



# Research Annual Report 2012



## Graduate School Neurosciences Amsterdam Rotterdam (ONWAR)

Neurobiology of mood disorders

Plasticity and dynamics of sensori-motor systems

**EMC ONWAR-01-58-02 - Neurobiology of mood disorders**

***Programme (brief description)***

Despite remarkable treatment advances over the past century, mood disorders remain among the most severe and intractable mental illnesses. Undoubtedly, the incomplete clinical repertoire for the diagnosis, treatment and prevention of mood disorders results from our historically limited understanding of the relevant neurobiology. However, recent advances in brain imaging, epidemiology, and genetics have laid a strong foundation for a detailed neurobiology. Accordingly, our research programme comprises both highly focused clinical studies and translational neurobiology. The four core elements of our programme include the translational neurobiological research laboratory of Steven Kushner, the O3 mental health network of Professor Niels Mulder, the Women’s Mental Health program and a prospective biobank. Importantly, a key strategy in our efforts is the synergy between scientific research (knowledge generation), education (knowledge transfer) and patient care activities (knowledge application). Further, our research focus is also aligned with the core strengths of our clinical department, and regards neurobiological studies of mood disorders with an emphasis on serious, treatment-resistant and peripartum uni- and bipolar depression. This sharp focus is being coordinated the highly successful epidemiological cohorts of the Erasmus MC (Generation R, ERGO) and with strong (pre) clinical departments, such as Neuroscience, Immunology, Obstetrics, Anaesthesia and Genetics. Importantly, our programme is also synergistic within 3 major domains of the Erasmus MC academische component: weesziekten, obesity and "klaar voor een kind". Together, these elements are mutually reinforcing and contribute to the central focus of our research programme.

Using an endophenotype-based approach in collaboration with the department of Neuroscience, we use state-of-the-art methods for temporally and spatially-restricted manipulations of gene expression and electrophysiological activity within defined neural circuits to uncover the causal links between neurobiology and behavior. In particular, we have focused our efforts on the translational neurobiology of social behavior and emotional learning. Thus far, we have demonstrated a novel mechanism by which neurons are selected for participation in a memory network based upon a competitive selection process driven by neuronal excitability. Further, the GEZIN studie (GEnetische Zoektocht In Neuropsychiatrische stoornissen) utilizes patient-derived neurons to investigate the molecular and cellular mechanisms of severe mental illness, in close collaboration with the department of Clinical Genetics and the Erasmus MC Stem Cell Institute. To avoid heterogeneity caused by the wide range of clinical phenomenology, we have focused our efforts on families with a high incidence of severe mental illness, identified through a large collaboration with psychiatric institutions throughout The Netherlands. Next-generation deep sequencing methods are being applied to identify the specific genetic variants underlying the psychiatric disturbance in each individual family. In parallel, patient-specific induced pluripotent stem cell (iPS) cultures provide the highly unique opportunity to study neural cell cultures derived from each individual participant. For the first time in the field of psychiatry, we can now study the neural development and physiology of cells that are entirely derived from patients, to develop neurobiologically-inspired treatments for severe mental illness.

***Key Figures***

<b><i>Department</i></b>	<b><i>Sp1</i></b>	<b><i>Sp2</i></b>	<b><i>Sp3</i></b>	<b><i>Sp4</i></b>	<b><i>SpTot</i></b>	<b><i>T1</i></b>	<b><i>T2</i></b>	<b><i>T3</i></b>	<b><i>Ttot</i></b>	<b><i>IS</i></b>	<b><i>FS</i></b>	<b><i>OP</i></b>	<b><i>Ptot</i></b>
neurosciences	0,05				0,05								
pediatric													
psychiatry	0,1				0,1								
psychiatry	9,19	3,45		1,5	14,14								
<b><i>Total</i></b>	<b><i>9,34</i></b>	<b><i>3,45</i></b>	<b><i>0</i></b>	<b><i>1,5</i></b>	<b><i>14,29</i></b>	<b><i>1</i></b>	<b><i>1</i></b>	<b><i>0</i></b>	<b><i>2</i></b>	<b><i>52</i></b>	<b><i>9</i></b>	<b><i>19</i></b>	<b><i>82</i></b>

### **Thesis**

Bergink, V. (2012, oktober 31). *First-onset postpartum psychosis*. EUR (155 pag.). Prom./coprom.: Prof. Dr. S.A. Kushner & Prof. Dr. H.A. Drexhage.

### **Article/Letter to the editor**

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#### **Book Editorship**

Peplinkhuizen, L., Verhoeven, W.M.A. & Sitsen, JMA (Eds.). (2012). *Het psychiatrisch formularium. Een praktische leidraad. 7e editie*. Houten: Bohn Stafleu van Loghum.



**EMC ONWAR-01-94-01 - Plasticity and dynamics of sensori-motor systems*****Programme (brief description)***

The central theme of research at the Department of Neuroscience is "Plasticity and Dynamics of Sensori-Motor Systems". This central theme is investigated by 18 groups using a variety of technical approaches, including molecular biology, cell biology and physiology, neuroanatomy, systems electrophysiology, and behavioral and clinical studies. At the systems level the research topics of the individual groups focus on transduction mechanisms or motor learning. Of special interest are the interactions of visual, auditory, vestibular or proprioceptive sensory inputs with motor outputs such as the oculomotor system, locomotion, and hand and neck movements. At the cellular level the research topics center around the synaptic mechanisms underlying these dynamic and plastic processes.

***Key Figures***

<b><i>Department</i></b>	<b><i>Sp1</i></b>	<b><i>Sp2</i></b>	<b><i>Sp3</i></b>	<b><i>Sp4</i></b>	<b><i>SpTot</i></b>	<b><i>T1</i></b>	<b><i>T2</i></b>	<b><i>T3</i></b>	<b><i>Ttot</i></b>	<b><i>IS</i></b>	<b><i>FS</i></b>	<b><i>OP</i></b>	<b><i>Ptot</i></b>
neurosciences	20,18	20,14	5,1	1,94	47,36								
otorhinolaryngology				0,75	0,75								
<b><i>Total</i></b>	<b><i>20,18</i></b>	<b><i>20,14</i></b>	<b><i>5,1</i></b>	<b><i>2,69</i></b>	<b><i>48,11</i></b>	<b><i>3</i></b>	<b><i>0</i></b>	<b><i>0</i></b>	<b><i>3</i></b>	<b><i>102</i></b>	<b><i>12</i></b>	<b><i>0</i></b>	<b><i>117</i></b>

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***Article/Letter to the editor***

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**Part of book - Abstract**

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