

Olga Voinova

Dr. med.

Developmental changes of release at neocortical excitatory synapses

Geboren am 29. September 1978 in Esenik, Tschechien

Examen am 10. September 2008 an der Universität Heidelberg

Promotionsfach: Physiologie

Doktorvater: Prof. Dr. med. Andreas Draguhn

Two main aims of the study were to assess possible differences between excitatory synapses in layer 2/3 and layer 5 of rat neocortex and check whether synaptic transmission at these synapses is developmentally regulated. Excitatory inputs were compared between layer 2/3 or layer 5 pyramidal cells and fast spiking (FS) interneurone. Such synaptic interactions are relevant in light of the powerful local feedback inhibition that exists in reciprocally connected pyramidal cells and FS interneurons. Based on our findings we conclude:

Synaptic release properties at layer 2/3 pyramidal to FS cell synapses remain unchanged in P14 and P28 animals. This conclusion is based on comparison of unitary EPSP amplitudes; release probability; paired pulse ratio; dependence of release on extracellular calcium concentration; sensitivity to exogenously loaded buffers and types of calcium channels subtypes contributing to release.

Differences were observed after the 4th postnatal week in layer 5 pyramidal to FS cell excitatory synapses: reduction of release probability and unitary EPSP amplitudes; increase in paired pulse ratio; reduced sensitivity to exogenously loaded buffers and change in presynaptic calcium channels subtypes.

Finally we found that excitatory synapses belonging to the different neocortical layers differ in organisation of their release sites and differentially undergo early postnatal maturation.