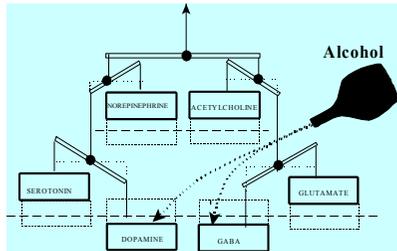


# Systems Neuropsychiatry of Stress, Anxiety and Addiction - an integrated view -

May, Fri 03 / Sat 04, 2013

9<sup>th</sup> International Workshop on  
*Computational Neuropsychiatry*



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University of Munich  
Alois-Alzheimer-Saal  
Nussbaumstrasse 7  
Munich, Germany

Supported by:



## Preamble

Today, neuropsychiatry is facing the challenge to 'understand' an overwhelming amount of data. It is assumed that empirical findings can 'explain' clinical phenomena and lead the development to new therapeutic tools. However, 'complexity' and 'dynamics' of the brain are the methodological key challenges for current theories in neurobiology which need new approaches for understanding. We think this approach could be based on *systems methodology*. Systems methodology can be characterised by a multi-level approach, by mathematical tools of complexity reduction and formal and computational modelling, aiming at computer-based in-silico experimentation. The systems approach is closely related to in-vivo and in-vitro experimentation developing its ideas in an interactive way. In this field systems scientists, experimental neurobiologists and clinicians work together in order to improve the understanding of mental disorders on a biological basis.

In this context, in our 9th symposium on 'Systems Neuropsychiatry', we will discuss integrative concepts of 'Stress, Anxiety and Addiction'. Here, we would like to present integrated functional knowledge of circuits of stress and anxiety (McEwen, Panksepp) which are interconnected with circuits of addiction (Volkow). Risk factors for addiction like 'impulsivity' (Everitt) are key factors to be discussed from an interdisciplinary perspective. Concepts like 'regulation', 'dysbalance', 'adaptation' (Allostasis; Koob & LeMoal) are crucial in this macro-structural context. Regarding the biochemical level, the dopaminergic transmission system is essential for acquiring addictive dispositions by reward mechanisms, but it is not the whole story: reward itself is a complex process (Berridge) and should be related to the opposing process of punishment, for instance the serotonergic transmission system (Dayan). Also, the nonlinear dynamics of synaptic dopaminergic computation have to be discussed with the aid of computational models (Voit).

One special role is played by the endocannabinoid system, which is mainly inhibiting the electrical reactivity of the respective neuron and even has retrograde presynaptic signalling properties. Additionally, the intracellular molecular signalling network, connected to dopamine signalling pathways, is analysed by exploratory computational models. Finally, the interplay between the genome, the proteome, the transcriptome and the epigenome (Nestler) is being explored.

The symposium aims to find a better understanding of the pathways from stress and anxiety to addiction, as one of the most important public health issues.

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Department of Pharmacology, University of Frankfurt

## PROGRAMME

(45 min = 30 min talk, 15 min discussion;  
30 min = 20 min talk, 10 min discussion)

----- Friday, May 03, 2013 -----

### 13.00 Welcome

#### INTRODUCTION

Oliver POGARELL / Felix TRETTER / Margot  
ALBUS / Dan RUJESCU / Chris TURCK /  
Werner MEWES / Eva MEISENZ AHL

#### CLINICAL ASPECTS

13.15 Moderation: John DITTAMI (Behavioural  
Biology, Univ. of Vienna, A)

**Felix TRETTER (Dept. of Addiction, IAK-  
KMO, Munich, G)**

**Perspectives of systems neuropsychiatry of  
stress, anxiety and addiction**

14.00 Moderation: Andreas DRAGUHN  
(Physiology, Univ. of Heidelberg, G)

**Andreas J. FALLGATTER (Dept. of  
Psychiatry, Univ. of Tübingen, G)**

**The Neurobiology of stress and anxiety**

### 14.45 Break

15.00 Moderation: Ulrich MANSMANN  
(Bioinformatics, Univ. of Munich, G)

**Ulrich ZIMMERMANN (Dept. of Psychiatry,  
Univ. of Dresden, G)**

**Neurobiology of stress and addiction**

15.45 Moderation: Eva MEISENZ AHL  
(Psychiatry, Univ. of Munich, G)

**Boris TABAKOFF (Dept. of Pharmacology,  
Univ. of Colorado, Denver, USA)**

**Molecular neurobiology of alcoholism and  
new treatment options**

### 16.30 Break

17.00 Moderation: Oliver POGARELL (Dept. of  
Psychiatry, Univ. of Munich, G)

**Barry EVERITT (Downing College Cambridge, UK)**

**Vulnerability: neural circuits and switches from  
impulsivity to compulsivity**

17.45 Moderation: Dan RUJESCU (Dept. of Psychiatry  
Univ. of Halle, G)

**Philippe DE WITTE (Univ. of Louvain, B)**

**Imbalance between neuroexcitatory and -inhibitory  
amino acids causes craving for nicotine and ethanol**

#### KEYNOTE LECTURE

18.30 Moderation: Matthias MUNK (MPI Biol.  
Cybernetics, Tübingen, G)

**Viktor JIRSA (Univ. of Marseille, F)**

**The Human Connectome Project**

19.15 Invited Discussant: Hans-Werner MEWES

20.00 End

20.30 Dinner

----- Saturday, May 04, 2013 -----

#### BASIC RESEARCH

09.00 Moderation: Hans BRAUN (Physiology, Univ. of  
Marburg, G)

**Rafael MALDONADO (Neuropharmacology, Univ.  
of Pompeu Fabra, Barcelona, E)**

**Information processing in the endocannabinoid  
system**

9.45 Moderation: Michael ZEHETLEITNER  
(Psychology, Univ. of Munich, G)

**Chris TURCK (MPI for Psychiatry, Munich, G)**  
**Anxiety biosignatures**

10.15 Moderation: Stephan SELLMAIER  
(Neurophilosophy, Univ. of Munich, G)

**Maurizio POPOLI (Neuropharmacology, Univ.  
of Milan, I)**

**Epigenetic regulation in the stress response and  
vulnerability for neuropsychiatric disorders**

### 10.45 Break

11.15 Moderation: Uwe AN DER HEIDEN (Chair  
of Mathematics, Witten-Herdecke, G)

**Francois IRIS (bmsystems, Paris, F)**

**Molecular pathways of anxiety**

11.45 Moderation: Peter GEBICKE-HAERTER  
(Mannheim, G and Chile )

**Eberhard VOIT & Zen QUI (Georgia Institute  
of Technology, Georgia, USA)**

**Molecular biological mechanisms of addiction**

12.15 Moderation: Gustavo DECO (Univ. of  
Barcelona, E)

**Boris GUTKIN (École Normale Supérieure,  
Paris, F)**

**Computational model of mechanisms of  
addictions**

### 13.00 FINAL DISCUSSION

Moderation: Oliver POGARELL / Dan RUJESCU /  
Felix TRETTER

### 13.30 END OF WORKSHOP