

**NETHERLANDS  
BRAIN BANK**

**PROGRESS REPORT  
2017**

# NBB Progress Report – 2017

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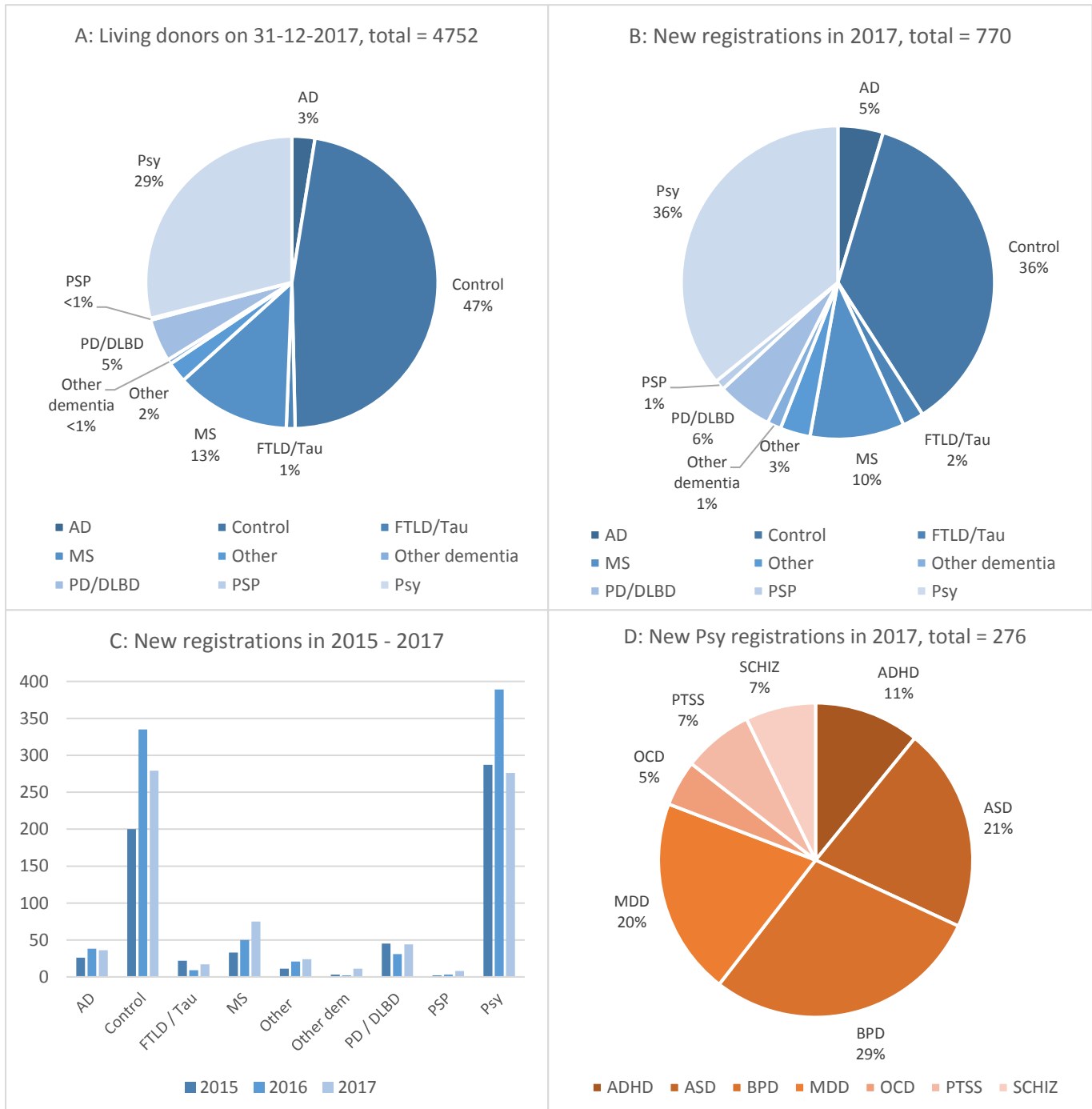
[www.brainbank.nl](http://www.brainbank.nl) | [www.hersenbank.nl](http://www.hersenbank.nl)

[www.herseninstituut.nl](http://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 registration 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](http://www.hersenbank.nl), [www.brainbank.nl](http://www.brainbank.nl), [www.nhb-psy.nl](http://www.nhb-psy.nl) (until 2017), [www.nbb-psy.nl](http://www.nbb-psy.nl) (until 2017), [www.wehebbenhersensnodig.nl](http://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.

Date	Title*/Description	Medium
2-3-2017	The NBB for MS, article about NBB and its MS tissue collection	MS Research online newsletter
6-3-2017	Saskia Palmen talks about NBB at Psysalon, meeting for patients/people involved with psychosis	Event
30-3-2017	Day for Bipolar Disorder, radio interview with Geertje de Lange (NBB staff) about the NBB-Psy/bipolar disorder	Radio, Omroep Flevoland
30-3-2017	Attention for Day for Bipolar Disorder, NBB-Psy, and radio interview with Geertje de Lang (see above)	UMC Utrecht Hersencentrum Twitter, Leo Schouwenaar (Omroep Flevoland Radio) Twitter, Ypsilon (Patient association) Twitter, VMDB (Patient association) Twitter
April 2017	"Message from the Netherlands Brain Bank", article about the NBB	Internet/magazine, newsletter 22q11 study (Maastricht University)
April 2017	"Netherlands Brain Bank for Psychiatry", article about the NBB	Internet, woonzorgnet.nl
24-4-2017	"Too often 'mistakes'", article about the NBB and differences between clinical and pathological diagnoses	Telegraaf, national newspaper
24-4-2017	"Diagnosis very often wrong", article about the NBB and differences between clinical and pathological diagnoses	Noord Hollands Dagblad, regional newspaper
24-4-2017	Radio interview with Annemieke Rozemuller about the NBB and differences between clinical and pathological diagnoses	Radio, NPO 1, news
24-4-2017	News item about the NBB and differences between clinical and pathological diagnoses	Television, NPO 1, evening news
24-4-2017	"Many patients with brain disease got wrong diagnosis", article about the NBB and differences between clinical and pathological diagnoses	Nu.nl, news website
24-4-2017	"Cause of death too often wrong", article about the NBB and differences between clinical and pathological diagnoses	NOS.nl, news website
24-4-2017	"Doctors often wrong about brain diseases", article about the NBB and differences between clinical and pathological diagnoses	Max Vandaag, news website
24-4-2017	"Brain autopsy often shows other cause of death than officially reported", article about the NBB and differences between clinical and pathological diagnoses	Blik op nieuws, news website
26-4-2017	Research meeting NBB-Psy, lectures by Lot de Witte, Marjolein Sneeboer, Mark Mizze	Event, NBB
May 2017	"The NBB for MS, the precious gift from braindonors makes MS-research possible", article about NBB-MS	Rondom MS, patient organization magazine
May 2017	"Collecting special brains", article about NBB	Magazine, Amsterdam Medical Center
May 2017	"Online registration Netherlands Brain Bank", article about the new online-registration possibility of the NBB	Internet, NESDA.nl
5-5-2017	"Neuropathologist concerned for profession", interview with Annemieke Rozemuller about the NBB and differences between clinical and pathological diagnoses	Medisch Contact, online magazine for medical professionals
22-5-2017	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)	Event

**Table 1:** NBB PR activities (continued)

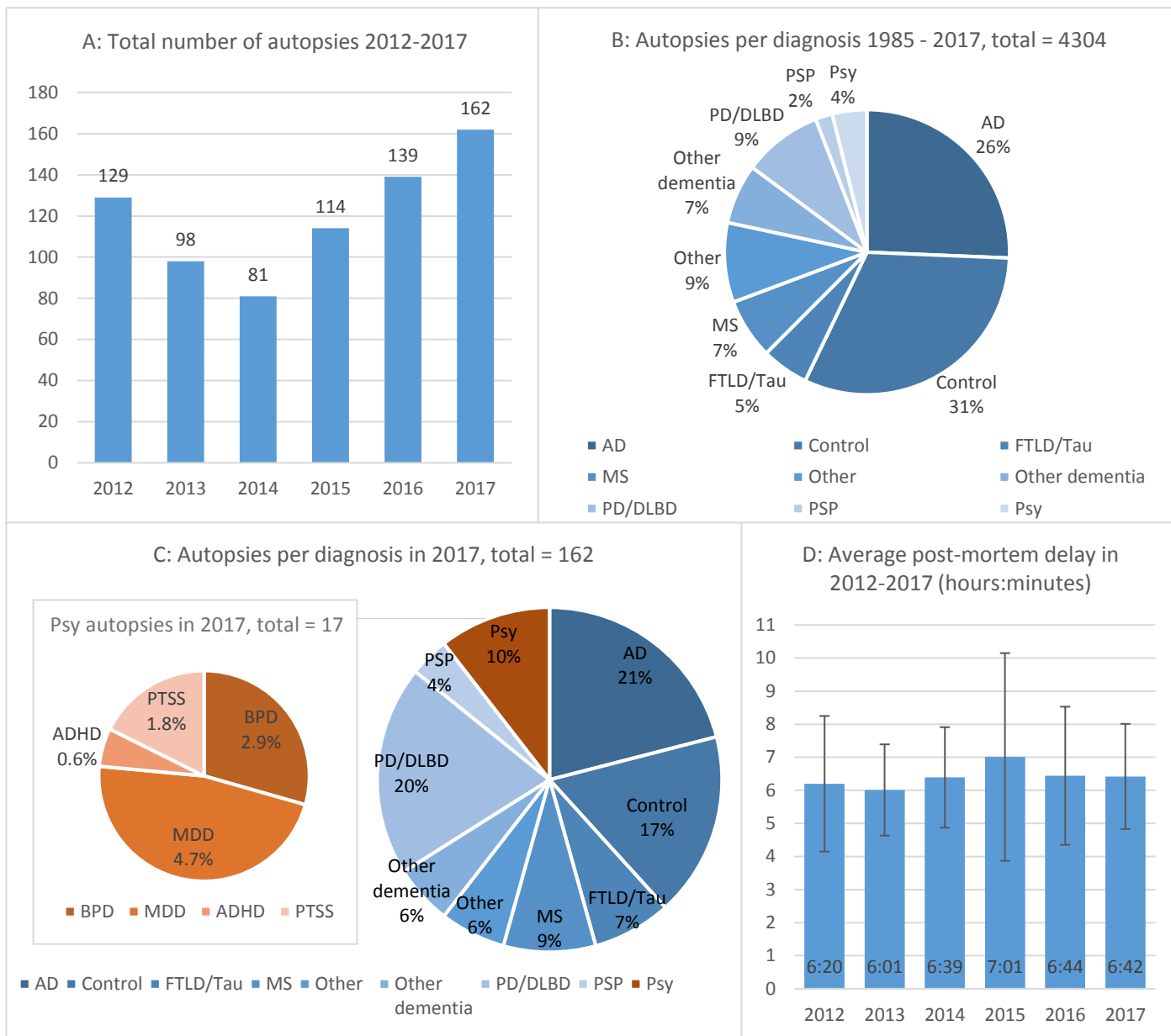
Date	Title*/Description	Medium
22-5-2017	Interview with Rosa Douw and Inge Huitinga about the NBB-MS, in the program 'Koffietijd'	Television, RTL 4
31-5-2017	"Searching for the treatment possibilities of MS", article about NBB-MS	Website, mijn-lichaam.com
June 2017	"Open about brain donation", article about presence of Saskia Palmen at Psysalon (6-3-2017)	Magazine, Ypsilon News
14-6-2017	"Searching for the treatment possibilities of MS", article about NBB-MS	Digital newspaper, Telegraaf
4-7-2017	Amsterdamse Bos Golf, Golf Tournament and auction organized by Rotary Aalsmeer-Uithoorn, proceeds go to NBB	Event
12-7-2017	Article about the Amsterdamse Bos Golf Tournament	Newspaper
June 2017	Amsterdam Brain & Cognition Journal, interview with Inge Huitinga about women in science	Magazine and internet
24-7-2017	"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	Internet, Nedkad.nl
27-7-2017	"Increase in number of brain donors with depression, also thanks to NESDA participants", article about NBB-Psy	Internet, Nesda.nl
August 2017	Article about NBB-Psy in newsletter of psychiatric care organization Reinier van Arkel	Internet, reiniervanarkel.nl
25-8-2017	Multiple Tweets by Menno Oosterhoff about brain donation	Twitter
30-8-2017	"Shall I donate my brain?" Blog by Menno Oosterhoff (author and psychiatrist) about NBB-Psy and his decision to become a brain donor	Internet, Medisch Contact
31-8-2017	Multiple Tweets by Menno Oosterhoff concerning brain donation	Twitter
September 2017	"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	Magazine, Impuls en Woortblind
September 2017	"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	Magazine, Ypsilon News (Ypsilon, patient association)
September 2017	"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	Magazine, Open Geest (Anoiksis, patient association)
September 2017	"The Netherlands Brain Bank for Psychiatry", article about NBB-Psy	Family newsletter Magnolia, Reinier van Arkel
6-9-2017	Meeting for patient associations about 5 years of NBB-Psy, lectures by Menno Oosterhoff, Saskia Palmen	Event, NBB
6-9-2017	Multiple Tweets by Menno Oosterhoff concerning brain donation	Twitter
7-9-2017	"Can we have your brain?", blog about NBB by Madelon Wonink	Internet, madelonwonink.com
12-10-2017	Petra Brom and Laura Boekel represent NBB at a public event of the Dutch Brain Foundation	Event, Nederlandse Hersenstichting
24-10-2017	"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	MS Reseach online
25-27 -10-2017	Lecture by Inge Huitinga about research by NBB and Netherlands Institute for Neuroscience (Immunology group) on differences in MS between males/females	Event, European Committee for Treatment and Research in Multiple Sclerosis (ECTRIMS)
7-11-2017	"Doktors of tomorrow", television special about the brain, including about the NBB	Television, NPO 1
9-11-2017	Mark Mizee represents the NBB	Event, GGZ Rivierduinen
13-11-2017	Mark Mizee represents the NBB	Event, Memorabel Deltaplan Dementie

**Table 1:** NBB PR activities (continued)

Date	Title*/Description	Medium
14-15 -11-2017	Rosa Douw, Petra Brom, Inge Huitinga represent the NBB and the "MS Researchdays", NBB leaflet is distributed in goody bags	Event, Patient Association MS Research
17-11-2017	Article by Geertje de Lange about NBB-Psy	Internet, UMC Utrecht, Brain Center Rudolf Magnus
30-11-2017	Symposium about MS, to improve the collaboration of healthcare professionals, Rosa Douw and Petra Brom are present to inform the visitors about the NBB	Event, MSMS2017 and MSZorg
December 2017	"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	Magazine, PlusMinus (VMDB, Patient Association)

## 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  $\pm$  standard deviation (time between death and the end of the autopsy) is shown in figure 2D.



**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  $\pm$  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



to researchers for cell culture or 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

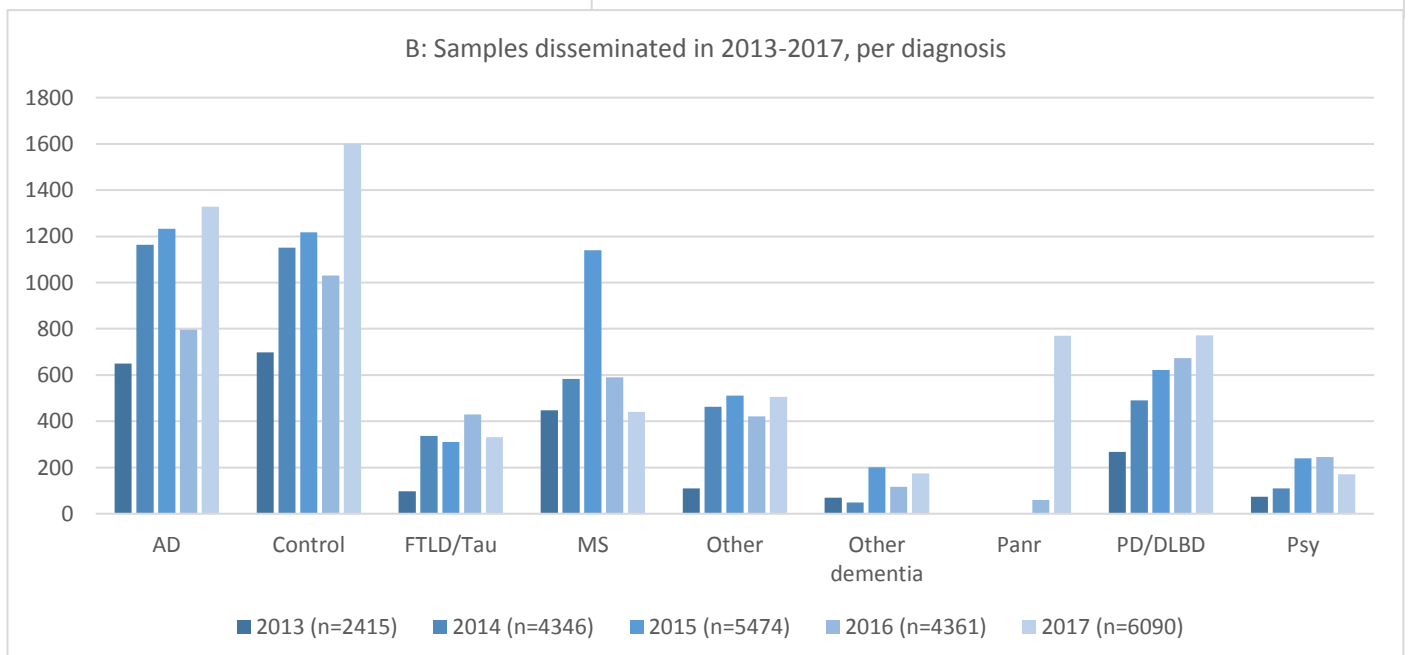
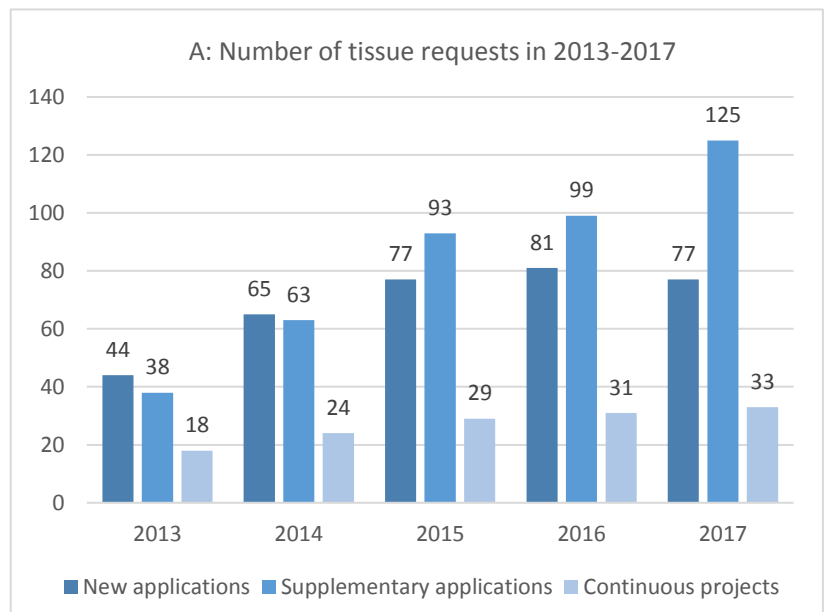
Tissue from the NBB is supplied to non-profit and for profit research organizations, if the application has been approved by the NBB's tissue advisory board, and a Material Transfer Agreement (MTA) has been concluded between the NBB and said organization.

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, FTLT/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, Panr; 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).

Description	Specification	Amount*
Structural support KNAW		€220,000
NWO	Project 2012-2020: The Netherlands Brain Bank for Psychiatry (NBB-Psy)	€3,450,000**
Stichting MS Research	Project 2013-2017: The Netherlands Brain Bank for MS (NBB-MS)	€444.400**
Hersenstichting	2017 - 2019	€100.000**
Rotary Club Aalsmeer-Uithoorn	Project: Differences in clinical and neuro-pathological diagnoses	€42,500
Donations		€110,200

## 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.
- Aguila Benitez, J., Nichterwitz, S., Nijssen, J., Allodi, I., Comley, L.H., Hedlund, E.** Department of Neuroscience, Karolinska Institutet, Biomedicum, Stockholm, Sweden. Identification of protective and degenerative pathways in motor neuron disorders.
- 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., Hölzel, 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, Hospitalet de Llobregat, Spain; Universitat de Barcelona, Hospitalet de Llobregat, Barcelona, Spain. Annexin A5 prevents amyloid- $\beta$ -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.
- Boddeke, H.W.G.M., Brouwer, N., Eggen, B., Raj, D., Holtman, I., Vachtein, I.** University Medical Centre Groningen, Department of Neuroscience, Groningen. Analysis of age-related changes in gene expression in human microglia.
- 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.

**Bordone, M.**, Morais, N. Instituto de Medicina Molecular João Lobo Antunes, Faculdade de Medicina, Universidade de Lisboa, Lisboa, Portugal. Alternative splicing: an etiological factor and a novel therapeutic target in Parkinson'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.

**Brinks, J.**, van Dijk, E.H.C., Habeeb, M., Nikolaou, A., Tsonaka, R., Peters, H.A.B., Sips, H.C.M., van de Merbel, A.F., de Jong, E.K., Notenboom, R.G.E., Kielbasa, S.M., van der Maarel, S.M., Quax, P.H.A., Meijer, O.C., Boon, C.J.F. Department of Ophthalmology, Leiden University Medical Centre, Leiden, the Netherlands; Department of Medical Statistics and Bioinformatics, Leiden University Medical Centre, Leiden, the Netherlands; Department of Vascular Surgery, Leiden University Medical Centre, Leiden, the Netherlands; Eindhoven Laboratory for Experimental Vascular Medicine, Leiden University Medical Centre, Leiden, the Netherlands; Department of Medicine, Division of Endocrinology and Metabolism, Leiden University Medical Centre, Leiden, the Netherlands; Department of Urology, Leiden University Medical Centre, Leiden, the Netherlands; Department of Ophthalmology, Donders Institute for Brain, Cognition, and Behaviour, Radboud University Medical Centre, Nijmegen, the Netherlands; Department of Anatomy and Embryology, Leiden University Medical Centre, Leiden, the Netherlands; Department of Human Genetics, Leiden University Medical Centre, Leiden, the Netherlands; Department of Ophthalmology, Academic Medical Centre, University of Amsterdam. The Effect of Corticosteroids on Human Choroidal Endothelial Cells: a Model to Study Central Serous Chorioretinopathy.

**Calabresi, P.** Fitzgerald, K., Johns Hopkins School of Medicine, Department of Neuroimmunology and Neurological Infections, Baltimore, USA. Do Complement Pathway Genes Increase Risk of Optic Nerve and Retinal Degeneration in Multiple Sclerosis Patients?

**Cao, S.**, Li, X., Dai, D., Bao, A. Institute of Neuroscience, Department of Neurobiology, Key Laboratory of Medical Neurobiology of The Ministry of Health of China, Zhejiang Province Key Laboratory of Neurobiology, Zhejiang University School of Medicine, Hangzhou, Zhejiang, China. ErbB4 deletion in noradrenergic neurons induced manic-like behavior and cognitive impairment.

**Carrasco, L.**, Pisa, D., Alonso, R., Fernández, A.M. Centro de Biología Molecular Severo Ochoa (CSIC-UAM). c/Nicolás Cabrera, Universidad Autónoma de Madrid, Madrid, Spain. Etiology of neurodegenerative diseases.

**Chrobok, N.L.**, van Strien, M.E., Bol, J.G., van Dam, A.M. VU University Medical Center, Dept. Anatomy and Neurosciences, Amsterdam, The Netherlands. Characterization of tissue Transglutaminase expression in leukocytes in active and chronic active white matter MS lesions.

**Cremers, T.** University of Groningen, Department of Farmaceutical analysis, Groningen, The Netherlands. Setting up in vitro neurotransmitter release systems.

**Cui, Y.**, Yang, Y., Dong, Y., Ma, S., Jia, X., Wu, Z., Hu, H. Center for Neuroscience, Key Laboratory of Medical Neurobiology of the Ministry of Health of China, School of Medicine, Interdisciplinary Institute of Neuroscience

- and Technology, Qiushi Academy for Advanced Studies, Zhejiang University, Hangzhou, China; Mental Health Center, School of Medicine, Zhejiang University, Hangzhou, China. Astroglial Kir4.1 in the lateral habenula drives neuronal bursts in depression.
- Dai, H., Ping, H.** Second Affiliated Hospital, Zhejiang University School of Medicine, Department of Pharmacy, Hangzhou, China. The role and mechanism of annexin A2 on the cerebral vascular dysfunction in Alzheimer's disease.
- De Wit, N., De Vries, H.E., Rozemuller, J.M. Vumc,** Department of Molecular cell biology and Immunology, Amsterdam, The Netherlands. Altered shingolipid balance in Alzheimer's disease: a new therapeutic approach?
- Dehay, B., Dovero, S., Porras, G., Breger, L.S., Arotcarena, M-L., Fernagut, P.O., Zhang, L., Yu, X., Manshi, W., Zhao, W., Zhu, T., Zhou, L., Zhang, Y., Li, Q., Xiuping, S., Li, X., Chuan, Q., Bezard E.** Université de Bordeaux, Institut des Maladies Neurodégénératives, Bordeaux, France; Centre National de la Recherche Scientifique Unité Mixte de Recherche 5293, Bordeaux, France; Motac Neuroscience, Manchester, UK; Université de Poitiers, Laboratoire de Neurosciences Expérimentales et Cliniques,, Poitiers, France; Institut National de la Santé et de la Recherche Médicale, Unité Mixte de Recherche 1084, Poitiers, France; Institute of Laboratory Animal Sciences (ILAS), Beijing, China. Modelling neurodegenerative diseases in rodent and non-human primates using intracerebral injections of patient-derived protein aggregates.
- Den Haan, J., Morrema, T., ten Brink, J., Hoozemans, J., Bergen, A., Bouwman, F.** VU University Medical Center Alzheimer Center, Neurology, Amsterdam, The Netherlands; Dept. of Pathology, VU University Medical Center, Amsterdam, The Netherlands; Department of Clinical Genetics, Academic Medical Center, Amsterdam, the Netherlands. AD pathological hallmarks in post mortem retinas of AD patients.
- Dewachter, I., Vasconcelos, B.** Institute of Neuroscience, Université catholique de Louvain (UCL), Department of Cellular and Molecular Neuroscience (CEMO), Brussels, Belgium. Analysis of the cross-seeding mechanism between A $\beta$  and Tau and its relevance in Alzheimer's disease.
- Dichgans, M., Lichtenthaler, S.** Institute for Stroke and Dementia Research (ISD), München, Germany; German Center for Neurodegenerative Diseases (DZNE), Munich, Germany. Identification of key molecular targets and pathways in cerebral small vessel disease (SVD) by proteomics on isolated cerebral microvessels.
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**Van de Berg, W.D.J., De Jong, F.J., Berendse, H., Voorn, P., Yousri, Y.** VU University Medical Center, Department of Anatomy and Neuroscience, Amsterdam, The Netherlands; Erasmus MC, Rotterdam, The Netherlands. The Clinical relevance of Insular pathology and its relationship with cognitive decline across Lewy Body diseases.

**Van de Berg, W.D.J., Rozemuller, J.M., Stahlberg, H., Shahmoradian, S.** Neuroscience Campus Amsterdam, VU University Medical Center, Department of Anatomy and Neurosciences, Amsterdam, The Netherlands; C-CINA, Biozentrum, University Basel, Switzerland. Subcellular localisation of conformational forms of alpha-synuclein in post-mortem brain tissue of elderly and patients with Parkinson's disease.

**Van der Valk, P., Amor, S.** VU University Medical Center, Department of Pathology, Amsterdam, The Netherlands. Lesion formation and development in Multiple Sclerosis.

- Van der Vies**, S.M., Hoozemans, J.J.M., Rozemuller, J.M., Kennedy, M. VU University Medical Center, Department of Pathology, Amsterdam, The Netherlands; Merck Sharp & Dohme Corp. IRAK-4 kinase inhibitors as a potential drug target for Alzheimer's Disease in human adult primary glial cells.
- Van der Weerd**, L., Van Buchem, M.A., Van Duinen, S.G. Leiden University Medical Center, Department of Radiology, Leiden, The Netherlands. Pathological correlates of cortical changes in Alzheimer's Disease at ultra-high field MRI.
- Van Dijk**, B.J., Hol, E.M. Brain Center Rudolf Magnus, Translational Neuroscience, Utrecht, The Netherlands. Glial response after subarachnoid hemorrhage.
- Van Gool**, W.A., Oudewortel, L., Emiliani, F. GGZ Dijk en Duin, Afdeling opname psychogeriatric, Castricum, The Netherlands. Is microglia activation involved in delirium superimposed on dementia.
- Van Heesbeen**, H.J., Von Oerthel, L., Smidt, M.P. University of Amsterdam, Swammerdam Institute for Lifesciences, Department of Molecular Neuroscience, Amsterdam, The Netherlands. Epigenetic mechanisms in maintenance of dopaminergic neurons.
- Van Nostrand**, W.E., Rozemuller, J.M., Miller, L. Stony Brook University, Department of Neurosurgery, Stony Brook, NY, USA; VU Medical Center, Department of Pathology, The Netherlands; Brookhaven National Laboratory. Determination of metal type, content and speciation in cerebral amyloid angiopathy.
- Van Swieten**, J.C. et. al. Erasmus Medisch Centrum, Rotterdam, The Netherlands. Immunohistochemic and biochemic characterization of fronto-temporal dementia and progressive supranuclear palsy.
- Van Vliet-Ostapchouk**, J.V., Swaab, D.F., Wolffenbuttel, B.H., Jonker, J.W. University Medical Center Groningen, Endocrinology, Groningen, The Netherlands; Netherlands Institute for Neuroscience, Amsterdam, The Netherlands. The TUB gene expression in the human hypothalamus and adipose tissue.
- Van Wageningen**, T.A., Bol, J.G.J.M., van Dam, A-M. VU University Medical Centre; MS Centre, Dept. Anatomy and Neurosciences, Amsterdam, The Netherlands. Characterizing microglia in white-matter and grey-matter lesions in Multiple Sclerosis.
- Vangoor**, V., De Wit, M., Senthilkumar, K., Gomes Duarte, A., Pasterkamp, R.J. Department of. Translational Neuroscience, Brain Center Rudolf Magnus, UMC Utrecht, Utrecht, The Netherlands. The role of non-coding RNAs in epilepsy.
- Varrone**, A., Miranda Azpiazu, P., Varnäs, K. Schou M. Department of Clinical Neuroscience, Centre for Psychiatry Research, Karolinska Institutet and Stockholm County Council; PET Science Centre, Precision Medicine and Genomics, IMED Biotech Unit, AstraZeneca, Karolinska Institutet, Sweden. Identification and validation of transcripts and proteins as well as PET radioligand development in neurodegenerative disorders with special emphasis to Parkinsons disease (PD) and Alzheimer's disease (AD).
- Varrone**, A., Svedberg, M., Varnäs, K., Häggvist, J., Halldin, C., Bard, J., Wityak, J., Mrzljak, L., Wood, A. Karolinska Institutet, Department of Clinical Neuroscience, Karolinska University Hospital, Stockholm, Sweden. CHDI Foundation, USA. Preclinical studies of novel potential huntingtin binding PET radioligands in postmortem brain tissue.
- Veerhuis**, R. et. al. VU University Medical Center, Department of Pathology and Clinical Chemistry, Amsterdam, The Netherlands. Amyloid associated factors in Alzheimer's disease.
- Veldink**, J., Giuliani, F., Luykx, J., Aronica, E. UMC Utrecht Brain Center Rudolf Magnus, Neurogenetics Unit, Utrecht, The Netherlands; University of Amsterdam-Swammerdam Institute for Life Sciences (SILS), Amsterdam, The Netherlands. The role of long non-coding RNAs in Bipolar Disorder.
- Verbeek**, M., Schreuder, F., Klijn, K., Richard, E., Claassen, J., Kuiperij, H.B., Portelius, E. Radboudumc, Nijmegen, The Netherlands; University of Gotheborg, Gothenburg, Sweden. Biomarkers for Cerebral Amyloid Angiopathy.

- Vergouw**, L.J.M., de Jong, F.J., van Swieten, J.C., van Steenoven, I., Lemstra, A.W., Quadri, M., Bonifati, V., de Gier, Y., Van de Berg, W.D.J., Paliukhovich, I., Li, K.W., Smit, A.B. Department of Neurology and Alzheimercenter zuidwest Nederland, Erasmus Medical Center, Rotterdam, the Netherlands; Department of Neurology and Alzheimercenter, Amsterdam Neuroscience, VU Medical Center, Amsterdam, the Netherlands; Department of Clinical Genetics, Erasmus Medical Center, Rotterdam, the Netherlands; Department of Anatomy and Neurosciences, section Clinical Neuroanatomy, Amsterdam Neuroscience, VU Medical Center, Amsterdam, the Netherlands; Center for Neurogenomics and Cognitive Research, Amsterdam Neuroscience, VU Medical Center, Amsterdam, the Netherlands. Identification of molecular and genetic mechanisms in familial Lewy Body Dementia: a novel approach.
- Verwer**, R., Sluiter, A., Swaab, D.F. Netherlands Institute for Neuroscience, an Institute of the Royal Netherlands Academy of Arts and Sciences, Amsterdam, The Netherlands. Postmortem brain slice culture.
- Voet**, S., Mc Guire, C., Van Loo, G. VIB Center for Inflammation Research, Ghent, Belgium; Department of Biomedical Molecular Biology, Ghent University, Ghent, Belgium. Characterization of inflammasome activation in samples from MS patients.
- Wennström**, M. et. al. Lund University, Department of Clinical Science, Malmö, Sweden. Analyses of distribution and activation of NG2+glialcells in the Alzheimer brain.
- Wergeland**, S., Schenk, G., Bø, L., Van De Berg, W.D.J. VU University Medical Center, Department of Anatomy and Neurosciences, Clinical Neuroscience, Amsterdam, The Netherlands; Haukeland University Hospital, Department of Neurology, Bergen, Norway. The oligodendrocyte proteome in multiple sclerosis.
- Werkman**, I., Gorter, R.P., Baron, W. Department of Biomedical Sciences of Cell & Systems, section Molecular Neurobiology, University of Groningen, University Medical Center Groningen, Groningen, the Netherlands. Reshaping the ECM landscape in MS lesions to promote remyelination.
- West**, S.J., Bennett, D.H.L. Nuffield Department of Clinical Neurosciences, John Radcliffe Hospital, Oxford, United Kingdom. Investigation of the Lateral Spinal Nucleus in Human Spinal Cord.
- Wetzels**, S., Vanmierlo, T., Scheijen, J.L.J.M., Schalkwijk, C.G., Hendriks, J.J.A., Wouters, K. Cardiovascular Research Institute Maastricht, Department of Internal medicine, Maastricht University, Maastricht, the Netherlands; Biomedical Research Institute, Department of Immunology and Biochemistry, Hasselt University, Hasselt, Belgium; School for Mental Health and Neuroscience, Department of Psychiatry and Neuropsychology, Maastricht University, Maastricht, the Netherlands. Advanced glycation endproducts in multiple sclerosis.
- Wilhelmus**, M.M.M. Amsterdam University Medical Centers, Department of Anatomy and Neurosciences. Triple P: New P2Y<sub>12</sub> receptor targeting PET tracers as next generation neuroinflammation markers in Parkinson's disease.
- Winner**, B., Riemenschneider, M. Institute of Human Genetics, Department of Stem Cell Biology, Erlangen, Germany; Department of Neuropathology, University Hospital Regensburg, Regensburg, Germany. T helper cell-induced neurotoxicity in sporadic Parkinson's disease.
- Xicoy**, H., Brouwers, J.F., Wieringa, B., Martens, G.J.M. Dept. Cell biology, Radboud Institute for Molecular Life Sciences, Radboud University Medical Centre; Dept. Molecular Animal Physiology, Donders Institute for Brain, Cognition and Behaviour, Donders Centre for Neuroscience, Faculty of Science; Dept. Biochemistry & Cell Biology, Lipidomics Facility, Faculty of Veterinary Medicine, Utrecht University. Transcriptomic and lipidomic analysis of substantia nigra and striatum of Parkinson's disease patients and control individuals.
- Xu**, Y., Huang, M., Zhou, W. Hu, J. Zhejiang Province Key Laboratory of Mental Disorder's Management, Department of Mental Health, HangZhou, Zhejiang, China PR. A neural circuit in Schizophrenia: a postmortem study.
- Yeo**, S., Kim D., Choi S.H., Choi Y.R., Yoon J.H., Choe Y., Korea Brain Research Institute, Dong-gu, Daegu, Republic of Korea. Topographic biomarkers reveal defective neurovascular units in Schizophrenia.

**Yoon J.H., Jung H-J., Lee M.S., Choe Y.,** Korea Brain Research Institute, Dong-gu, Daegu, Republic of Korea. Blood exosomal proteomic profiles for murine and human Alzheimer's disease.

**Zhang, X., O'callaghan, P., Zhang, G. Tan, Y., Lindahl, U., Li, J.-P.** Department of Neuroscience, Department of Molecular and Cellular Biology and Department of Medical Biochemistry and Microbiology, Uppsala University, Sweden. Roles of heparan sulfate/heparanase in clearance of beta-amyloid from the brain – relevance to Alzheimer's disease.

**Zhao, J., Verwer, R., Lucassen, P., Kessels, H.** Netherlands Institute for Neuroscience, an Institute of the Royal Netherlands Academy of Arts and Sciences, Amsterdam, The Netherlands; Swammerdam Institute for Life Sciences, University of Amsterdam, Amsterdam, The Netherlands. The molecular basis of depression and suicide.

**Zhu, S., Mamo, T., Viejo-Borbolla, A.** Institute of Virology, Hannover Medical School; Institute of Molecular Biology, Hannover Medical School; Department of Pediatric Nephrology, Gastroenterology & Metabolic Diseases, Hannover Medical School; Institute of Virology, Hannover Medical School, Hannover, Germany. Derivation of human peripheral neurons from inducible pluripotent stem cells suggests the existence of a novel neuronal population.

**Zilocchi, M., Finzi, G., Lualdi, M., Sessa, F., Fasano, M., Alberio, T.** Department of Science and High Technology, Center of Neuroscience, University of Insubria, Italy; Department of Pathology, University Hospital ASST-Settelaghi, Varese, Italy. Mitochondrial alterations in Parkinson's disease human samples and cellular models.

## 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 A $\beta$  oligomers in AD brain tissues.  
Characterization of BIIB054 binding pattern to pathological variants of  $\alpha$ -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- $\kappa$ B 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.

CruceCell 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.

Grünenthal 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-A $\beta$  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

Characterization of alpha-synuclein novel antibodies on post-mortem human brain tissue.  
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

Bergen, A. A., Kaing, S., ten Brink, J. B., Netherlands Brain Bank, Gorgels, T. G., & Janssen, S. F. (2015). Gene expression and functional annotation of human choroid plexus epithelium failure in Alzheimer's disease. *BMC Genomics*, *16*(1), 1–15. <https://doi.org/10.1186/s12864-015-2159-z>

Krudop, W. A., Bosman, S., Geurts, J. J., Sikkes, S. A., Verwey, N. A., Stek, M. L., ... Netherlands Brain Bank. (2015). Clinico-pathological correlations of the frontal lobe syndrome: results of a large brain bank study. *Dementia and geriatric cognitive disorders*, *40*(3–4), 121–129.

Vermunt, M. W., Tan, S. C., Castelijns, B., Geeven, G., Reinink, P., de Bruijn, E., ... Creyghton, M. P. (2016). Epigenomic annotation of gene regulatory alterations during evolution of the primate brain. *Nature neuroscience*, *19*, 494-503.

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Acquarelli, J., Brain Bank, T. N., Bianchini, M., & Marchiori, E. (2016). Discovering Potential Clinical Profiles of Multiple Sclerosis from Clinical and Pathological Free Text Data with Constrained Non-negative Matrix Factorization. In *Applications of Evolutionary Computation* (pp. 169–183). Springer, Cham. [https://doi.org/10.1007/978-3-319-31204-0\\_12](https://doi.org/10.1007/978-3-319-31204-0_12)

Adams, S. L., Benayoun, L., Tilton, K., Chavez, O. R., Himali, J. J., Blusztajn, J. K., ... Delalle, I. (2017). Methionine sulfoxide reductase-B3 (MsrB3) protein associates with synaptic vesicles and its expression changes in the hippocampi of Alzheimer's disease patients. *Journal of Alzheimer's disease : JAD*, *60*(1), 43–56. <https://doi.org/10.3233/JAD-170459>

Adams, S. L., Tilton, K., Kozubek, J. A., Seshadri, S., & Delalle, I. (2016). Subcellular Changes in Bridging Integrator 1 Protein Expression in the Cerebral Cortex During the Progression of Alzheimer Disease Pathology. *Journal of Neuropathology & Experimental Neurology*, *75*(8), 779–790. <https://doi.org/10.1093/jnen/nlw056>

Ádori, C., Glück, L., Barde, S., Yoshitake, T., Kovacs, G. G., Mulder, J., ... Mitsios, N. (2015). Critical role of somatostatin receptor 2 in the vulnerability of the central noradrenergic system: new aspects on Alzheimer's disease. *Acta neuropathologica*, *129*(4), 541–563.

Adorjan, I., Ahmed, B., Feher, V., Torso, M., Krug, K., Esiri, M., ... Szele, F. G. (2017). Calretinin interneuron density in the caudate nucleus is lower in autism spectrum disorder. *Brain*, *140*(7), 2028–2040. <https://doi.org/10.1093/brain/awx131>

Allodi, I., Comley, L., Nichterwitz, S., Nizzardo, M., Simone, C., Benitez, J. A., ... Hedlund, E. (2016). Differential neuronal vulnerability identifies IGF-2 as a protective factor in ALS. *Scientific Reports*, *6*, 25960. <https://doi.org/10.1038/srep25960>

Almandoz-Gil, L., Lindström, V., Sigvardson, J., Kahle, P. J., Lannfelt, L., Ingelsson, M., & Bergström, J. (2017). Mapping of Surface-Exposed Epitopes of In Vitro and In Vivo Aggregated Species of Alpha-Synuclein. *Cellular and Molecular Neurobiology*, *37*(7), 1217–1226. <https://doi.org/10.1007/s10571-016-0454-0>

Anand, P., Yiangou, Y., Anand, U., Mukerji, G., Sinisi, M., Fox, M., ... Hein, P. (2016). Nociceptin/orphanin Fq receptor expression in clinical pain disorders and functional effects in cultured neurons. *Pain*, *157*(9), 1960–1969. <https://doi.org/10.1097/j.pain.0000000000000597>

Anand, U., Yiangou, Y., Sinisi, M., Fox, M., MacQuillan, A., Quick, T., ... Anand, P. (2015). Mechanisms underlying clinical efficacy of Angiotensin II type 2 receptor (AT2R) antagonist EMA401 in neuropathic pain: clinical tissue and in vitro studies. *Molecular Pain*, *11*(1), 1–12. <https://doi.org/10.1186/s12990-015-0038-x>

- Arena, A., M. Iyer, A., Milenkovic, I., G. Kovacs, G., Ferrer, I., Perluigi, M., & Aronica, E. (2017, december). Developmental Expression and Dysregulation of miR-146a and miR-155 in Down's Syndrome and Mouse Models of Down's Syndrome and Alzheimer's Disease [Text]. <https://doi.org/info:doi/10.2174/1567205014666170706112701>
- Baek, J.-H., Schmidt, E., Viceconte, N., Strandgren, C., Pernold, K., Richard, T. J. C., ... Eriksson, M. (2015). Expression of progerin in aging mouse brains reveals structural nuclear abnormalities without detectible significant alterations in gene expression, hippocampal stem cells or behavior. *Human Molecular Genetics*, *24*(5), 1305–1321. <https://doi.org/10.1093/hmg/ddu541>
- Barateiro, A., Afonso, V., Santos, G., Cerqueira, J. J., Brites, D., Horsen, J., & Fernandes, A. (2015). S100B as a Potential Biomarker and Therapeutic Target in Multiple Sclerosis. *Molecular Neurobiology*, 1–16. <https://doi.org/10.1007/s12035-015-9336-6>
- Barbash, S., Simchovitz, A., Buchman, A. S., Bennett, D. A., Shifman, S., & Soreq, H. (2017). Neuronal-expressed microRNA-targeted pseudogenes compete with coding genes in the human brain. *Translational Psychiatry*, *7*(8), e1199. <https://doi.org/10.1038/tp.2017.163>
- Barbash, Shahar, Garfinkel, B. P., Maoz, R., Simchovitz, A., Nadorp, B., Guffanti, A., ... Soreq, H. (2017). Alzheimer's brains show inter-related changes in RNA and lipid metabolism. *Neurobiology of Disease*, *106*, 1–13. <https://doi.org/10.1016/j.nbd.2017.06.008>
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- Bekenstein, U., Mishra, N., Milikovsky, D. Z., Hanin, G., Zelig, D., Sheintuch, L., ... Soreq, H. (2017). Dynamic changes in murine forebrain miR-211 expression associate with cholinergic imbalances and epileptiform activity. *Proceedings of the National Academy of Sciences*, *114*(25), E4996–E5005. <https://doi.org/10.1073/pnas.1701201114>
- Bennis, A., Brink, J. B. ten, Moerland, P. D., Heine, V. M., & Bergen, A. A. (2017). Comparative gene expression study and pathway analysis of the human iris- and the retinal pigment epithelium. *PLOS ONE*, *12*(8), e0182983. <https://doi.org/10.1371/journal.pone.0182983>
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- Bruggink, K. A., Kuiperij, H. B., Gloerich, J., Otte-Höller, I., Rozemuller, A. J. M., Claassen, J. A. H. R., ... Verbeek, M. M. (2015). Dickkopf-related protein 3 is a potential A $\beta$ -associated protein in Alzheimer's Disease. *Journal of Neurochemistry*, *134*(6), 1152–1162. <https://doi.org/10.1111/jnc.13216>
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## List of abbreviations

AD	Alzheimer's disease
ADHD	Attention deficit hyperactivity disorder
ASD	Autism spectrum disorder
BPD	Bipolar disorder
Contr	Non-demented control donors
DEPMA	Bipolar disorder
FTLD/tau	Frontotemporal lobar degeneration/Tauopathy
MDD	Major depressive disorder
MS	Multiple sclerosis
OCD	Obsessive compulsive disorder
Other	Other diagnoses
Other dem	Other types of dementia
PANR	Pathological report not ready yet
PD/DLBD	Parkinson's disease/Diffuse Lewy body dementia
PSP	Progressive supranuclear palsy
Psy	Psychiatric disorders (unspecified)
PTSD	Posttraumatic stress disorder
SCHIZO	Schizophrenia