

Benefits for society

- New knowledge on the functions of the brain and the development of diseases
- New intervention strategies and therapies for diseases of the nervous system
- Training and qualification of young scientists
- Ensuring international competitiveness
- Strengthening Bavaria as a research location through innovative research in the field of neurosciences

Academic partners

- **Friedrich-Alexander-Universität Erlangen-Nürnberg**
Institute of Biochemistry
- **Universitätsklinikum Erlangen**
Department of Stem Cell Biology
Department of Molecular Neurology
- **Universität Regensburg**
Regensburg University Hospital:
Department of Neuropathology
- **Technical University of Munich**
Chair of Mathematical Modelling of Biological Systems
- **University of Passau**
Chair of Constitutional and Administrative Law,
Public International Law, European and International
Economic Law

Collaborating partner

- **ETH Zurich, Switzerland**
Department of Biosystems Science and Engineering,
Basel (D-BSSE)

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Goals

- Better understanding the cell-cell interactions of the human brain
- Developing new platforms in order to analyse the function of the brain
- Developing new intervention strategies and therapies for diseases of the nervous system
- Analysing the current legal and ethical framework and defining potential amendments to address new therapeutic strategies
- Strengthening neurosciences in Bavaria and contributing to the dialogue between science and society



EXCELLENT
RESEARCH
IN BAVARIA

Bavarian Research Association

ForInter

Interaction of Human Brain Cells



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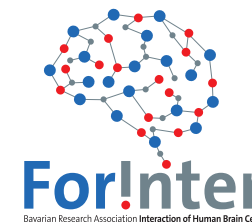
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 **Bavarian
Research Alliance**



Interaction of Human Brain Cells

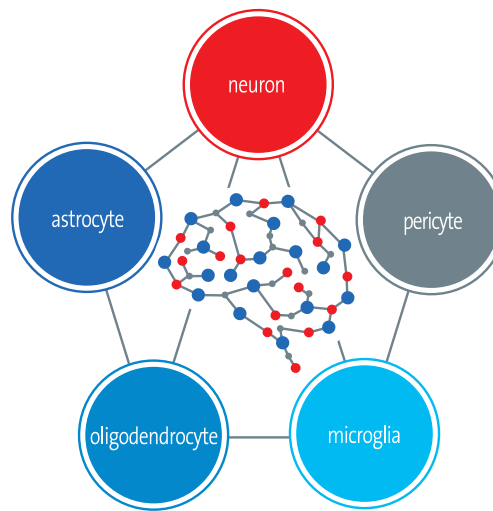
The human brain displays a complicated architecture of diverse and specialised cells, such as neurons, glial, and microglial cells. These cells form and interact in functional and dynamic circuits, thus providing the basis for the complex functions of the human brain.

Even though our understanding of the human brain has made tremendous advances in recent decades, many questions on the physiological and pathological functions of the human brain remain unanswered. For a deeper understanding, dynamic and functional investigations of the interaction between the different cells in the human brain are required. Therefore, the Bavarian Research Association **ForInter** aims to investigate the interaction between the different cell types in the human brain using multidimensional cell culture systems based on the following hypothesis:

Defined human cell-cell systems are able to model the physiological and pathological interactions of the cells in the human brain.

The achievements in biology and stem cell research of the past years have laid the foundation for the generation of multidimensional human cell-culture systems and brain organoids. These model systems promise new insights into the structural and dynamic interactions and allow the analysis of the physiological development of the human brain as well as of pathological processes.

ForInter unites scientists from the fields of neurobiology with expertise in basic biological and stem cell biological questions, neuropathology and translation in neurology. Scientists from the fields of bioinformatics, ethics and law complete the interdisciplinary expertise of the ForInter consortium.



Research Topics

- Physiological interaction of neural cells
- Interaction of neural cells during pathological conditions
- Bioinformatic methods for the analysis and modelling of the interactions of neural cells
- Ethical and legal issues concerning research on genome-edited stem cells and derived neural cells and human brain organoids as well as implications for clinical translation

The consortium provides **platforms** for:

- the generation of specific cell types and neural organoids
- co-cultures of different cell types of the nervous system in 2-dimensional or 3-dimensional structures

and furthermore, **state-of-the-art methodological skills, such as:**

- Single-cell RNA-seq analysis
- CRISPR/CAS 9 technology for genome editing
- Bioinformatic methods for data analysis



Organoid technology offers unique insights into human biology. Here, 3D brain organoids are generated from induced pluripotent stem cells.

Objectives of ForInter

ForInter aims at **better understanding the cell-cell interactions of the human brain** and **developing new platforms for the functional analysis of the brain**. The newly gained knowledge should result in **new intervention strategies** and **treatments of diseases of the central nervous system**.

New therapeutic concepts and substances also have great economic potential, thus ForInter intends to collaborate with pharmaceutical and biotech companies in the future.

The interdisciplinary approach and the resulting synergies will **strengthen Bavaria as an attractive location for science**, and in particular for neurosciences.

The application of brain organoids in research and therapy and technologies like genome editing may raise **ethical and legal questions**, which will be prospectively addressed and analysed.

Additionally, by providing more insight into these technologies, ForInter will actively contribute to the **dialogue between science and society**.