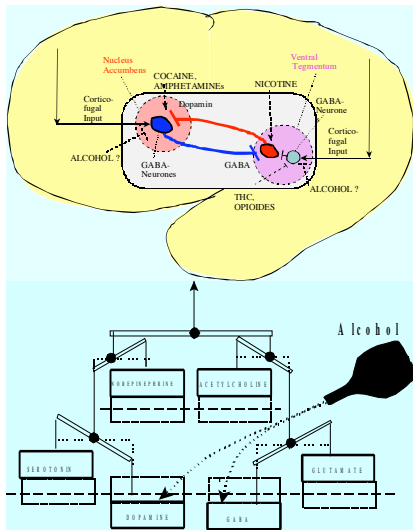


Systembiologie der Sucht (Systems Biology of Addiction)

- Version Feb 08 -

4th International Workshop on
Computational Neuropsychiatry

April 18th/19th 2008



IAK Clinic Munich East / Munich (FRG)
(IAK Klinikum München Ost / München)

Vockestr. 72
85540 Haar

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Preamble (draft)

Analysis of biological mechanisms in addiction has proceeded in the last years. Many data are obtained by imaging studies and by experimental molecular biology and pharmacology. Development of addiction, addiction memory, craving and relapse are related to neurobiological mechanisms. Only in the latest years some researchers tried to put together the pieces of neurobiological knowledge in order to obtain an integrated view. The functional relevance of *macrocircuits* in the brain – e.g. projections from the prefrontal cortex to subcortical areas or projections from the midbrain to limbic structures – can be seen now in an operationally closed network that is controlling the behavior by the *dynamic balance of activation* by the brain stem and by *inhibition* mediated by the cortex. The loss of behavioral control can be explained by a dysfunctional network activity of the prefrontal cortex. With regard to this it must be stated that the most important theoretical steps were made by understanding the brain as a system of closed loops that are able to optimize themselves. The opponent-process theory of Solomon now can be translated into a neurobiological concept as it was proposed by by Koob and LeMoal by their concept of “*allostatic*” and *homeostatic neuronal mechanisms*. This model allows to understand the dynamics of the development of addiction on a macro- (and micro-)level of the brain.

Additionally, as the brain must be understood as a dynamic multi-level system the local neuronal networks of the various nuclei in the brain (e.g. Nucleus accumbens, Amygdala) have to be

considered. Here we have the task to understand the interaction between the various neurochemical systems like glutamate, dopamine, serotonin and GABA converging onto these nuclei (“*neurochemical mobile*”). These molecular mechanisms were analyzed in detail by the work of Nestler et al. Finally, on the molecular level of the synapses and also with regard to the intracellular signaling networks we need a comprehensive understanding of the cell as a living system.

The main challenge of understanding addiction from a system’s perspective is the structural and functional complexity of the brain. For this reason theoretical neuropsychiatry needs the tools of systems science like systemic modeling and computer simulations.

With this aim we started a series of workshops on “*Computational Neuropsychiatry*” in order to relate psychiatry to *computational modeling* in theoretical neuroscience in 2005. These workshops are designed as *communicational meetings* between theoreticians such as *systems scientists*, *computational scientists* and empirical researchers such as *neuropsychiatrists* and *neurobiologists*. We started with a workshop with Arvid Carlsson and discussed his models of networks of schizophrenia. In 2006 we organized a second workshop in order to discuss clinical and experimental data and theoretical concepts of disturbances of the working memory as they are observed in

patients with schizophrenia. In 2007 we discussed the perspective of Molecular Systems Biology on schizophrenia. For 2008, we would like to apply these experiences on addiction.

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Program (Version: Dez 07):

Friday (Little Theatre)

PUBLIC PART - overviews

2.30 pm Opening of Workshop
Margot ALBUS,
Felix TRETTER

Introductory remarks

3.00 pm **Molekulare Neurobiologie der Sucht (Molecular Neurobiology of addiction)**

Rainer SPANAGEL, Centre for mental health, Mannheim (FRG)

Moderation:

Uwe AN DER HEIDEN, Univ. Witten (FRG)

Otto LESCH, Univ. Vienna (A)

3.30 pm Discussion

3.45 pm **The path to addiction as staged by neuropathologies**

Michel LE MOAL, Univ. Bordeaux, FR

Moderation:

Gustavo DECO, Univ. Barcelona (E)

Hans BRAUN, Univ. Marburg (FRG)

4.30 pm Discussion

4.45 pm Break

5.00 pm **Die intrazelluläre Signaltransduktion im Opiatsystem. (The intracellular signal transduction of the opiate system)**

Volker HÖLLT, Univ. Magdeburg (FRG)

Moderation:

Eduardo MENDOZA, Univ. Munich (FRG)

Michael KOCH, Univ. Bremen, (FRG)

5.45 pm Discussion

6.00 pm **Das intrazelluläre Dopamin – Signalnetzwerk**

(Intracellular Dopamine Signaling Network)

Anita HANSSON, NIH- NIAAA Bethesda (USA)

Moderation:

Jürgen GALLINAT, Univ. Berlin (FRG)

Walter E.MÜLLER, Inst. Pharmacology, Univ. Frankfurt (FRG)

6.45 pm Discussion

7.00 pm General discussion

8.00 pm Dinner with speakers

Saturday (Spiegelsaal, New Casino) WORKSHOP

9.00 **Introduction – more details**

Margot ALBUS, Felix TRETTER,

9.30 **Molecular biology of the functional structure of the reward System**

Bo SÖDERPALM, Univ. Goteborg(S)

Moderation:

Peter GEBICKE-HAERTER, Centre for mental health, Mannheim (FRG)

10.00 Discussion

10.15 **The Simulation of drug addiction**

Serge AHMED, Univ. Bordeaux

Moderation:

Oliver POGARELL, Univ. Munich (FRG)

10.45 Discussion

11.00 Break

11.15 **Modeling nicotine dependence**

Boris GUTKIN, Group of Neural Theory, College de France & DEC-ENS, Paris (F)

Moderation:

Daniel DURSTEWITZ, Univ. Plymouth (UK)

Georg WINTERER, Univ. Düsseldorf

11.45 Discussion

12.00 **Modeling the dopamine pathways**

Lu LI / Nicolas LENOVERE, EMBL-EBI, Cambridge.

Moderation:

Dan RUJESCU, Univ. Munich

Hans ROMMELSPACHER, FU Berlin, (FRG)

12.45 Discussion

1.00 pm **The tools and problems of systemic modeling**

Eduardo MENDOZA, Univ. Munich (FRG)

Moderation:

Heinrich KÜFNER, IFT Munich

1.30 End of Workshop / Lunch