University Hospital Heidelberg

Clin. Neurobiology | DKFZ A230 | INF 280 | 69120 Heidelberg

Dr. Magdalene Schlesiger
Dept. Clinical Neurobiology,
Heidelberg

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I am looking for Ph.D. and Master's students with strong analytical/computational background and an interest in experimental Neuroscience to work on a joint project between the Schlesiger lab (Uniklinikum und DKFZ, Heidelberg, Department Prof. Hannah Monyer) and the Leibold lab (Group for Theoretical Systems Neuroscience, Freiburg University).

https://www.izn.uni-heidelberg.de/en/research/izn-investigators/dr-magdalene-schlesiger
https://www.uni-heidelberg.de/de/newsroom/hochdotierte-foerderung-des-erc-fuer-heidelberger-nachwuchswissenschaftlerin
https://www.bio.uni-freiburg.de/ag/leibold
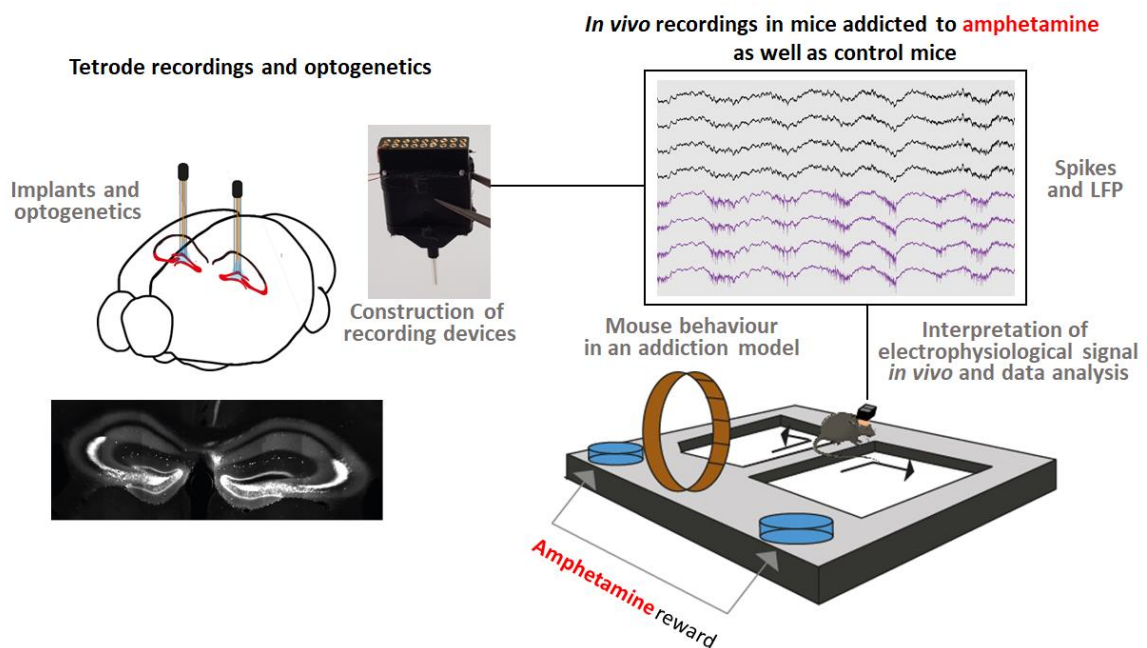
Project description

Addiction to drugs is a ubiquitous neuropathological disease that imposes immense societal costs. A core aspect of addiction that poses a major challenge for effective treatment is the propensity to relapse in contexts where drugs were previously taken. An in-depth understanding of the circuitry and neuropathology linking drug consumption to memory and ultimately triggering context-induced drug seeking are at the core of our projects. Specifically, we investigate how input from a key component of the brain's reward system, mesolimbic dopaminergic neurons, influences neuronal activity in areas crucial for episodic memory formation, such as the hippocampus and entorhinal cortex. Addiction-triggered neuronal changes are measured using *in vivo* electrophysiological recordings from large ensembles of neurons in behavioural tasks that model various aspects of addiction in mice. This is combined with virus-mediated circuit analysis involving opto- and chemogenetics to reverse the drug-induced maladaptive neuronal changes and prevent relapse to drug use.

Our approach not only relies on a large variety of modern experimental methods but also involves a strong analytical component including the processing and statistical analysis of complex neuronal data sets, the development of efficient analysis pipelines and the programming of deep-learning software for the automatization of behavioural experiments.
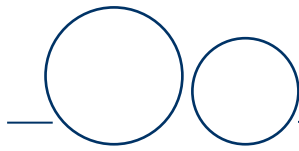
We are hiring students who will complement our team of in vivo electrophysiologists and behavioural neuroscientists with expertise in data science and machine learning. Putative students will work in the Schlesiger laboratory in Heidelberg on projects that are predominantly data analytical with optional experimental components, particularly closed-loop control of experiments. They will additionally benefit from co-supervision and training in computational and statistical methods by Prof. Christian Leibold at Freiburg University.
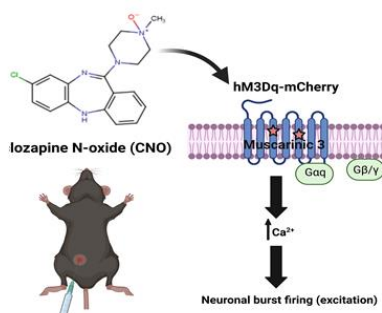
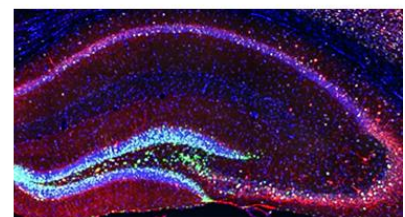## Summary of experimental methods used in our lab

Tetrode recordings and optogenetics

In vivo **recordings in mice addicted to amphetamine as well as control mice**

Implants and optogenetics

Construction of recording devices

Spikes and LFP

Mouse behaviour in an addiction model

Interpretation of electrophysiological signal *in vivo* and data analysis

Amphetamine reward

Additional methods

Stereotaxic surgery

Chemogentetics + behaviour

hM3Dq-mCherry

lozapine N-oxide (CNO)

Muscarinic 3

Gaq   Gβ/γ

↑Ca²⁺

Neuronal burst firing (excitation)
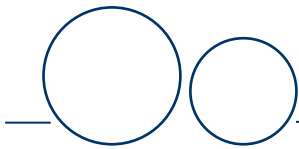
Stereotaxic virus injections
+
Immunohistochemistry
+
Confocal microscopy

How to apply?

Please send your application to Dr. Magdalena Schlesiger (m.schlesiger@dkfz-heidelberg.de). Ph.D. application will benefit from supporting documents such as reference and motivation letters.

Master's students will receive a Hiwi salary, Ph.D. positions are 65% E13.