

## Presentation of scientific institutions

Kristina Endres\* and Simone Eggert\*

# Forschungskolleg “NeurodegX”

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*„Isolation and characterization of neuroprotective substances from fungi and cyanobacteria as potential substances for treatment of neurodegenerative diseases“*

In 2018, a new concept for a research college (Forschungskolleg) has been established: the “Forschungskolleg Rheinland-Pfalz”. This funding was especially conceptualized by the Ministry of Science to support cooperation between Universities of Applied Sciences and academic universities, which will promote students from the Universities of Applied Sciences to receive a doctoral degree. Four research colleges of this type are currently funded and in 2020, two more are going to be included. In 2019, a joint project proposal „Neuroprotective substances – NeurodegX“ from the Technical University (TU) Kaiserslautern and the Johannes Gutenberg University (JGU) Mainz as well as the University of Applied Sciences Kaiserslautern (HS Kaiserslautern) was positively evaluated. As PIs Simone Eggert, Gerhard Erkel, Stefan Kins, and Michael Schroda (Technical University Kaiserslautern), Tanja Brigadski, Bernd Bufe, Peter Groß, Michael Lakatos, Holger Rabe, and Karl-Herbert

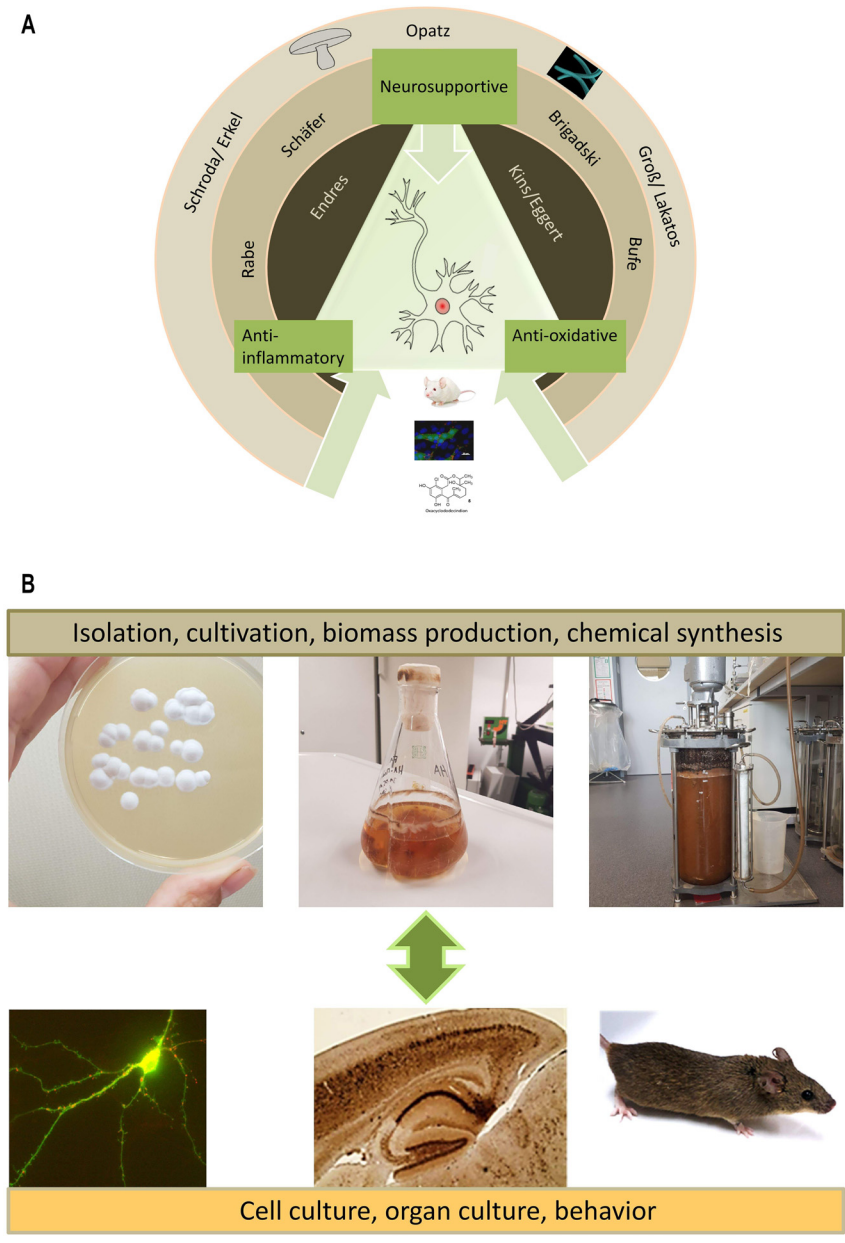
Schäfer (University of Applied Sciences Kaiserslautern) as well as Kristina Endres and Till Opatz (Johannes Gutenberg-University Mainz) are participating (<https://www.hs-kl.de/verbundvorhaben/neurodegx>). A total of eight doctoral students, performing their thesis in eight different labs (see Figure 1), benefits directly from this support.

The scientific focus of this cooperation is to identify natural compounds from fungi and cyanobacteria and to test them for their potential therapeutic effect on neurodegenerative diseases such as Alzheimer’s dementia. While over 30 million patients are currently suffering from Alzheimer’s disease worldwide, only drugs for the treatment of symptoms are clinically available and there is an urgent need for innovative new drugs. According to the A $\beta$  hypothesis, the loss of nerve cells in Alzheimer’s disease patients is caused by accumulation and aggregation of the A $\beta$  peptide, which is derived by enzymatic cleavages of the amyloid precursor protein (APP).

Accordingly, within the framework of this consortium, active substances from differentially cultivated microorganisms will be identified. We aim to find antioxidative, anti-inflammatory and in the end neurosupportive drugs against neurotoxicity of the A $\beta$  peptide (Figure 1).

After initial mid-throughput screening using crude extracts and selected secondary cell lines, fractionation will identify potential candidate substances. These will – together with already known candidates from former pilot projects – be subjected to in-depth functional testing including electrophysiology and synaptogenesis in primary cell cultures of cortical but also enteric neurons. Finally, single candidates with the best outcome will be tested *in vivo* in transgenic mouse models of Alzheimer’s disease. The consortium provides a fungal and cyanobacterial biobank with various organisms that have even not been cultivatable before and has many years of expertise in identification of those organisms, their propagation and the isolation of substances. The broad chemical, biotechnical, cellular, and biomedical expertise of the aforementioned groups will promote interdisciplinary working and professional development of the PhD students integrated in the consortium.

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**Figure 1:** Structure and work schedule of NeurodegX. (A) Central goal of the consortium is the identification and characterization of new drugs from fungi or cyanobacteria for treatment of neurodegenerative diseases. Therefore, scientists from three institutions teamed up: the Technical University Kaiserslautern, the University of Applied Sciences Kaiserslautern and the Johannes Gutenberg-University Mainz. (B) With this, a combination of chemical, biotechnical, cellular, and biomedical expertise was gained, which provides a highly interdisciplinary working environment.