Lunch Discussion 03.10-13

Bruno Benedetti presented an insightful introduction into slice electrophysiology.

The presentation involved a detailed description of methods, basic principle of biophysics for an understanding of experimental data, and an example of practical application.

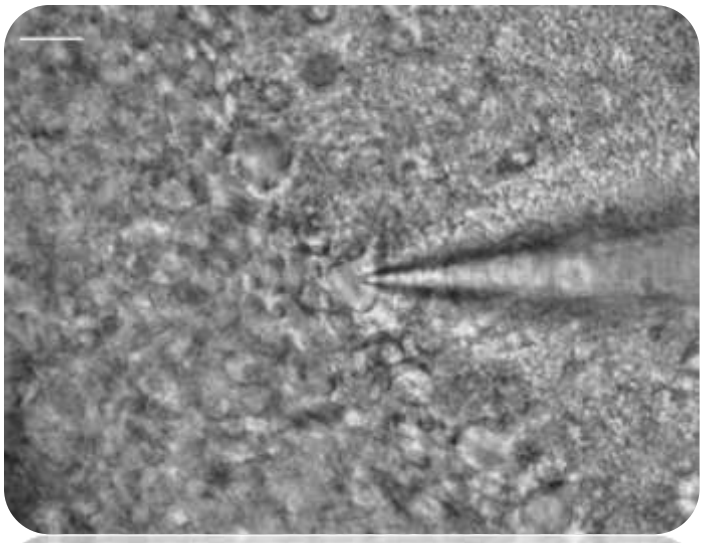
The necessary equipment for electrophysiology on slice preparation was detailed highlighting its difference from the similar technique of patch clamp on cultured cells. A detailed description was given about the typical structure and wiring of a slice-patch clamp setup, the difference-interference contrast optics (DIC) technique, common problems and troubleshooting strategies for electric-noise screening and perfusion.

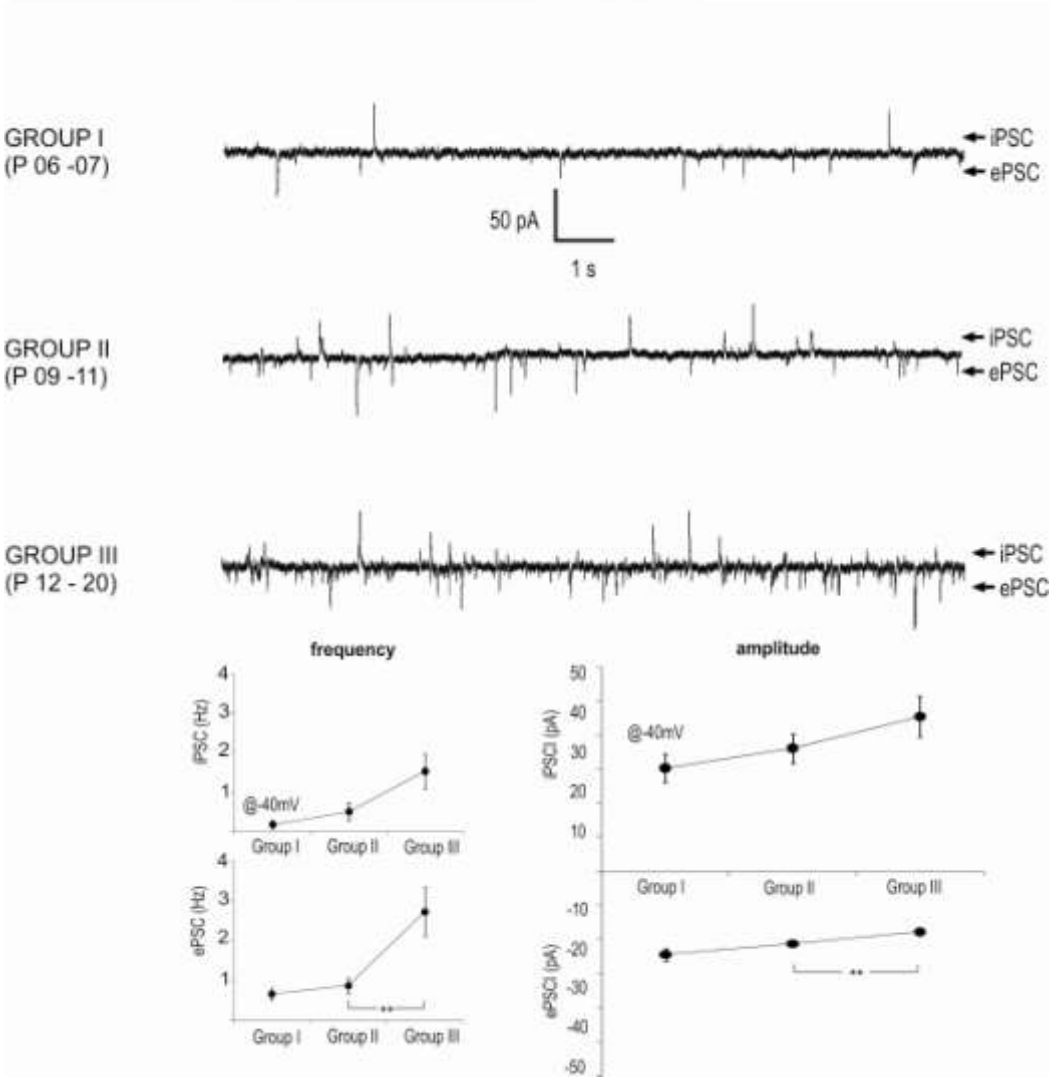
The procedure for brain dissection and slice preparation at the vibratome was illustrated, with reference to the cerebellar microanatomy. Different strategies of tissue preparation were also described in the light of the necessity to preserve the architecture of neural networks intact.

Further parts of the presentation focused on principles of biophysics and ionic balance across the neuronal membrane. These concepts are at the base of electrical recordings that analyze physiological properties of neurons such as the synaptic activity. Such topic portrayed ionic fluxes across the cell membrane in the context of whole cell patch clamp and included an explanation of experimental paradigms allowing the simultaneous recording of GABAergic and Glutamatergic synaptic release.

An application of these paradigms was discussed with the presentation of experimental data. These were a characterization of the cerebellar synaptic activity with focus on the first postnatal weeks of development. Analyzing electrical currents it was possible to state that the excitatory and inhibitory activity in the network increase significantly in the first three weeks of life. The spontaneous excitatory activity predominates over the inhibitory activity, which in turn controls tonically the excitatory synaptic release. Dramatic physiological changes occur alongside large morphological rearrangements of neuronal dendrites, which size increases with age. The procedure for morphological labelling of single neurons in slice preparation was elucidated as well as the technique for morphological analysis at the confocal microscope.

The presentation was followed by an insightful discussion and questions, along with a tasty lunch kindly provided by the SFB-44 consortium.




GROUP I
(P 06 -07)
iPSC
ePSC
50 pA
1 s
GROUP II
(P 09 -11)
iPSC
ePSC
GROUP III
(P 12 - 20)
iPSC
ePSC
frequency
amplitude
iPSC (Hz)
@-40mV
Group I
Group II
Group III
ePSC (Hz)
iPSCI (pA)
ePSCI (pA)