NMDA currents in acutely isolated neurons

Rapid substance application to primary cells with extensions

Ion channel:
NMDA

Cell type:
Native neurons

Chip type:
DF-16

Data courtesy of Orion Pharma, Turku, Finland

Methods

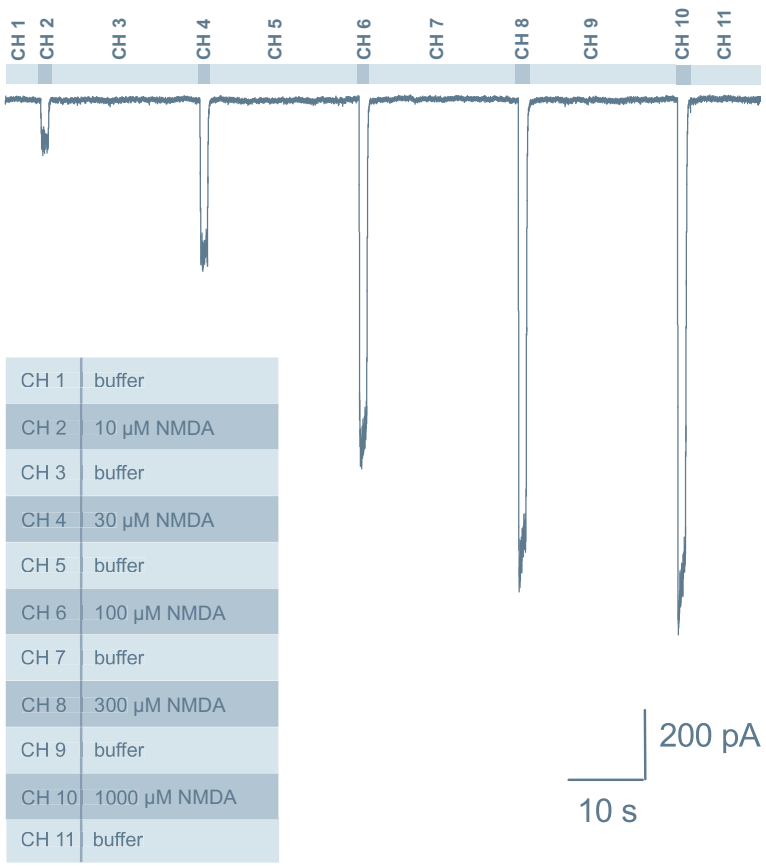
The results shown below were obtained by inducing inward currents in acutely isolated spiny neurons from rat striatum with NMDA. Neurons were isolated with either enzymatic or mechanical procedures. Neurons with typically 3-5 proximal dendrites were chosen for experiments.

This data demonstrates the flexibility of the Dynaflow system. Even with big cells, or cells with extensions (i.e. dendrites and axons), Dynaflow executes fast and distinct solution exchange. Using the DF- 16 chip, stable recordings were obtained for more than 20 min. All results shown were extracted from the use of one chip for delivery of agonist to one patch-clamped cell.

Easy to extract full dose-response curve from a single cell

To generate a dose-response curve, the cells were exposed to the agonist for 1s followed by a 20 s washout period. The same cell was used to scan for three full dose-response curves. NMDA concentrations applied were 10, 30, 100, 300 and 1000µM. The current peaks of the dose response can be seen in **Figure 1** and the corresponding fit of the responses to a Hill sigmoidal function is shown in **Figure 2.** Note that these are mean values of three scans from the same cell.

Figure 1



CH = Dynaflow chip channel

Quality of recordings and kinetics

In a close up of the current response at 1000 µM it can be seen that the noise level is significantly increased during the NMDA activation compared to the base line **(Figure 3)**. This is characteristic for the NMDA receptor response due to its high conductance, and can be seen clearly due to the high quality of the recording. Additionally, it is possible to determine activation and inactivation times of the receptor because of the accuracy and efficiency of the solution exchange.

Modulation of current response

Quinpirole, a dopamine D2 receptor agonist, was co-applied with NMDA to monitor the effect on NMDA-activated current response. Cells were pre-incubated with Quinpirole for 20s prior to NMDA exposure. The modulation of the NMDA current response by Quinpirole can clearly be seen in **Figure 4**.

Figure 2

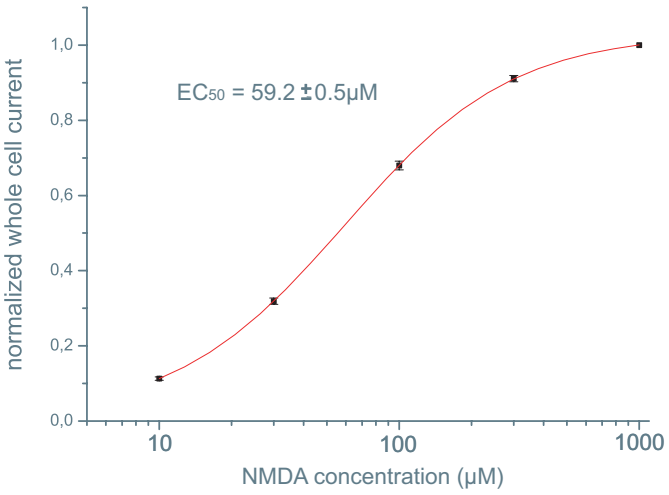


Figure 3

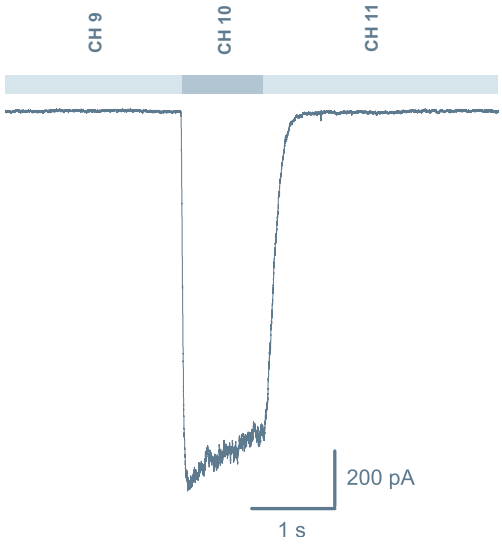
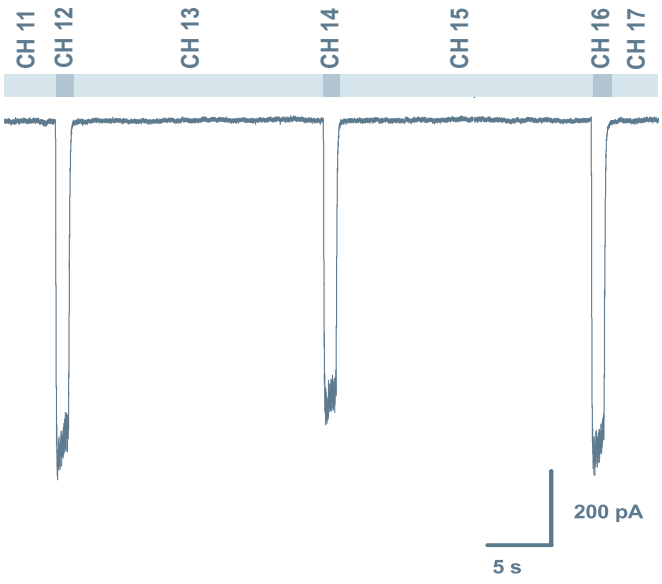


Figure 4

CH 11	buffer
CH 12	100 µM NMDA
CH 13	10 µM Quinpirole
CH 14	100 µM NMDA + 10 µM Quinpirole
CH 15	buffer
CH 16	100 µM NMDA
CH 17	buffer

CH = Dynaflow chip channel



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