Abstract

Chronic Dietary Magnesium-L-Threonate Speeds Extinction of a Conditioned Taste Aversion

Methods

• MgT: Magnesium-L-threonate, a novel magnesium compound that has shown promise in reducing symptoms of neurological diseases such as Alzheimer's and Parkinson's. MgT has been shown to improve cognitive function, reduce inflammation, and enhance brain health in various animal and human studies.

• EU Extinction Procedures: Explicitly Unpaired extinction procedures involve presenting the conditioned stimulus (CS) and unconditioned stimulus (US) on alternating days. This method is commonly used in animal models of fear conditioning to assess extinction.

• Facilitated consolidation: A method that involves presenting the CS and US in a repeated manner to facilitate the consolidation of the conditioned response into long-term memory. This method has been shown to enhance extinction in animal models.

• Spontaneous recovery: A natural recovery process that occurs after extinction training. SR is a measure of the ability of a CS to elicit a response after extinction training, and it is often used as a measure of the strength of the conditioned response.

• MgT and EU-EXT Procedures Combined: MgT is shown to reduce spontaneous recovery of a CTA, indicating that MgT may have clinical relevance for reducing SR following fear extinction.

Results

• MgT increases the rate of CTA extinction, facilitating the expression of extinction in the group that received MgT treatment. This effect is most pronounced in the group that received MgT treatment for an extended time period.

• MgT reduces spontaneous recovery of a CTA, indicating that MgT may have clinical relevance for reducing SR following fear extinction.

Summary & Conclusions

• Our data indicate that chronic MgT treatment:
  ○ Facilitated consolidation of a CTA
  ○ Increased the rate of CTA extinction
  ○ Reduced spontaneous recovery of a CTA
  ○ Interacted with EU extinction procedures to reduce spontaneous recovery of a CTA

• MgT shows promise as a cognitive enhancing treatment that may have efficacy in reducing learned fear responses and the anxiety that mediate them (Stanley et al., 2010; Abamaru et al., 2013).

• MgT may be especially efficacious when combined with behavioral methodologies (e.g., extinction procedures) aimed at reducing SR following fear extinction.

• Our data are consistent with a growing animal literature suggesting that chronic MgT treatment may have clinical relevance since it has been shown to reduce learned helplessness (a model of depression) (Abamaru et al., 2009), contextual discrimination (Deonna et al., 2008), and cognitive deficits in a mouse model of Alzheimer’s Disease (Liu et al., 2009).

References


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