

## **Extracellular recording of sodium currents with planar electrodes**

Alfred Stett, Alexander Gatto

NMI Natural and Medical Sciences Institute\* at the University of Tuebingen,

Markwiesenstr. 55, 72770 Reutlingen; Germany.

[www.nmi.de](http://www.nmi.de). [stett@nmi.de](mailto:stett@nmi.de)

Due to the increasing interest in ion channels as drug targets, the use of cell-based assays for functional screening gains in importance. Traditional, investigations are done with the patch-clamp technique. This method, however is invasive and therefore alters the composition of the cytoplasm.

Another method for single-cell recording is the use of planar microelectrodes (MEA, microelectrode array) for recording of extracellular potentials. By comparing whole-cell voltage-clamp recordings of cells positioned on small diameter electrodes with corresponding extracellular recordings we tested under which conditions MEAs can be used for screening ion channel function and modulation.

The shape and signal-to-noise ratio of the MEA signal depends strongly on the electrical and geometrical characteristics of the cell-substrate contact. Using Neuro2A cells we obtained from extracellular recordings voltage-dependent sodium current characteristics that reveals the same features as obtained from the intracellular recorded current-voltage curve.

The results suggest that planar electrodes can be used to generate dose/response curves from compounds acting on voltage- and ligand-gated ion channels in the complete functional context of an untouched cytoplasm.