

Annual Status Report 2008



Neurobiology Research Unit

Dept. Neurology, Neuroscience Centre
Rigshospitalet
Faculty of Health Sciences
Copenhagen University

www.nru.dk

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1. Research Facilities

Since June 1996 the Neurobiology Research Unit has been located at Juliane Maries Vej 24 in an old villa named Building 92 at the Rigshospitalet campus. In this house, NRU has offices and facilities for data analysis; approx. 500 square meters, 19 offices and a conference room with kitchen facilities is allocated for NRU.

The SPECT laboratory of NRU is located at the Department of Neurology on the 8th floor in the main complex of Rigshospitalet. The laboratory includes a room for the Philips IRIX SPECT scanner, a type B approved isotope laboratory, and a small office. Further office and laboratory facilities are shared with other employees at the department.

The NRU experimental laboratory resides in Building 93, Juliane Maries Vej 20, just opposite Building 92. The ground floor of Building 93 is shared with the Cardiovascular Laboratory. Four laboratory rooms (in total 92.5 m²) are allocated for NRU, and it shares another three rooms and two offices with the above mentioned research group.

NRU conducts its PET research activities in close collaboration with the Department of Clinical Physiology/Nuclear Medicine, and has access to the three PET scanners in the PET Unit in the Finsen Building at Rigshospitalet. NRU has a close collaboration with the Department of Clinical Physiology/Nuclear Medicine in the research planning and developmental activities.

2. Objectives, Organization, and Staff

NRU has its main interest within neurotransmission brain research, with particular focus on neuroreceptor imaging. Traditionally, the research unit has also been involved in studies of cerebral blood flow. The unit has a close collaboration with the Danish Research Centre for Magnetic Resonance (DRCMR), Hvidovre University Hospital. Finally, image analysis and tracer kinetics remain issues that receive high attention within the unit.

The research group is chaired by Professor Gitte Moos Knudsen. Professor Olaf B. Paulson, who since 1995 also has chaired the DRCMR at Hvidovre Hospital, Chief Engineer Claus Svarer, PhD, and Associate Professor Steen Hasselbalch are partners in the NRU steering group. The Chief Technologist is Gerda Thomsen and laboratory leader is PhD Susana Aznar.

In 2008 the research staff consisted of:**Senior Researchers:**

Susana Aznar, Biologist, PhD
 Amir Hashemi, Biologist, PhD
 Steen Hasselbalch, MD, DMSc (half time)
 Gitte Moos Knudsen, Professor, MD, DMSc
 Jens Damsgaard Mikkelsen, MD
 Finn Årup Nielsen, Engineer, PhD*
 Olaf B. Paulson, Professor, MD, DMSc
 Karam Sidaros, Engineer, PhD*
 Claus Svarer, Engineer, PhD

PhD-students:

David Erritzøe, MD
 Anders Ettrup, Human Biologist
 Vibe Gedsø Frøkjær, MD
 Mette Haahr, MD
 Jens Munk Hansen, Physicist
 Jan Kalbitzer, MD
 Birgitte Rahbek Kornum, Human Biologist
 Cecilie Løe Licht, Human Biologist
 Karine Madsen, MD
 Anders Bue Marcussen, Human Biologist
 Lisbeth Marnér, MD
 Robin de Nijs, Physicist*
 Mikael Palner, Engineer
 Morten Ziebell, MD

Junior Researchers:

Anetta Claussen, Engineer
 Ruben Christensen, Biologist
 Celia Kjærby Hansen, Human Biologist
 Klaus Holst, Biostatistician
 Daniel Tolnai, MD
 Gry Zornhagen, Psychologist

Associated Researchers:

Steven Haugbøl, MD
 Lars Hageman Pinborg, MD

Students:

Tine Arentzen, biochemistry student
 Maria Christoffersen, medical student
 Christoffer Clemmensen, human biology student
 Mona El-Sayed, human biology student
 Signe Holm-Hansen, human biology student
 Christian Gaden Jensen, psychology student
 Peter Vestergaard Jensen, biology student
 Lisbeth Kirkegaard, biology student
 Gitte Lauritzen, biology student
 Caroline Myosatis, psychology student
 Martin Santini, human biology student
 Andreas Schmith, biochemistry student

Technical Administrative Personnel:

Anita Dole, medical technologist
 Pia Farup, secretary
 Lone Freyr, nurse
 Dorthe Givard, secretary
 Mette Søgaard Hansen, medical technologist
 Kirsten Hornsyld, medical technologist
 Bente Høy, nurse
 Christine B. Janssens, medical technologist
 Hans Jørgen Jensen, medical technologist
 Thomas Jensen, IT supporter
 Anja Pedersen, medical technologist
 Lene Rottensten, research assistant
 Blerta Shuka, medical technologist
 Rasmus Sichlau, research assistant
 Glenna Skouboe, medical technologist
 Gerda Thomsen, Chief technologist

* shared with another research group

Guest Researchers:

Julian Neumann, stud.med, ERASMUS student
 Hans Rasmussen, psychologist, Glostrup Hospital
 Sigurdur Sigurdsson, MD, Dept. of Nephrology, KAS Herlev
 Petrine Wellendorph, Cand.Pharm.,PhD, Faculty of Pharmaceutical Sciences, Copenhagen
 Rebecca Williamson, student, Canada

3. Collaborators in 2008

Center for Integrated Molecular Brain Imaging, Cimbi

www.cimbi.dk

Cimbi consists of a multidisciplinary collaboration among institutes and departments in the Copenhagen area. These institutions include:

- Department of Medical Chemistry, The Danish University of Pharmaceutical Sciences
- Danish Research Center for Magnetic Resonance, Hvidovre Hospital
- The PET and Cyclotron Unit, Rigshospitalet
- Informatics and Mathematical Modelling, Technical University of Denmark
- Neurobiology Research Unit, Rigshospitalet
- Department of Psychology, University of Copenhagen
- Department of Medical Biochemistry & Genetics (IMBG), University of Copenhagen
- Department of Health Psychology, University of Copenhagen

Copenhagen Brain Research Center, CBRC

www.cbrc.dk

CBRC consists of a multidisciplinary collaboration among institutes and departments in the Copenhagen area working with brain related research. These institutions include:

- Department of Medicinal Chemistry, Faculty of Pharmaceutical Sciences
- H. Lundbeck A/S, Copenhagen
- Danish Research Center for Magnetic Resonance, Hvidovre Hospital
- The PET and Cyclotron Unit, Rigshospitalet
- Department of Informatics and Mathematical Modelling, Technical University of Denmark
- Neurobiology Research Unit, Rigshospitalet
- Department of Psychology, University of Copenhagen

Additional departments within Rigshospitalet

Department of Cardiology

Department of Hepatology

Department of Infectious Diseases

Department of Neuroanesthesiology

Department of Neurosurgery

Department of Pediatrics

Department of Psychiatry

Development of New Radiotracers for the in-vivo Assessment of Biological Functions and Drug Interactions (COST).

Collaborators within COST, workgroup 1: Radioligands for Brain Receptors.

PET-centres in Orsay, Villigen-PSI, Jülich, Stockholm, London (Hammersmith), Turku, Kuopio, Uppsala, Brussels, Aarhus.

*EU 6th Framework Program**DiMI - Diagnostic Molecular Imaging (LSHB-CT-2005-512146)*

The goal of the Network of Excellence "Diagnostic Molecular Imaging" (DiMI) - Molecular Imaging for Diagnostic Purposes - is to integrate multidisciplinary research for the development of new probes and multimodal non-invasive imaging technology for early diagnosis, assessment of disease progression and treatment evaluation.

The general objectives of DiMI are to coordinate and efficiently integrate more than 50 research groups from various disciplines to study non-invasively gene expression and function in major diseases such as neurodegeneration, stroke, heart failure, atherosclerosis and autoimmune diseases. For further information, please visit www.dimi-net.org.

NRU is training platform for image and data analyses for DiMI partners.

EU 7th Framework Program

EURIPIDES - European Research initiative to develop Imaging Probes for early In-vivo Diagnosis and Evaluation of response to therapeutic Substances is a four year, €7 million project, funded by the European Union under European Framework Programme 7 (FP7). Co-ordinated by Dr. Matthias Koepp from the Institute of Neurology at University College London, the project aims to develop new radiotracers for imaging of the P-glycoprotein (P-gp) transporter using PET and validating current PET tracers in patients with suspected over-expression of P-gp function, contributing to drug resistance.

It is hoped that the study will provide both functional evidence in support of the transporter hypothesis of drug resistance, and a potential tool for the prediction of transporter-mediated resistance in patients with major neurological or neurodegenerative conditions as well as patients with tumours.

Measuring Endogeneous Transmitter Release with PET-tracers (METPETS)

Neurotransmitters are mediating a large part of the communication between nerve cells in the brain, so a key goal of neuroscience is to identify the factors regulating this release. PET and SPECT techniques are currently the only way in which neurotransmitter release in the brain can be measured; this is well proven for one transmitter, dopamine, where studies have revealed important roles in addiction, schizophrenia, and depression. However the challenges of developing such tracers are so immense that over the past decade there has been little progress with tracers for other transmitters despite the clear need. The best way to progress this critical area is to enable the major European imaging centres to act as an integrated network.

European Network of Excellence for Brain Imaging under the umbrella of the EANM

SPECT Centers from Italy, Germany, Belgium, Netherlands, Austria, Denmark, United Kingdom, France, and Spain.

Others

Glaxo SmithKline Beecham, London, UK

H. Lundbeck A/S

Language Section, National Institutes of Health, Bethesda, Maryland, USA

Mannheim Central Mental Institute, University of Heidelberg

MAP Medical, Helsinki, Finland

NeuroSearch A/S

Philips Medical Systems

4. Publications

PhD-theses

Dethloff T. PhD-afhandling: Identification of factors responsible for impairment of cerebral blood flow autoregulation in acute liver failure. København: Eget forlag 2008:1-138. Forsvaret d. 12. September 2008 ved Københavns Universitet, Det Sundhedsvidenskabelige Fakultet.

Frøkjær V. PhD-afhandling: Relating cerebral serotonin 2A receptor and serotonin transporter binding to personality and familial risk for mood disorder. København: Eget forlag 2008:1-57. Forsvaret d. 11. juni 2008 ved Københavns Universitet, Det Sundhedsvidenskabelige Fakultet.

Gerlach C. Disputats: Visual object recognition and category-specificity. København: Eget forlag 2008:1-83. Forsvaret d. 7. november 2008 ved Københavns Universitet, Det Samfundsvidenskabelige Fakultet.

Peer-review Full-length Publications

Cerebral Blood Flow and Metabolism

Dethloff TJ, Knudsen GM, Larsen FS. Cerebral blood flow autoregulation in experimental liver failure. *J Cereb Blood Flow Metab* 2008;28:916-26.

Pedersen M, Brandt C, Knudsen GM, Østergaard C, Skinhøj P, Skovsted IC, Frimodt-Møller N, Møller K. The effect of *S. Pneumoniae* bacteremia on cerebral blood flow autoregulation in rats. *J Cereb Blood Flow Metab* 2008;28:126-34.

Thomsen G, de Nijs R, Høgh-Rasmussen E, Frøkjær V, Svarer C, Knudsen GM. Required time delay from 99mTc-HMPAO injection to SPECT data acquisition: healthy subjects and patients with rCBF pattern. *Eur J Nucl Med Mol Imaging* 2008;35:2212-19.

Brain Mapping and Structure

Dyrby TB, Rostrup E, Baaré WFC, van Straaten ECW, Barkhof F, Vrenken H, Ropele S, Schmidt R, Erkinjuntti T, Wahlund L-O, Pantoni L, Inzitari D, Paulson OB, Hansen LK, Waldemar G. Segmentation of age-related white matter changes in a clinical multi-centre study. *Neuroimage* 2008;41:335-45.

Kalowska E, Rostrup E, Rosenbaum S, Petersen P, Paulson OB. Acute MRI changes in progressive ischemic stroke. *Eur Neurol* 2008;59:229-36.

Ptito M, Schneider FCG, Paulson OB, Kupers R. Alterations of the visual pathways in congenital blindness. *Exp Brain Res* 2008;187:41-9.

Ryberg C, Rostrup E, Sjöstrand K, Paulson OB, Barkhoff F, Scheltens P, van Straaten EC, Fazekas F, Schmidt R, Erkinjuntti T, Wahlund LO, Basile AM, Pantoni L, Inzitari D, Waldemar G. White matter changes contribute to corpus callosum atrophy in the elderly: The LADIS Study. *Am J Neuroradiol* 2008;29:1498-1504.

Sidaros A, Engberg AaW, Sidaros K, Liptrot MG, Herning MG, Petersen P, Paulson OB, Jernigan TL, Rostrup E. Diffusion tensor imaging during recovery from severe traumatic brain injury and relation to clinical outcome: a longitudinal study. *Brain* 2008;131:559-72.

Basic Neuroscience

Bundzikova J, Pirnik Z, Zelena D, Mikkelsen JD, Kiss A. Response of substances co-expressed in hypothalamic magnocellular neurons to osmotic challenges in normal and Brattleboro rats. *Cell Mol Neurobiol* 2008;28:1033-47.

Hale MW, Hay-Schmidt A, Mikkelsen JD, Poulsen B, Shekhar A, Lowry CA. Exposure to an open-field arena increase c-Fos expression in a distributed anxiety-related system projecting to the basolateral amygdaloid complex. *Neuroscience* 2008;155:659-72.

Hale MW, Hay-Schmidt A, Mikkelsen JD, Poulsen B, Bouwknecht JA, Evans AK, Stamper CE, Shekhar A, Lowry CA. Exposure to an open-field arena increase c-Fos expression in a subpopulation

of neurons in the dorsal raphe nucleus, including neurons projecting to the basolateral amygdaloid complex. *Neuroscience* 2008;157:733-48.

Experimental and Clinical Neuroreceptor Studies

Christensen R, Marcussen AB, Wörtwein G, Knudsen GM, Aznar S. A β (1-42) injection causes memory impairment, lowered cortical and serum BDNF levels, and decreased hippocampal 5-HT_{2A} levels. *Exp Neurol* 2008;210:164-71.

Erritzoe D, Rasmussen H, Kristiansen KT, Frokjaer VG, Haugbol S, Pinborg L, Baaré W, Svarer C, Madsen J, Lublin H, Knudsen GM, Glenthoj BY. Cortical and subcortical 5-HT_{2A} receptor binding in neuroleptic-naive first-episode schizophrenic patients. *Neuropsychopharmacol* 2008;33:2435-41.

Frokjaer VG, Mortensen EL, Nielsen FA, Haugbol S, Pinborg LH, Adams KH, Svarer C, Hasselbalch SG, Holm S, Paulson OB, Knudsen GM. Frontolimbic serotonin 2A receptor binding in healthy subjects is associated with personality risk factors for affective disorder. *Biol Psychiatry* 2008;63:569-76.

Frokjaer VG, Pinborg LH, Madsen J, de Nijs R, Svarer C, Wagner A, Knudsen GM. Evaluation of the serotonin transporter ligand 123I-ADAM for SPECT studies on Humans. *J Nucl Med* 2008;49:247-54.

Hasselbalch SG, Madsen K, Svarer C, Pinborg LH, Holm S, Paulson OB, Waldemar G, Knudsen GM. Reduced 5-HT_{2A} receptor binding in patients with mild cognitive impairment. *Neurobiol Aging* 2008;29:1830-8.

Herth MM, Debus F, Piel M, Palner M, Knudsen GM, Lüddens H, Rösch F. Total synthesis and evaluation of [18F]MHMZ. *Bioorg Med Chem Let* 2008;18:1515-19.

Jacobsen JPR, Weikop P, Hansen HH, Mikkelsen JD, Redrobe JP, Holst D, Bond CT, Adelman JP, Christophersen P, Mirza NR. SK3 K⁺ channel-deficient mice have enhanced dopamine and serotonin release and altered emotional behaviors. *Genes Brain Behav* 2008;7:836-48.

Mikkelsen JD, Bundzikova J, Larsen MH, Hansen HH, Kiss A. GABA regulates the rat hypothalamic-pituitary-adrenocortical axis via different GABA-A receptor alpha-subtypes. *Ann NY Acad Sci* 2008;1148:384-92.

Pinborg LH, Arfan H, Haugbol S, Kyvik KO, Hjelmberg JvB, Svarer C, Frokjaer VG, Paulson OB, Holm S, Knudsen GM. The 5-HT_{2A} receptor binding pattern in the human brain is strongly genetically determined. *Neuroimage* 2008;40:1175-80.

Søderman A, Thomsen MS, Hansen HH, Nielsen EØ, Jensen MS, West MJ, Mikkelsen JD. The nicotinic α 7 acetylcholine receptor agonist SSR 180711 is unable to activate limbic neurons in mice overexpressing human amyloid- β 1-42. *Brain Res* 2008;1227:240-7.

Trajkovska V, Vinberg M, Aznar S, Knudsen GM, Kessing LV. Whole blood BDNF levels in healthy twins discordant for affective disorder: Association to life events and neuroticism. *J Affect Disord* 2008;108:165-9.

Textbooks and Reviews

Hansen HH, Waroux O, Seutin V, Jentsch TJ, Aznar S, Mikkelsen JD. Kv7 channels: Interaction with dopaminergic and serotonergic neurotransmission in the CNS. *J Physiol* 2008;586:1823-32.

Paulson OB, Knudsen GM. Comments on point: Counterpoint: Sympathetic activity does/does not influence cerebral blood flow. Role of a rudimentary sympathetic nervous system on cerebral blood flow. *J Appl Physiol* 2008;105:1371-2.

Paulson OB. Heart and brain circulation in healthy men are differently affected by CO₂. *Acta Physiol* 2008;193:203.

Strandgaard S, Sigurdsson ST. Last word on point: Counterpoint: Sympathetic nervous activity does/does not influence cerebral blood flow. *J Appl Physiol* 2008;105:1366-7.

Other

Ettrup A. Anders' grisebasser skal sladre om Alzheimers. Pharma 2008:14-17.

Frøkjær V. Stress er arveligt. Brunch, TV2 02.10.2008

<http://www.lorry.dk/moduler/nyheder/showregvideo.asp?dato=02-10-2008&cID=5&vId=446827>

Jensen CG. Neurobiologi og den frie vilje - en kritisk læsning af John R. Searles bevidsthedsfilosofi. Psykolog Nyt 2008;10:20-21.

Jensen CG. Sommer-effekten: Global opvarmning øger menneskets voldelige tendenser. Weekendavisen 2008 (41), 51.

Knudsen GM. Hjernen og depression. Deadline 17.00, DR2 06.10.2008 (link ikke tilgængeligt).

Paulson OB. Forskerne har fundet det: Her er dit eget spillecenter. Interviewes af Søren Frandsen. Ekstrabladet 14. oktober 2008.

Pinborg L. Stress ligger i generne. IndenRigs 22.09.2008.

Pinborg L. 5-HT2A, tvillinger og sårbarhed overfor stress. TV2 Nyhederne 05.12.2008.

Rasmussen H, Knudsen GM, Glenthøj B. Visualisering af skizofreni. BestPractise 2008:12-15.

Multicenterundersøgelser uden medforfatterskab

Baezner H, Blahak C, Poggesi A, Pantoni L, Inzitari D, Chabriat H, Erkinjuntti T, Fazekas F, Ferro JM, Langhorne P, O'Brien J, Scheltens P, Visser MC, Wahlund LO, Waldemar G, Wallin A, Hennerici MG; LADIS Study Group. Association of gait and balance disorders with age-related white matter change: the LADIS study. Neurology 2008;70:935-42.

Grouw AA, van der Flier WM, van Straaten EC, Pantoni L, Bastos-Leite AJ, Inzitari D, Erkinjuntti T, Wahlund LO, Ryberg C, Schmidt R, Fazekas F, Scheltens P, Barkhof F; LADIS Study Group. Reliability and sensitivity of visual scales versus volumetry for evaluating white matter hyperintensity progression. Cerebrovasc Dis 2008;25:247-53.

Grow AA, van der Flier WM, Fazekas F, van Straaten ECW, Pantoni L, Poggesi A, Inzitari D, Erkinjuntti T, Wahlund LO, Waldemar G, Schmidt R, Scheltens P, Barkhof F; LADIS Study Group. Progression of white matter hyperintensities and incidence of new lacunes over a 3-year period: the leukoaraiosis and disability study. Stroke 2008;39:1414-20.

5. Other Activities

5.1 Congress Participation

The staff of NRU has participated in 33 international and national meetings and congresses related to their research fields. Staff members have participated as evaluators of abstracts and as chairmen at scientific sessions.

5.2 Congress/Symposium Organizing

Member of the Scientific Programme Committee for Brain09 and BrainPET09, July 2009, Chicago (Gitte Moos Knudsen)

Member of the Scientific Programme Committee for ECNP Congress, 12-16 September 2009 (Gitte Moos Knudsen)

5.3 Pre- and Postgraduate Teaching

PhD-course: Basic Kinetic Modeling in Molecular Imaging, Copenhagen, 4.-8.2.2008 (Gitte Moos Knudsen)

NRU organizes every other week seminars open to the public within the areas of NRU research interests. The meetings are announced on the homepage <http://nru.dk/meetings/FIG>.

On December 12, 2008, NRU organized an open-to-the-public one day symposium where scientists from NRU presented their most recent data.

Pregraduate Supervision:

Master thesis: Lisbeth Kirkegaard, biology student: Glucocorticoid receptor involvement in depression. Investigation of serotonin receptor 4 levels and serotonin fiber density in hippocampus of mice (supervisor: Susana Aznar).

OSVAL II: Sofi Anna Kann, medical student: The role of serotonin in the central regulation of energy balance (supervisor: Gitte Moos Knudsen).

Master thesis: Anders Ettrup, human biology student: A porcine model of serotonin depletion - Validation and changes in serotonin receptor levels (supervisor: Gitte Moos Knudsen).

5.4 International Exchange

PhD-student Cecilie Løe Licht: Department of Pharmacology, Oxford.

PhD-student Anders Bue Marcussen: Sackler School of Graduate Medical Sciences, Tufts University, Boston.

PhD-student Mikael Palner: PET-center, Toronto, Canada, and Columbia University, New York

5.5 National and International Committees

National Committees:

Vice Chairman, Department of Neurology, Psychiatry and Sensory Sciences, University of Copenhagen (Olaf B. Paulson)

Chairman of the Research Committee of the Neuroscience Centre at Rigshospitalet (Olaf B. Paulson)

Member of the Research Committee of Hvidovre Hospital (Olaf B. Paulson)

President of the Danish Society of Neurology (Olaf B. Paulson)

Member of the board of directors of the Elsass Foundation (Olaf B. Paulson)

Board Member of the NeuroCluster, Health Science Faculty, Copenhagen University (Gitte Moos Knudsen)

Steering group member of the Danish Society for Neuroscience since 1997 (Gitte Moos Knudsen)
Chairman for the steering group for research laboratories at Rigshospitalet from 1999 (Gitte Moos Knudsen)

Member of the Steering Group for the Neurocluster, Health Science Faculty, since 2004 (Gitte Moos Knudsen)

HR representative committee member of Biologue since 2007 (Gitte Moos Knudsen)

Formand for neurogruppen vedr Forskningsindikatorer, Forskning- og innovations-styrelsen 2008 (Gitte Moos Knudsen)

Medlem af Sundhedsstyrelsens specialarbejdsgruppe for neurologi (Olaf B. Paulson).

International Committees:

Member of the Editorial Board of the Journal of Cerebral Blood Flow and Metabolism from 2000 (Gitte Moos Knudsen)

Member of the Steering Group for the Network of Excellence Diagnostic Molecular Imaging (DiMI) since 2005 (Gitte Moos Knudsen)

International scientific advisor for Brain Imaging Centre West, Jülich, Germany (Gitte Moos Knudsen)

Scientific Advisory Board Member, Health Science Faculty, University of Lund since 2008 (Gitte Moos Knudsen)

Scientific Advisory Board Member, NevroNor, The Norwegian Research Council since 2008 (Gitte Moos Knudsen)

Evaluation:

Evaluator of PhD-thesis: Line Michan: Evaluation of pre-clinical models of obsessive-compulsive disorder (Gitte Moos Knudsen).

Evaluation of PhD-thesis: Thomas Dethloff: Identification of factors responsible for impairment of cerebral blood flow autoregulation in acute liver failure (Olaf B. Paulson).

Evaluation Site-Visit, Uppsala Berzelii Centra, Vinnova, Stockholm (Gitte Moos Knudsen).

External examiner at the Technical University of Denmark and Aalborg University (Claus Svarer)

Finally, staff members of NRU regularly conduct peer-reviews for several international journals and at international congresses.

6. SPECT Laboratory

A total of 403 clinical scans have been performed in 2008, 108 with the dopamine transporter ligand ^{123}I -PE2I, the remaining with $^{99\text{m}}\text{Tc}$ -SHMPO.

During 2008, subtraction of interictal from ictal SPET images with subsequent coregistration with MRI (SISCOM) has been fully implemented as a useful diagnostic tool for identifying the epileptogenic region. The method has been fully standardized and quality assured (Analyze 8.1).

Research projects carried out in 2008

- Required time delay from $^{99\text{m}}\text{Tc}$ -HMPAO injection to SPET data acquisition: Healthy subjects and patients with abnormal rCBF pattern
([Eur J Nucl Med Mol Imaging](#), 2008 Dec;35(12):2212-9.)
- Reproducibility of ^{123}I PE2I SPET in patients with decreased striatal dopamine transporter availability and clinical impact of MRI co-registration.
- ^{123}I -PE2I SPECT as a diagnostic tool in clinically uncertain parkinsonian syndromes
- European database of ^{123}I -FP-CIT(DatSCAN) SPECT scans of healthy controls (ENC-DAT)
- Head-to-head comparison of the DAT tracers ^{123}I -PE2I and ^{123}I -FP-CIT in healthy subjects
- Energy correction for both scatter and downscatter for I-123 in SPECT-studies
- Computer simulation for the elamination of optimal low-pass fliter cut-off frequency

7. Acknowledgements

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Dagmar Marshalls Fond

Danish Agency for Science, Technology and Innovation

Danish Medical Research Council

Emmy Lange f. Kramps Legat

Fonden til Lægevidenskabens Fremme

Gangstedfonden

Helen og Ejnar Bjørnows Fond

H:S - Copenhagen Hospital Corporation

Kong Chr. X's Fond

Rigshospitalets Jubilæumsfond

Savværksejer Jeppe Juhl og hustru Ovita Juhls Mindelegat

The Alfred Benzon Foundation

The Augustinus Foundation

The Capital Region of Denmark

The Health Insurance Foundation

The Lundbeck Foundation

The Novo Nordisk Foundation

The Research Council of Rigshospitalet

University of Copenhagen, Faculty of Health Sciences and the Neuro Cluster

International research funding:

EU 6th Framework program

EU 7th Framework program