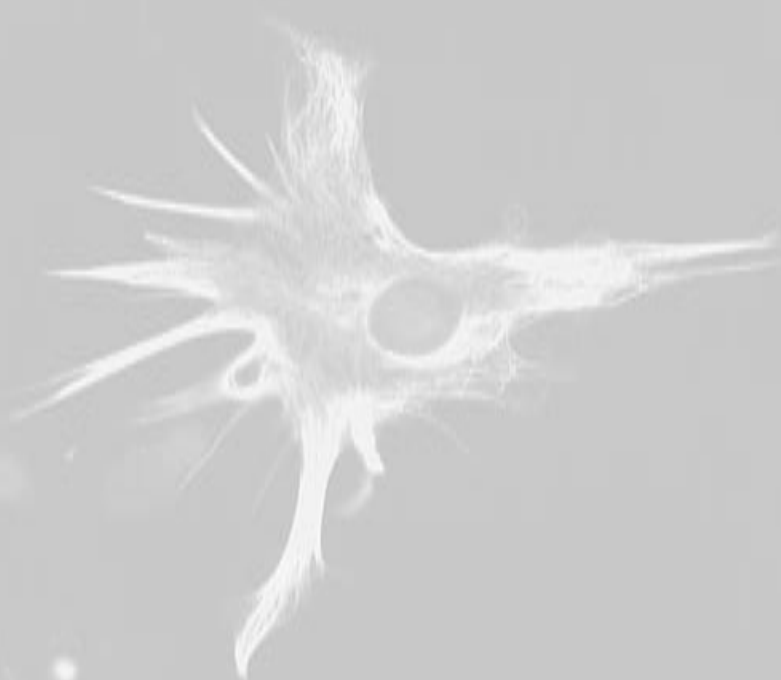
The NBB was able to supply tissue to all tissue applicants. The next chapter shows which researchers are currently performing research with NBB material. The articles on research carried out with NBB material and published in acknowledged scientific journals over the past five years are shown under 'Publications'.

Figure 5 gives an overview of the amount of material that has been supplied during the past two years. This material was supplied to new research projects as well as to ongoing research projects. For the supply of tissue, the NBB is dependent upon the number of autopsies. Figure 5 shows the small amount of tissue that has been supplied to depression research. This is, among other things, a result of the small number of NBB donors with depression (or even psychiatric disorders in general).



**Figure 5** Units of material supplied in 2005 and 2006. One unit consists of one tissue block, a series of sections or 1 ml of CSF.







# Current research projects

The abstracts can be downloaded from our website

## **NIN, Amsterdam**

- Bao, A. The role of sex hormones on the CRH neurons in human hypothalamic PVN in mood disorders.
- Bossers, K., G. Meerhoff, C. Kruse, D.F. Swaab, J. Verhaagen. Gene expression profiling of Parkinson's and Alzheimer's disease.
- Fischer, D.F., R. van Dijk, J.A. Sluijs, S.M. Nair, M. Racchi, C.N. Levelt, F.W. van Leeuwen, E.M. Hol. Activation of the Notch pathway in Down syndrome: cross-talk of Notch and APP.
- Frnczek, R., S. Overeem, S. Y. Y. Lee, I.M. Hegeman, J. van Pelt, S.G. van Duinen, G.J. Lamers, D.F. Swaab. Hypocretin (orexin) loss in Parkinson's Disease.
- Goncharuk, V., R. Buijs, D.F. Swaab. Hypothalamic CRH activity in hypertensive patients.
- Huitinga, I., P. van Hulst van Run, T. Hooper van Veen, D.F. Swaab. Stress response system in multiple sclerosis.
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AstraZeneca AB, Sweden

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N.V. Organon, The Netherlands

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# Finances

The NBB receives structural financial support from the KNAW, but is furthermore almost completely dependent upon grants, donations and the financial contributions that are made by the researchers who use NBB material.

The “Stichting tot Ondersteuning van de Hersenbank” (Foundation for the Support of the NBB) was founded in 1986 and tries to help realize the goals of the NBB by giving financial support. The assets of this Foundation are formed by donations, testamentary dispositions and legacies. The Foundation is registered at the Trade Register in Amsterdam under no. S205869. Below the organizations are shown from which the NBB received grants in 2005 and 2006 (amounts in euros).

| <b>Grants</b>                              | <b>2005</b> | <b>2006</b> |
|--|-------------|-------------|
| Structural contribution of the KNAW        | 208,700     | 207,408     |
| Stichting MS Research                      | 83,718      | 109,036     |
| Stichting MS Research, for promotional DVD |             | 20,000      |
| Internationaal Parkinson Fonds             | 10,000      | 20,000      |
| Parkinson Patiënten Vereniging             | 12,500      |             |
| Hersenstichting Nederland                  | 7,500       |             |

In 2005 and 2006, the Foundation for the support of the NBB received the following donations and legacies:

| <b>Donations</b>                           | <b>2005</b> | <b>2006</b> |
|--|-------------|-------------|
| Anonymous donation                         | 5,000       | 5,000       |
| Mrs. M.P.A. van Juchem Lamme               | 570         | 470         |
| Championship BV                            | 450         | 450         |
| Mrs. A. Huls                               | 300         | 300         |
| Mrs. F.D. Fowler-Kal                       | 180         | 120         |
| Mrs. A. Anema                              |             | 2,269       |
| Mr. B. Boxman and Mrs. M. Ikeda            |             | 20          |
| J. Frank                                   |             | 20          |
| G. Wiersma                                 |             | 200         |
| Mr. J. v/d Houten and Mrs. J.A. v/d Houten |             | 150         |

| <b>Legacies</b>                                | <b>2005</b> | <b>2006</b> |
|--|-------------|-------------|
| Mrs. E. Verhoeven-van Tongeren                 | 1,134       |             |
| Mrs. S. van Schuppen                           |             | 8,284       |
| Boekel de Nerée Notaries (legacy of C.C. Smit) |             | 2,579       |

The work of the NBB would not be possible without the support of numerous foundations, patient organizations, and the enthusiastic dedication of private individuals.





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We owe special thanks to the autopsy assistants of the Pathological Institute, VUmc, Amsterdam, A. van Berkom, P. Kraaijeveld, T. Oldert and R. Vos, and to the undertakers of Rouwtransport Amsterdam and Uitvaartcentrum Zuid for their dedication to the Netherlands Brain Bank.

### *Advisory Board*

To be installed shortly

### *Scientific Committee*

I. Huitinga (NBB)  
J. Verhaagen (Netherlands Institute for Neuroscience)  
J.M. Rozemuller (Pathological Institute, VUmc)



