

## New electrophysiological database for the screening of CNS drugs



The German company NeuroProof GmbH has developed a database containing the electrophysiological action profiles of over 100 substances. The company uses primary neuronal cell cultures cultivated on microelectrode array neurochips which record and analyse the electrical pattern of the action potentials of individual nerve cells in complex networks. Data analysis is based on proprietary methods of pattern recognition and similarity analysis developed by the company.

The combination of these optimised methods permits the precise electrophysiological description and differentiation of the effects of substances on the central nervous system. Depending on the brain region tested and the substance with which the neuronal network is chemically stimulated, the electrical action potential pattern changes distinguishable in a way comparable with the changes visible on an EEG. The advantage of this method is that most of the physiological *in vivo* targets of potential drugs are present in the *in vitro* system. This opens the way for the discovery of completely new and unexpected mechanisms of action. Using complex methods of data analysis the company's scientists have identified those parameters of the activity patterns which are of particular significance in the analysis of activity changes. They were also able to show that even substances with similar mechanisms of action can cause differentiable changes in activity patterns as a result of differences in the structure of receptor subtypes in different tissues.

The current version of this first completed substance data base documents the effect of substances on the frontal cortex of the mouse. This region of the brain plays a crucial role in all cognitive processes. The database contains substances from all the main classes, classified according to G protein-coupled and ionotropic receptors, ion channels, gap junctions and the enzymes of various signalling cascades. Many of these substances are used both in the treatment of common CNS conditions such as Alzheimer's, epilepsy, depression and anxiety disorders and in pain relief. As all biological subsystems, receptors etc. are present in the primary neuronal cell cultures, this broadband sensor system reliably picks up even those biological mechanisms not previously attributed to a particular substance. This is especially important in the light of the fact that completely new therapies are currently being urgently sought for a wide range of illnesses.

As CNS drugs work differently in different regions of the brain, NeuroProof GmbH is currently developing three other databases of substance-specific activity profiles for the spinal cord, the hippocampus and the hypothalamus. The spinal cord is of particular interest in the development of analgesics and neuroregenerative substances, the hippocampus in substances which influence learning and memory (this is of high interest for Alzheimer's disease), and the hypothalamus plays a major role in anxiety, among other things.

NeuroProof is the world leader in the long term cultivation of primary neurone glia co-cultures on MEA neurochips for use in commissioned studies.

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### Contact:

Dr. Olaf Schröder  
NeuroProof GmbH  
Friedrich-Barnewitz-Str. 4  
18119 Rostock  
Germany

E-mail: [info@neuroproof.com](mailto:info@neuroproof.com)  
Tel.: +49-171-3657940  
Homepage: [www.neuroproof.com](http://www.neuroproof.com)