

## HISTOLOGY OF THE MAMMALIAN BRAIN

As a highly developed organ, the mammalian brain is the place of integration and processing of complex signals. For this purpose a large number of different cells closely cooperate. Almost all cell types react to ischemic stroke with specific, acute or delayed answer patterns. Those patterns can enhance or inhibit regeneration. Hence, apart from behavioral phenotyping and imaging techniques, histology is an important methodical buttress in the examination of neuroprotective and neurorestorative therapies. Only with these methods it is possible to register, quantify and evaluate processes of cellular integration, differentiation, and therapeutic modulation.

### Unique Feature

Histological analysis enables verification of therapeutic effects after measures of regeneration support. Furthermore, it allows us to create hypotheses on the basic mechanisms of such effects. These hypotheses can be the starting point for subsequent therapy protocol optimization. Ideally, it is therefore possible to generate not only improved therapy protocols, but also knowledge for trade mark rights.

### Methods

Conventional staining techniques and immunohistochemical procedures are used. Histological methodology is very complex and is directed towards the particular case.

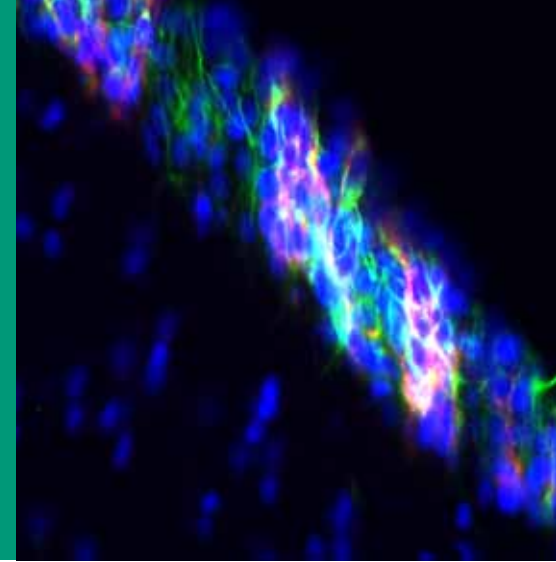
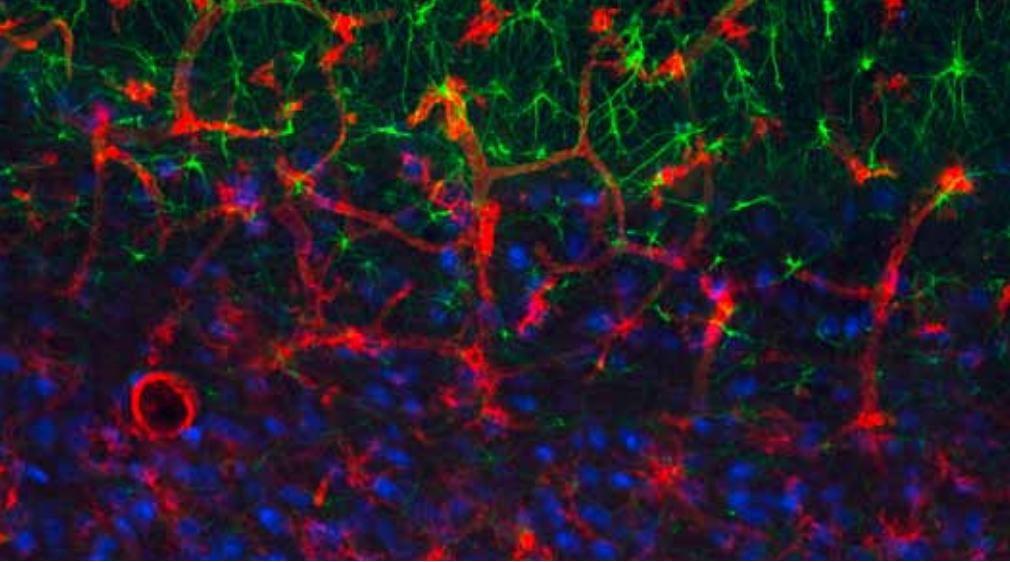
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### Investigation Methods

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- Overview staining: overview of infarct, tissue degeneration and regenerative processes
- Immunohistochemistry: representation of specific cell populations and cell interactions in cell culture, rat and sheep brain
- Stereology: quantification of discrete cellular events (e. g. density of astrocytes)
- Fluorescence microscopy
- Confocal microscopy: representation of cellular interactions and cellular functionality (by means of surface molecules)
- Staining techniques: representation of cell homing and integration

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### Selected Applications

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- Description of processes of cellular migration, differentiation and integration
- Description of processes of degeneration and regeneration after stroke
- Description of therapeutic influence on nerve cells and glia
- Safety and quality control: screening for tumor growth after cell therapy or local inflammation reactions after application of allogenic and xenogenic material
- Representation of neuro-, vaso- and glia genesis
- Representation of cellular processes as a correlate of regeneration

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### Reference Project

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If used alone, histological techniques are rarely suitable to examine spontaneous regenerative processes or experimental regenerative processes after stroke. Nevertheless, these tools are indispensable to study and validate regeneration on a cellular level or to interpret results in connection with other findings. The Neurorepair Research Group continuously researches the expansion of its histological portfolio, including conventional and immunohistochemical staining of the brain. All CNS cell populations of rat and sheep can be detected and examined for interactions. Overview pathology due to ischemic stroke is also part of this examination spectrum.