Reduced anxiety, conditioned fear, and hippocampal long-term potentiation in transient receptor potential vanilloid type 1 receptor-deficient mice.

Abstract:

The transient receptor potential vanilloid type 1 channel (TRPV1) (formerly called vanilloid receptor VR1) is known for its key role of functions in sensory nerves such as perception of inflammatory and thermal pain. Much less is known about the physiological significance of the TRPV1 expression in the brain. Here we demonstrate that TRPV1 knock-out mice (TRPV1-KO) show less anxiety-related behavior in the light-dark test and in the elevated plus maze than their wild-type littermates with no differences in locomotion. Furthermore, TRPV1-KO mice showed less freezing to a tone after auditory fear conditioning and stress sensitization. This reduction of conditioned and sensitized fear could not be explained by alterations in nociception. Also, tone perception per se was unaffected, as revealed by determination of auditory thresholds through auditory brainstem responses and distortion-product otoacoustic emissions. TRPV1-KO showed also less contextual fear if assessed 1 d or 1 month after strong conditioning protocols. These impairments in hippocampus-dependent learning were mirrored by a decrease in long-term potentiation in the Schaffer collateral-commissural pathway to CA1 hippocampal neurons. Our data provide first evidence for fear-promoting effects of TRPV1 with...
respect to both innate and conditioned fear and for a decisive role of this receptor in synaptic plasticity.

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