Presentation Abstract

Program#/Poster#:	632.04/V10
Presentation Title:	Postnatal ablation of mGluR5 in parvalbumin-positive fast-spiking interneurons results in alterations of auditory event-related potentials
Location:	Halls B-H
Presentation time:	Tuesday, Nov 12, 2013, 4:00 PM - 5:00 PM
Topic:	++C.16.d. Animal models

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Abstract: Cortical fast-spiking inhibitory neurons that express parvalbumin (PV) are involved in generation of functional gamma oscillations, a normal phenotype that is consistently altered in a number of neurodevelopmental diseases such as schizophrenia. We previously showed that mice with a deletion of the metabotropic glutamate receptor (mGluR5) in PV+ neurons had a decrease in the number of inhibitory synaptic contacts on excitatory pyramidal cells. These results suggested that cortical pyramidal neurons in these mice may have decreased inhibition and thus altered oscillatory activity. In order to make a direct characterization of functional neural circuit oscillations as a result of mGluR5 knockout in PV+ neurons, we recorded epidural auditory event-related potentials (ERPs) using EEG in mice. Specifically, we implanted six electrodes placed bilaterally to record from the frontal, medial, and occipital regions (Bregma: 1, -1, -2.5 mm). To acquire auditory ERPs, animals were habituated and later presented with a Gaussian white noise stimulus repetitively every 2.5 s for the duration of a 50-minute session. The resulting data were filtered, epoched, averaged, separated according to sex, and compared across genotype. The components and latencies of the resulting auditory ERPs were analyzed in the 200 ms post-stimulus. Analysis of components showed a significant increase in amplitude of the P20 and P80 in the PV-mGlu5-/- as compared to the controls in both males and females and a significant decrease in the amplitude of the N40 component. Multitaper spectral analysis was performed in order to investigate evoked changes in ERP-related

frequency bands. Differences in the relative percent change from baseline were observed in the power spectrum. Our results suggest that mGluR5 in PV+ neurons play a functional role in the development of normal network function and oscillatory activity in mice.

Disclosures: **A.J. Kappe:** None. **A.C. Metzler:** None. **M.P. Mendoza:** None. **K.Y. Tupper:** None. **E.A. Mukamel:** None. **X. Wang:** None. **T.J. Sejnowski:** None. **M.M. Behrens:** None.

Keyword(s): PARVALBUMIN

MGLUR

SCHIZOPHRENIA

Support: NIH grant MH091407

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