Hippocampal rhythms affected by the GABA_A R β3 subunit


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Introduction
- The rodent hippocampus displays distinct field potential rhythms (θ, 4-12 Hz), δ (1-4 Hz), and γ (30-90 Hz), respectively.
- δ oscillations in the CA1 subfield are presumably driven by two generators whose synaptic input product spatially segregated inputs of different currents and sources (in stratum pyramidal and stratum lacunosum-moleculare, respectively).
- These generators are phase-shifted relative to each other, producing the gradual phase shift of δ across hippocampal layers.

Methods
- δ and γ oscillations are more prominent during exploration than during immobility

θ and γ oscillations are more prominent during exploration than during immobility

- δ oscillations are slower, weaker and less coherent across layers in knockouts

θ oscillations are slower, weaker and less coherent across layers in knockouts

- δ oscillations are more prominent during exploration than during immobility

θ oscillations are more prominent during exploration than during immobility

- δ and γ oscillations are more prominent during exploration than during immobility

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- δ oscillations are slower, weaker and less coherent across layers in knockouts

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Summary
- Two prominent hippocampal rhythms, δ and γ, are attenuated in δ. Knockouts, particularly in L5M, are associated with the attenuation of δ. In knockouts, δ rhythms are less well organized (less regular, less coherent among layers), but show a profile of laminar phase shifts undistinguishable from those in wildtypes
--modulation of δ by γ is less pronounced in KO, but the layer-specific temporal interplay between the rhythms is not affected
- most differences between genotypes tend to be more pronounced during exploratory behavior
- Taken together, our results are compatible with a role of slow inhibition in sculpting hippocampal δ rhythms and modulation of γ