Research Institute for Applied Neurosciences

Neuroprotection after Oxygen- Glucose Deprivation (OGD) and Excitotoxic insult in Organotypic Hippocampal Slice Cultures (OHCs)

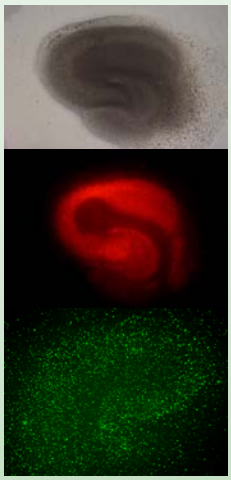
Compounds of interest can be assessed *in vitro* for their

- **Neuroprotective properties after OGD and Excitotoxic insult by glutamatergic agonist glutamate (Propidium iodide uptake)**
- **Toxicity**
- **Proliferative potential under physiological and pathological conditions**

Models

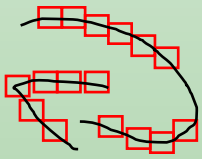
Cell degeneration assays

Neuronal cell death after oxygen-glucose deprivation (OGD) and glutamate or test compound application is assessed by densitometric measurement of propidium iodide (PI) uptake. Fluorescent images will be acquired semi-automatised (Nikon motorised stage; LUCIA software) and analysed by densitometry to quantify cell death (LUCIA Image analysis software). Cell death is expressed as % PI-uptake of the respective regions of interest (CA1, CA3). Apoptotic cell death can be assessed by a Caspase-3 assay.



Cell proliferation assay

Proliferating cells are labelled with Bromodeoxyuridine (BrdU). $BrdU^+$ cells (green) are counted to quantify proliferation in areas CA1, CA3 and AD.



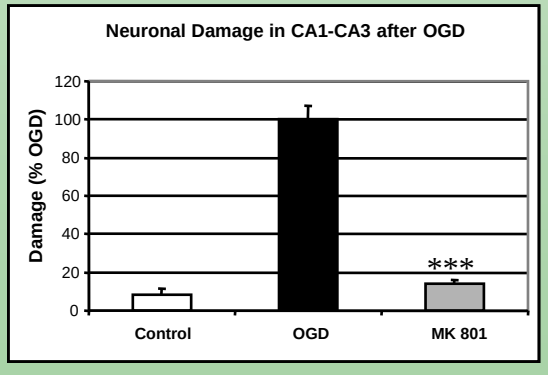


Fig.1 Quantification of neuronal cell death after OGD (area CA1-CA3) by PI uptake. OGD=Oxygen Glucose Deprivation. MK801=Treatment with 10µM neuroprotective reference substance. (n=8/bar)

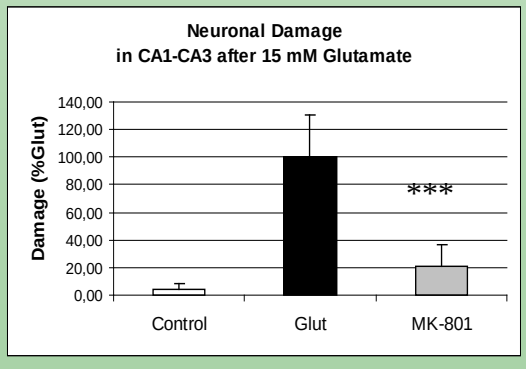


Fig.2 Quantification of neuronal cell death after Excitotoxic insult by glutamaterigic agonist glutamate (area CA1-CA3) by PI uptake.
(n=8/bar)

Electrophysiology in Brain Slices: Synaptic Transmission, Plasticity (LTP, LTD) and Oxygen- Glucose Deprivation

Scope of application

- **Evaluation of drug effects on synaptic transmission related to dementias as well as cognition enhancement**
- **Electrophysiological mouse phenotyping of knock- out, knock- in and transgenic mice**
- **Safety pharmacology (detection of side effects of putative therapeutics)**
- **Evaluation of neuroprotective compounds**

Characterisation of basic synaptic transmission and excitability

Extracellular recording of field potentials (field-EPSP, population spike) in hippocampal slices from adult rats or mice in a submerged-type chamber; evaluation of paired-pulse inhibition and paired-pulse facilitation as well as different types of short-term plasticity.

Long- term potentiation (LTP) and long- term depression (LTD)

Long-term recording of different types of LTP and LTD (e.g. weak, strong) up to 5 hours.

Oxygen- Glucose Deprivation

Restitution of the population spikes in area CA1 of acutely isolated hippocampal slices from adult rats/mice kept in an interface type recording chamber are taken as functional read-out for neuronal damage.