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**Editors**

Inge Huitinga  
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www.herseninstituut.nl

*The Netherlands Brain Bank is a department of the Netherlands Institute for Neuroscience, an institute of the Royal Netherlands Academy of Arts and Sciences (KNAW)*
Donor Program

On December 31, 2017 a total of 4752 donors were registered with the Netherlands Brain Bank (NBB). In 2017, the number of new donor registrations was 770. The NBB has a prospective donor program, registering donors during life, via informed consent. Read more about the NBB’s registration procedure here, and about NBB-Psy, a donor program within the NBB specifically focused on psychiatric disorders, here. Figure 1 shows the total number of registered donors (A), new registrations in 2017 (B), new registrations as compared to earlier years (C), and new registrations of donors with psychiatric disorders (D). When a donor registers with multiple diagnoses, only the main diagnosis is presented.

**Figure 1:** The total amount of living donors on 31-12-2017 per diagnosis (A), the new registrations in 2017 per diagnosis (B), the new registrations in 2017 per diagnosis compared to earlier years (C), and the new registrations within NBB-Psy in 2017, per diagnosis (D).

When a donor registers with multiple diagnoses, only the main diagnosis is presented. Abbreviations: AD; Alzheimer’s disease, Control; Non-demented control, FTLD/Tau; Frontotemporal lobar degeneration/Tauopathy, MS; Multiple Sclerosis, Other; Other neurological diagnoses, Other dem; Other types of dementia, PD/DLBD; Parkinson’s disease/Diffuse Lewy body dementia, PSP; Progressive supranuclear palsy, Psy; Psychiatric disorders, ADHD; Attention deficit hyperactivity disorder, ASD; Autism spectrum disorder, BPD; Bipolar disorder, MDD; Major depressive disorder, OCD; Obsessive compulsive disorder, PTSS; Post-traumatic stress disorder, SCHIZ; Schizophrenia.
Cohorts

The NBB cooperates with several clinical research cohorts, of which participants are informed about the NBB and asked whether they wish to register as a brain donor. The clinical research cohorts with which the NBB participates are:

- **VUmc Alzheimer Center:** all patients of the VUmc Alzheimer Center are informed about the possibility to register as a brain donor. Within the Alzheimer Center, there are several specific brain donor programs:
  - 100-plus study, project leader Dr. H. Holstege.
  - 90-plus study, project leader Dr. P.J. Visser.
  - Pathological substrate of clinical variability in Alzheimer’s disease (PAGE-AD) study, project leader Dr. R.F. Bouwman.
  - Twin 60++ in cooperation with the Netherlands Twin Register, project leader Dr. P.J. Visser.
- **Prevention of dementia by intensive vascular care (PreDIVA),** project leader Prof. P. van Gool, AMC Amsterdam.
- **Collaborations with specialized nursing homes, who inform their residents about the NBB:**
  - Dijk en Duin: Elderly persons with psychiatric symptoms and/or cognitive behavioural problems.
  - Nieuw Unicum: Multiple Sclerosis.
- **Psychiatric clinical research cohorts included in the NBB-Psy consortium (cohort name, diagnosis):**
  - AMC OCD, obsessive compulsive disorder
  - AMC OCD DBS, obsessive compulsive disorder with deep brain stimulation
  - NOCDA, obsessive compulsive disorder
  - BEPP/EMDR, post-traumatic stress syndrome
  - BioMap, post-traumatic stress syndrome
  - Booster, post traumatic stress syndrome
  - Paroxetine/OGT, post-traumatic stress syndrome
  - Politiepoli, post traumatic stress syndrome
  - GROUP, schizophrenia
  - BiG, bipolar disorder
  - DELTA, major depression disorder
  - DIADE, major depression disorder and bipolar disorder
  - ECT, major depression disorder
  - MOTAR, major depression disorder and anxiety
  - NESDA, major depression disorder and anxiety
  - NESDA-fam, family members of people with major depression disorder and anxiety
  - NESDO, elderly with major depression disorder and anxiety
  - Impact, attention deficit hyperactivity disorder
  - Karakter, attention deficit hyperactivity disorder and autism spectrum disorder
  - NeuroIMAGE, attention deficit hyperactivity disorder
  - BOA, autism spectrum disorder
Public Relations

The NBB continues to create awareness for its activities via several media and events. Table 1 provides an overview of articles etc. that were published in 2017, and focused on the NBB. In addition to the items in the overview, the NBB publishes regularly on its own Facebook- and Twitter-accounts, and the NBB websites: www.hersenbank.nl, www.brainbank.nl, www.nhb-psy.nl (until 2017), www.nbb-psy.nl (until 2017), www.wehebbenhersensnodig.nl (campaign website for NBB-Psy, until 2-17). Also, the NBB has brochures that are distributed at several sites.

Table 1: Overview of public relations activities and articles about the NBB in 2017. *Original Dutch title were translated to English.

<table>
<thead>
<tr>
<th>Date</th>
<th>Title*/Description</th>
<th>Medium</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-3-2017</td>
<td>The NBB for MS, article about NBB and its MS tissue collection</td>
<td>MS Research online newsletter</td>
</tr>
<tr>
<td>6-3-2017</td>
<td>Saskia Palmen talks about NBB at Psysalon, meeting for patients/people involved with psychosis</td>
<td>Event</td>
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<tr>
<td>30-3-2017</td>
<td>Day for Bipolar Disorder, radio interview with Geertje de Lange (NBB staff) about the NBB-Psy/bipolar disorder</td>
<td>Radio, Omroep Flevoland</td>
</tr>
<tr>
<td>30-3-2017</td>
<td>Attention for Day for Bipolar Disorder, NBB-Psy, and radio interview with Geertje de Lang (see above)</td>
<td>UMC Utrecht Hersencentrum Twitter, Leo Schouwenaar (Omroep Flevoland Radio) Twitter, Ypsilon (Patient association) Twitter, VMDB (Patient association) Twitter</td>
</tr>
<tr>
<td>April 2017</td>
<td>“Message from the Netherlands Brain Bank”, article about the NBB</td>
<td>Internet/magazine, newsletter 22q11 study (Maastricht University)</td>
</tr>
<tr>
<td>April 2017</td>
<td>“Netherlands Brain Bank for Psychiatry”, article about the NBB</td>
<td>Internet, woonzorgnet.nl</td>
</tr>
<tr>
<td>24-4-2017</td>
<td>“Too often ‘mistakes’”, article about the NBB and differences between clinical and pathological diagnoses</td>
<td>Telegraaf, national newspaper</td>
</tr>
<tr>
<td>24-4-2017</td>
<td>“Diagnosis very often wrong”, article about the NBB and differences between clinical and pathological diagnoses</td>
<td>Noord Hollands Dagblad, regional newspaper</td>
</tr>
<tr>
<td>24-4-2017</td>
<td>Radio interview with Annemieke Rozemuller about the NBB and differences between clinical and pathological diagnoses</td>
<td>Radio, NPO 1, news</td>
</tr>
<tr>
<td>24-4-2017</td>
<td>News item about the NBB and differences between clinical and pathological diagnoses</td>
<td>Television, NPO 1, evening news</td>
</tr>
<tr>
<td>24-4-2017</td>
<td>“Many patients with brain disease got wrong diagnosis”, article about the NBB and differences between clinical and pathological diagnoses</td>
<td>Nu.nl, news website</td>
</tr>
<tr>
<td>24-4-2017</td>
<td>“Cause of death too often wrong”, article about the NBB and differences between clinical and pathological diagnoses</td>
<td>NOS.nl, news website</td>
</tr>
<tr>
<td>24-4-2017</td>
<td>“Doctors often wrong about brain diseases”, article about the NBB and differences between clinical and pathological diagnoses</td>
<td>Max Vandaag, news website</td>
</tr>
<tr>
<td>24-4-2017</td>
<td>“Brain autopsy often shows other cause of death than officially reported”, article about the NBB and differences between clinical and pathological diagnoses</td>
<td>Blik op nieuws, news website</td>
</tr>
<tr>
<td>26-4-2017</td>
<td>Research meeting NBB-Psy, lectures by Lot de Witte, Marjolein Sneeboer, Mark Mizee</td>
<td>Event, NBB</td>
</tr>
<tr>
<td>May 2017</td>
<td>“The NBB for MS, the precious gift from braindonors makes MS-research possible”, article about NBB-MS</td>
<td>Rondon MS, patient organization magazine</td>
</tr>
<tr>
<td>May 2017</td>
<td>“Collecting special brains”, article about NBB</td>
<td>Magazine, Amsterdam Medical Center</td>
</tr>
<tr>
<td>May 2017</td>
<td>“Online registration Netherlands Brain Bank”, article about the new online-registration possibility of the NBB</td>
<td>Internet, NESDA.nl</td>
</tr>
<tr>
<td>5-5-2017</td>
<td>“Neuropathologist concerned for profssion”, interview with Annemieke Rozemuller about the NBB and differences between clinical and pathological diagnoses</td>
<td>Medisch Contact, online magazine for medical proffesionals</td>
</tr>
<tr>
<td>22-5-2017</td>
<td>An evening with Erik Scherder, Inge Diepman, Inge Huitinga about the NBB and the Amsterdamse Bos Golf (The proceeds of the evening and the golf tournament go to the NBB)</td>
<td>Event</td>
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<tr>
<td>Date</td>
<td>Title*/Description</td>
<td>Medium</td>
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<tr>
<td>22-5-2017</td>
<td>Interview with Rosa Douw and Inge Huitinga about the NBB-MS, in the program 'Koffietijd'</td>
<td>Television, RTL 4</td>
</tr>
<tr>
<td>31-5-2017</td>
<td>“Searching for the treatment possibilities of MS”, article about NBB-MS</td>
<td>Website, mijn-lichaam.com</td>
</tr>
<tr>
<td>June 2017</td>
<td>“Open about brain donation”, article about presence of Saskia Palmen at Psyson (6-3-2017)</td>
<td>Magazine, Ypsilon News</td>
</tr>
<tr>
<td>14-6-2017</td>
<td>“Searching for the treatment possibilities of MS”, article about NBB-MS</td>
<td>Digital newspaper, Telegraaf</td>
</tr>
<tr>
<td>4-7-2017</td>
<td>Amsterdamse Bos Golf, Golf Tournament and auction organized by Rotary Aalsmeer-Uithoorn, proceeds go to NBB</td>
<td>Event</td>
</tr>
<tr>
<td>12-7-2017</td>
<td>Article about the Amsterdamse Bos Golf Tournament</td>
<td>Newspaper</td>
</tr>
<tr>
<td>June 2017</td>
<td>Amsterdam Brain &amp; Cognition Journal, interview with Inge Huitinga about women in science</td>
<td>Magazine and internet</td>
</tr>
<tr>
<td>24-7-2017</td>
<td>“5 year Netherlands Brain Bank for Psychiatry (NBB-Psy): What are the results?”, article about the closing of the active donor recruitment for NBB-Psy</td>
<td>Internet, Nedka.nl</td>
</tr>
<tr>
<td>27-7-2017</td>
<td>“Increase in number of brain donors with depression, also thanks to NESDA participants”, article about NBB-Psy</td>
<td>Internet, Nesda.nl</td>
</tr>
<tr>
<td>August 2017</td>
<td>Article about NBB-Psy in newsletter of psychiatric care organization Reinier van Arkel</td>
<td>Internet, reiniervanarkel.nl</td>
</tr>
<tr>
<td>25-8-2017</td>
<td>Multiple Tweets by Menno Oosterhoff about brain donation</td>
<td>Twitter</td>
</tr>
<tr>
<td>30-8-2017</td>
<td>“Shall I donate my brain?” Blog by Menno Oosterhoff (author and psychiatrist) about NBB-Psy and his decision to become a brain donor</td>
<td>Internet, Medisch Contact</td>
</tr>
<tr>
<td>31-8-2017</td>
<td>Multiple Tweets by Menno Oosterhoff concerning brain donation</td>
<td>Twitter</td>
</tr>
<tr>
<td>September 2017</td>
<td>“5 year Netherlands Brain Bank for Psychiatry (NBB-Psy): What are the results?”, article about the closing of the active donor recruitment for NBB-Psy</td>
<td>Magazine, Impuls en Woortblind</td>
</tr>
<tr>
<td>September 2017</td>
<td>“5 year Netherlands Brain Bank for Psychiatry (NBB-Psy): What are the results?”, article about the closing of the active donor recruitment for NBB-Psy</td>
<td>Magazine, Ypsilon News (Ypsilon, patient association)</td>
</tr>
<tr>
<td>September 2017</td>
<td>“The Netherlands Brain Bank for Psychiatry”, article about NBB-Psy</td>
<td>Family newsletter Magnolia, Reinier van Arkel</td>
</tr>
<tr>
<td>6-9-2017</td>
<td>Meeting for patient associations about 5 years of NBB-Psy, lectures by Menno Oosterhoff, Saskia Palmen</td>
<td>Event, NBB</td>
</tr>
<tr>
<td>6-9-2017</td>
<td>Multiple Tweets by Menno Oosterhoff concerning brain donation</td>
<td>Twitter</td>
</tr>
<tr>
<td>7-9-2017</td>
<td>“Can we have your brain?”, blog about NBB by Madelon Wonink</td>
<td>Internet, madelonwonink.com</td>
</tr>
<tr>
<td>12-10-2017</td>
<td>Petra Brom and Laura Boekel represent NBB at a public event of the Dutch Brain Foundation</td>
<td>Event, Nederlandse Hersenstichting</td>
</tr>
<tr>
<td>24-10-2017</td>
<td>“MS Out-of-the-Box Grant to the Netherlands Brain Bank”, article about the NBB receiving a €100,000 grant from MoveS and MS Research</td>
<td>MS Research online</td>
</tr>
<tr>
<td>25-27-10-2017</td>
<td>Lecture by Inge Huitinga about research by NBB and Netherlands Institute for Neuroscience (Immunology group) on differences in MS between males/females</td>
<td>Event, European Committee for Treatment and Research in Multiple Sclerosis (ECTRIMS)</td>
</tr>
<tr>
<td>7-11-2017</td>
<td>“Doktors of tomorrow”, television special about the brain, including about the NBB</td>
<td>Television, NPO 1</td>
</tr>
<tr>
<td>9-11-2017</td>
<td>Mark Mizee represents the NBB</td>
<td>Event, GGZ Rivierduinen</td>
</tr>
<tr>
<td>13-11-2017</td>
<td>Mark Mizee represents the NBB</td>
<td>Event, Memorabel Deltaplan Dementie</td>
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Table 1: NBB PR activities (continued)
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<tr>
<th>Date</th>
<th>Title*/Description</th>
<th>Medium</th>
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</thead>
<tbody>
<tr>
<td>14-15-11-2017</td>
<td>Rosa Douw, Petra Brom, Inge Huitinga represent the NBB and the “MS Researchdays”, NBB leaflet is distributed in goody bags</td>
<td>Event, Patient Association MS Research</td>
</tr>
<tr>
<td>17-11-2017</td>
<td>Article by Geertje de Lange about NBB-Psy</td>
<td>Internet, UMC Utrecht, Brain Center Rudolf Magnus</td>
</tr>
<tr>
<td>30-11-2017</td>
<td>Symposium about MS, to improve the collaboration of healthcare professionals, Rosa Douw and Petra Brom are present to inform the visitors about the NBB</td>
<td>Event, MSMS2017 and MSZorg</td>
</tr>
<tr>
<td>December 2017</td>
<td>“5 year Netherlands Brain Bank for Psychiatry (NBB-Psy): What are the results?”, article about the closing of the active donor recruitment for NBB-Psy</td>
<td>Magazine, PlusMinus (VMDB, Patient Association)</td>
</tr>
</tbody>
</table>
Autopsies and diagnostics

On December 31, 2017 a total number of 4304 autopsies had taken place via the NBB. In 2017 the total number of autopsies was 162. The numbers of autopsies in total, in 2017, and broken down by diagnosis are shown in figure 2 A-C. Also the average post-mortem delay ± standard deviation (time between death and the end of the autopsy) is shown in figure 2D.

The NBB uses different autopsy procedures for different diagnoses, as to include the different affected brain regions. In all protocols, one hemisphere is fixed in formalin for four weeks and used for post-mortem diagnoses and one hemisphere is dissected. Samples from this hemisphere are stored frozen, in FFPE, or kept fresh and immediately sent for psychiatric diagnoses.

Figure 2: The total number of autopsies in 2012-2017 (A), all autopsies since 1985 broken down by diagnoses (B), all autopsies in 2017 broken down by diagnoses, psychiatric diagnoses broken down separately (insert)(C), average post-mortem delay ± standard deviation (time between death and the end of the autopsy) in 2012-2017 in hours:minutes (D). When a donor had multiple diagnoses, only the main diagnosis is presented. All figures show the neuro-pathological diagnoses. In cases where this neuro-pathological diagnosis is not yet available, the clinical diagnosis is presented.

Abbreviations: AD; Alzheimer’s disease, Control; Non-demented control, FTLD/Tau; Frontotemporal lobar degeneration/Tauopathy, MS; Multiple Sclerosis, Other; Other neurological diagnoses, Other dem; Other types of dementia, PD/DLBD; Parkinson’s disease/Diffuse Lewy body dementia, PSP; Progressive supranuclear palsy, Psy; Psychiatric disorders, ADHD; Attention deficit hyperactivity disorder, BPD; Bipolar disorder, MDD; Major depressive disorder, PTSS; Post-traumatic stress disorder.

The NBB uses different autopsy procedures for different diagnoses, as to include the different affected brain regions. In all protocols, one hemisphere is fixed in formalin for four weeks and used for post-mortem diagnoses and one hemisphere is dissected. Samples from this hemisphere are stored frozen, in FFPE, or kept fresh and immediately sent for psychiatric diagnoses.
to researchers for cell culture of immediate analysis. In addition to the brain, donors can choose to also donate their eyes, spinal cord and/or cervical lymph nodes. In 2017 a total of 27 eyes were donated, spinal cord was donated from 24 donors and cervical lymph nodes from 1 donor. Read more about our autopsy procedures here.

**Post Mortem diagnosis**
After the autopsy, the tissue from the formalin-fixed hemisphere is divided in approximately eighteen standard regions, embedded in paraffin, cut and (immuno) histochemically stained. The sections, as well as the clinical medical information of the donor, are then evaluated by a neuropathologist who provides a post-mortem diagnosis. The brain tissue is only disseminated to researchers after the post-mortem diagnosis has been made, with the exception of the fresh tissue sent to researchers immediately after autopsy. Read more about our post-mortem diagnosis here.
**Tissue supply**

Tissue from the NBB is supplied to non-profit and for profit research organizations, if the application has been approved by the NBB’s tissue advisory board, and a Material Transfer Agreement (MTA) has been concluded between the NBB and said organization.

In 2017, 23 new MTA’s were signed, of which 19 with non-profit organizations and 4 with for profit organizations. On December 31, 2017 the total number of signed MTA’s was 190, of which 161 with non-profit organizations and 29 with for profit organizations.

Figure 3A shows the number of tissue requests. The figure shows the number of ‘New applications’, ‘Supplementary applications’ (applications for additional tissue for a project that had previously received tissue from the NBB) and ‘Continuous projects’ (applications for which tissue is collected prospectively from upcoming autopsies, often applications for fresh tissue).

Figure 3B shows the number of samples disseminated in 2017 compared to previous years, divided by post-mortem diagnosis. The category ‘Panr’ represents samples of which the pathological report is not ready yet at the time of publication of this report, and therefore the post-mortem diagnosis is not known yet. This concerns prospective projects where researchers received fresh tissue immediately after autopsy.

**Figure 3**: The total number of new applications, supplementary applications (follow-up applications for projects that have received tissue before) and continuous projects (research projects that request tissue prospectively from upcoming autopsies) in 2012 – 2017 (A), all samples that were disseminated in 2013 - 2017 per post-mortem diagnosis (B). Abbreviations: AD; Alzheimer’s disease, Control; Non-demented control, FTLD/Tau; Frontotemporal lobar degeneration/Tauopathy, MS; Multiple Sclerosis, Other; Other neurological diagnoses, Other dem; Other types of dementia, PD/DLBD; Parkinson’s disease/Diffuse Lewy body dementia, Pan; Pathological report not ready, Psy; Psychiatric disorders.
Finances

The NBB is a department of the Netherlands Institute of Neuroscience (NIN), which is an institute of the Royal Netherlands Academy of Arts and Sciences (KNAW). As such, the NBB receives structural financial support from the NIN and the KNAW. Besides this structural support, the NBB is entirely dependent on grants, donations and the financial contributions from the researchers who apply for tissue at the NBB. An overview of the structural income and received grants is featured in table 2.

Table 2: Income of the NBB in 2017. *All amounts are rounded to the nearest hundred Euro’s. ** Total amount for the period of 2012 – 2020 (NWO), 2013-2017 (Stichting MS Research), and 2017-2019 (Hersenstichting).

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
<th>Amount*</th>
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<tbody>
<tr>
<td>Structural support KNAW</td>
<td></td>
<td>€220,000</td>
</tr>
<tr>
<td>NWO</td>
<td>Project 2012-2020: The Netherlands Brain Bank for Psychiatry (NBB-Psy)</td>
<td>€3,450,000**</td>
</tr>
<tr>
<td>Stichting MS Research</td>
<td>Project 2013-2017: The Netherlands Brain Bank for MS (NBB-MS)</td>
<td>€444,400**</td>
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<tr>
<td>Hersenstichting</td>
<td>2017 - 2019</td>
<td>€100,000**</td>
</tr>
<tr>
<td>Rotary Club Aalsmeer-Uithoorn</td>
<td>Project: Differences in clinical and neuro-pathological diagnoses</td>
<td>€42,500</td>
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<tr>
<td>Donations</td>
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<td>€110,200</td>
</tr>
</tbody>
</table>
Research Projects

This chapter lists the research projects which have received tissue from the NBB in 2017.

Adorjan, I., Bin, S., Feher, V., Tyler, T., Veres, D., Szele, F. Department of Anatomy, Histology and Embryology, Semmelweis University, Budapest, Hungary; Department of Physiology, Anatomy and Genetics, University of Oxford, UK; Imperial College London, UK. Investigation of neuronal biomarkers in neuropsychiatric diseases.


Amor, S. VU University Medical Center, Amsterdam, The Netherlands. Pentraxin 3 - a novel anti-inflammatory agent in MS?

Amor, S., Kipp, M., van der Valk, P. VU University Medical Center, Amsterdam, The Netherlands. Pre-active MS lesions hold clues for reversal of inflammation. Stichting MS Research.

Arietti, M., Massey, S., Hözlé, M-B., Kamermans, M. Netherlands Institute for Neuroscience, Amsterdam, The Netherlands; McGovern School of medicine, university of Texas at Houston, Houston, USA. Restoration of high acuity vision in human.

Bartolome, F., Krzyzanowska, A., De La Cueva, M., Pascual, C., Antequera, D., Villarejo, A., Rabano, A., Fortea, J., Alcolea, D., Lleo, A., Ferrer, I., Hardy, J., Abramov, A.Y., Carro, E. Networking Biomedical Research Center on Neurodegenerative Diseases (CIBERNED), Spain; Group of Neurodegenerative Diseases, Hospital 12 de Octubre Research Institute (imas12), Madrid, Spain; Department of Molecular Neuroscience, University College London Institute of Neurology, London WC1N 3BG, United Kingdom; Neurology service Hospital Universitario 12 de Octubre, Madrid, Spain; Department of Neuropathology and Tissue Bank, Unidad de Investigación Proyecto Alzheimer, Fundación CIEN, Instituto de Salud Carlos III, Madrid, Spain; Memory Unit, Neurology Department, Hospital de la Santa Creu i Sant Pau, Barcelona, Spain. Institut d'Investigacions Biomediques Sant Pau - Universitat Autònoma de Barcelona, Barcelona, Spain; IDIBELL-Hospital Universitari de Bellvitge, Hospital de Llobregat, Spain; Universitat de Barcelona, Hospital de Llobregat, Barcelona, Spain. Annexin A5 prevents amyloid-β-induced toxicity in Alzheimer’s disease choroid plexus.

Battiston, M., Schenk, G., Samson, R.S., Gandini Wheeler-Kingshott, C.A., Geurts, J.J.G., Schneider, T., Grussu, F., Wergeland, S., Tachrount, M., Yiannakas, M.C., Tur Gomez, C. Queen Square MS Centre, UCL Institute of Neurology, Faculty of Brain Sciences, University College London, London, United Kingdom; Department of Anatomy and Neurosciences, VU University Medical Centre, Amsterdam, Netherlands; Department of Brain and Behavioural Sciences, University of Pavia, Pavia, Italy; Brain MRI 3T Research Centre, C. Mondino National Neurological Institute, Pavia, Italy; Philips UK, Surrey, United Kingdom; Centre for Medical Image Computing, Department of Computer Science, University College London, London, United Kingdom; Department of Neurology, Haukeland University Hospital, Bergen, Norway. Quantification of myelin in the human spinal cord using Magnetization Transfer Imaging.

Bergen, A.A. et. al. AMC Amsterdam, Department of Clinical Genetics, Amsterdam, The Netherlands. Study of reticular endothelial cells in the retina.


Boon, B.D.C., Hoozemans, J.J.M., Lopuhaä, B., Eigenhuis, K.N., Scheltens, P., Kamphorst, W., Rozemuller, A.J.M., Bouwman, F.H. Dept. of Neurology, Alzheimer Center, Amsterdam Neuroscience, VU University Medical Center, Amsterdam, The Netherlands; Dept. of Pathology, Amsterdam Neuroscience, VU University Medical Center,
Amsterdam, The Netherlands. Neuroinflammation is increased in the parietal cortex of atypical Alzheimer’s disease.


Bridel, C., Jimenez, C.R., Smit, A.B., van Swieten, J.C., van der Flier, W.M.H., van der Vlies, S., Visser, P.J., Teunissen, C.E. Department of Clinical Chemistry, Neurochemistry Lab and Biobank, VU Medical Centre, Amsterdam, The Netherlands; Department of Medical Oncology, OncoProteomics Laboratory, VU Medical Centre, Amsterdam, The Netherlands; Department of Molecular and Cellular Neurobiology, Center for Neurogenomics and Cognitive Research, Neuroscience Campus Amsterdam, VU University, Amsterdam, the Netherlands; Department of Neurology, Erasmus MC - University Medical Centre Rotterdam, The Netherlands; Department of Neurology, Alzheimer Center, VU University Medical Centre Amsterdam, Amsterdam, The Netherlands. Alzheimer Center and Department of Neurology, VUmc, Amsterdam Neuroscience, Amsterdam, the Netherlands; Department of Psychiatry and Neuropsychology, School for Mental Health and Neuroscience, Maastricht University, Maastricht, the Netherlands; Alzheimer Center and Department of Neurology, VUmc, Amsterdam Neuroscience, Amsterdam, the Netherlands. PRODIA: Development of biomarkers enabling early and accurate differential diagnosis of dementia.

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**Pharmaceutical companies**

In 2017 NBB tissue was supplied to the following research projects of pharmaceutical companies:

**AbbVie Deutschland GmbH & Co. KG**
- Assessment of lipid content of well-defined AD brains vs age-matched control brains and brains of young subject: verification of age- and disease-associated changes in (sphingo)lipid content and its correlation to neurodegeneration, abeta and Tau pathology.
- Assessment of sphingolipid content in Huntington’s Disease brain, CSF, and plasma.
- Discovery of new radioligands for aggregated Tau.
- Identification of key Tau pathological species and underlying pathological molecular mechanisms in the brain of sporadic Alzheimer disease at Braak stage I-II and V-VI.

**AC Immune SA**
- Development of immunotherapy approaches for treatment of Huntington’s disease.
- Identification of potential therapeutic targets for Age-Related Neurodegenerative diseases.
- Novel PET tracers of alpha-synuclein for the diagnosis of Parkinson’s disease.
- Novel PET tracers of TDP-43 for the diagnosis of amyotrophic lateral sclerosis and frontotemporal lobar degeneration.

**Actelion Pharmaceuticals Limited**
- Quantitative expression survey of GPCRs in neuronal sub-populations affected by neurodegenerative diseases.

**Asterand UK Acquisition Limited (BioIVT)**
- Purification of PHF-Tau from brain tissues of donors with progressive supranuclear palsy.
- Screening a panel of alpha-SYN research antibodies, using FFPE sections from normal donors and those with Parkinson’s Disease.

**BioArctic Neuroscience AB**
- Studies of alpha-synuclein in Parkinson’s disease and control brain.
Biogen Inc.
- Analysis of exosomes purified from Human CSF.
- Characterization of Aβ oligomers in AD brain tissues.
- Characterization of BIIB054 binding pattern to pathological variants of α-syn in human disease tissue.
- Characterization of Parkin activity and transcriptional profiling in sporadic PD brain tissue.
- SorLA as a Target for AD.
- The role of NF-κB canonical and non-canonical signaling in neurodegenerative disease.
- Quantifying pathogenic alpha synuclein species across Parkinson’s disease Braak Stages.

BioMed X GmbH
- Tau post-translational modifications and their relevance for Alzheimer’s disease.

Boehringer Ingelheim Pharma GmbH & Co.KG
- Target identification in non-diseased human Area postrema.
- Target identification and validation in non-diseased human Pituitary Gland.

Charles River Nederland BV
- Development of a microglia assay.
- Validation of therapeutic targets in cultured human microglia.

Charles River Laboratories Edinburgh Limited
- The determination of in vitro binding of test item to the brain proteins in Rhesus Monkey and Man.

Crucell Holland B.V.
- Characterization of the antibody response induced by tau vaccine candidates: Assessment of serum reactivity to control vs. AD brain tissue.

Evotec AG
- Proteomic analysis of huntingtin protein variants in post-mortem brain tissue from Huntington’s Disease patients.

GlaxoSmithKline
- Neurodegeneration and inflammation pathway activation in human AD, HD, PSP, and FTD tissue.
- Neurodegeneration and inflammation pathway activation in human ALS spinal cord tissue.
- Neurodegeneration and inflammation pathway activation in human Multiple sclerosis lesions.

Grüenthal GmbH
- Functional characterization of human DRGs for drug development.

Imanova Limited (Invicro)
- Evaluation of novel PET tracers and drug targets.

Janssen Prevention Center
- Detect differences in post-mortem tissue between subjects with and without Alzheimer’s disease.

Janssen Pharmaceutica NV
- Analysis of tau aggregation and spreading in Alzheimer’s disease and other tauopathies including PSP and evaluating anti-Abeta antibodies for plaque detection.

Lysosomal Therapeutics Inc.
- Glucocerebrosidase (GCase) and Acid ceramidase (ACR) enzyme activity, mRNA and substrate levels in human brain and plasma tissue samples of PD patients and controls: a pilot study.

Novartis Pharma AG
- Tissue Cross Reactivity Assay.
Roche Holding AG
Evaluation of changes in GCase activity and substrate levels in human brain from PD.

UCB Pharma SA
Assessment of biomarkers for Parkinson’s disease to support the identification of new therapeutic agents for the treatment of parkinson’s disease.
Bridging animal models to human disease: Targeting glia disease biologies for therapeutic benefit in ALS.
Development and validation of in vitro assays for the identification of therapeutics targeting synucleinopathies.
Evaluation of binding of UCB proprietary molecules to Alzheimer’s patients brains for the identification of new therapeutic agents for the treatment of Tauopathies and Alzheimer’s disease.
Evaluation of UCB proprietary molecules binding to brain samples from patients suffering of demyelinating diseases like multiple sclerosis (MS) for the identification of new therapeutic agents.
Publications 2015 – 2017

This chapter lists the publications that have resulted from research using NBB tissue in 2015-2017. Publications in which the NBB was actively involved and therefore listed as a corporate co-author are listed separately.

Publications with NBB as co-author


Publication list


Song, H., Kim, W., Kim, S.-H., & Kim, K.-T. (2016). VRK3-mediated nuclear localization of HSP70 prevents glutamate excitotoxicity-induced apoptosis and Aβ accumulation via enhancement of ERK phosphatase VHR activity. *Scientific Reports, 6*. https://doi.org/10.1038/srep38452


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Autopsy team 2017

We owe special thanks to the autopsy assistants of the Pathological Institute, VUmc, Amsterdam: A. Bakker, P. Kraaijeveld, T. Oldert and M. van Ooijen, and to the undertakers of Rouwservice Nederland, Uitvaartcentrum Zuis (Unigra) and Vervoerbedrijf P.A. Blanker, for their dedication to the Netherlands Brain Bank.

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- P. van der Valk (Pathology)

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- J. Buitelaar, MD, PhD (attention-deficit hyperactivity disorder)
- D. Denys, MD, PhD (obsessive compulsive disorder)
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- R. Kahn, MD, PhD (schizophrenia)
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<table>
<thead>
<tr>
<th>Abbreviation</th>
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<tr>
<td>AD</td>
<td>Alzheimer’s disease</td>
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<tr>
<td>ADHD</td>
<td>Attention deficit hyperactivity disorder</td>
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<td>ASD</td>
<td>Autism spectrum disorder</td>
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<td>BPD</td>
<td>Bipolar disorder</td>
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<td>Contr</td>
<td>Non-demented control donors</td>
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<td>DEPMA</td>
<td>Bipolar disorder</td>
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<td>FTLD/tau</td>
<td>Frontotemporal lobar degeneration/Tauopathy</td>
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<td>Major depressive disorder</td>
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<td>MS</td>
<td>Multiple sclerosis</td>
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<td>Other types of dementia</td>
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<td>Parkinson’s disease/Diffuse Lewy body dementia</td>
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<td>Progressive supranuclear palsy</td>
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<td>Psychiatric disorders (unspecified)</td>
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<td>Posttraumatic stress disorder</td>
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<td>SCHIZO</td>
<td>Schizophrenia</td>
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