

Multi-Electrode Arrays Allow Determination of Regional Hippocampal Differences In Chronic Ethanol Effects.

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Chronic ethanol treatment and withdrawal are accompanied by a variety of behavioral and physiological symptoms that include alterations in cognitive function and an increased seizure sensitivity. Although changes in the activity of several neurotransmitter systems are observed, several lines of evidence suggest that cholinergic hippocampal neurons may play an important role in the effects of ethanol withdrawal. For the studies reported here, male rats received 14 days exposure to ethanol through vapor inhalation. *In vitro* hippocampal slices were studied 6 to 8 hrs after withdrawal from ethanol exposure at the peak of behavioral seizure sensitivity using multi-electrode arrays of 64 electrodes (MED64) to evaluate neuronal network properties. Evoked field potentials were elicited throughout the slice by stimulation of the Schaffer Collateral and dentate/mossy fiber pathways (Figure 1). Perfusion with the cholinergic agonist carbachol produced effects characteristic of pre-synaptic inhibition (Figure 2). Slices from ethanol-treated animals were similar to those from ethanol-naive animals except in the CA₁ region where ethanol withdrawal resulted in a significant reduction in carbachol-induced paired-pulse facilitation (Figure 3). These data suggest that reduced cholinergic-mediated pre-synaptic inhibition in hippocampal area CA₁ during ethanol withdrawal may contribute to the hyperexcitability observed *in vivo* during the ethanol withdrawal syndrome.

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Figure 1. Hippocampal slice positioned on the MED64 array. Circled electrodes indicate sites of stimulation.

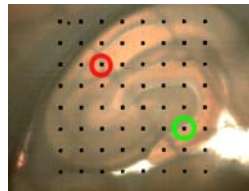


Figure 2. Color intensity of this figure reflects response amplitude and magnitude of difference between 1st and 2nd responses across the electrode array. Slice orientation is as in Fig. 1.

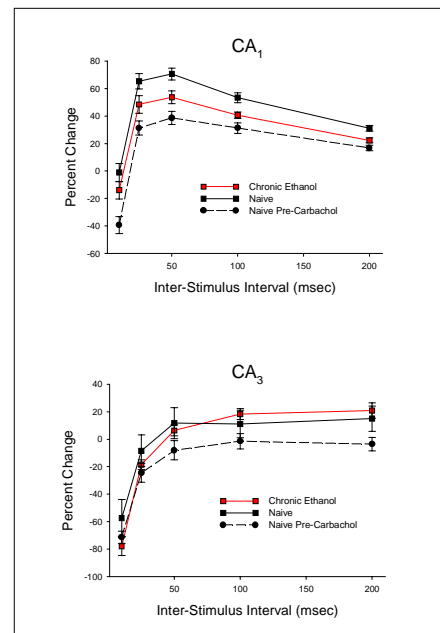
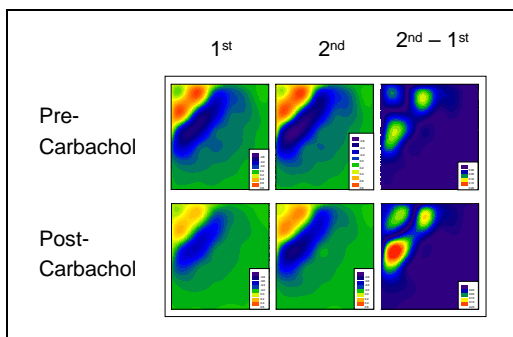


Figure 3. Ethanol withdrawal had no effect in area CA₃, but it reduced carbachol effects in CA₁.