The Investigation of the Novel Peptide TUF1 in Fear Potentiated Startle

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Introduction

•TUF1 is a newly discovered peptide expressed in the hippocampus, amygdala, hypothalamus, and endocrine tissues.

•It has been shown that rats exposed to stress have altered expression of TUF1.

•The goal of this study is to determine the role of TUF1 and to measure if the administration of this peptide into the ventricles alters fear responses by affecting the acquisition and/or expression of acoustic startle.

Methods

1. Rats are cannulated with 22 gauge cannuale aimed at the lateral ventricle
2. Testing was conducted after rats were allowed to recover for 7 days.
3. Prior to training, rats received two days of baseline. Animals were placed into 3 groups matched on baseline startle: ACSF (control), 1 ug TUF1, and 10 ug TUF1.
4. All group received 2 days of training. Training sessions consisted of tone (conditioned stimulus, CS) and shock (unconditioned stimuli, US). Before and after training trials, 20 startle stimuli were presented.
5. Prior to training, animals were infused with TUF1 or ACSF. Infusion volumes were 2 ul with infusion rate of 2ul/min.
6. 24-hours later animals received a test session. Testing session consisted of 30 leader startle presented to habituate animals, 20 startle-alone trials, and 20 CS-startle trials.
7. Animals are finally sacrificed for cannulae placement verification.

Startle Sessions

•16 tone-shock pairing during of which a 4-s tone will co-terminate with a 0.5-s shock.

•Average ISI is variable between 1.0 and 3.0 minutes with a mean of 2.0 minutes.

•Startle stimuli at decibel level of 95dB and 105dB with IS=30s

Results

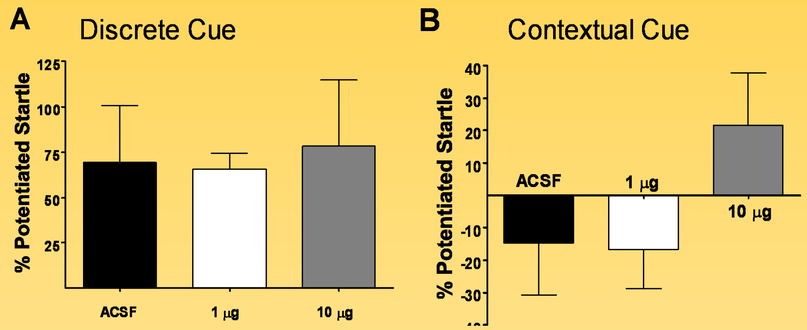

Fig **A**. Potentiation of startle to a discrete tone cue previously paired with shock in animals infused with vehicle, 1, or 10 µg of TUF1 peptide.

Fig **B**. Potentiation of startle to contextual cues present in the startle chamber. A high dose of TUF1 (10 µg) results in a moderate increase in test day baseline startle. Values are means ± SEM, n =5-7, ANOVA.

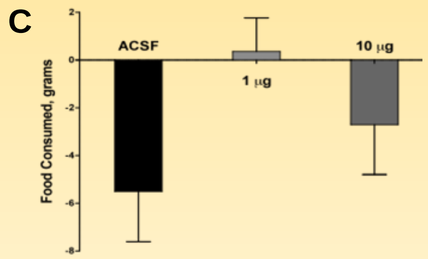

Fig **C**. Difference in food consumed (infusion days-baseline days) in animals infused with vehicle, 1, or 10 µg of TUF1 peptide. Values are means ± SEM, n =4-7, ANOVA.

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Unpublished research by Phu V. Tran

Conclusions / Discussion

•Our results show that there was not a significant difference between the startle response elicited from discrete cues between the TUF1 infused animals and the control animals. Although there was no different in discrete cue, TUF1-infused animals elicited more startle response to contextual cue compared to control animals.

•Food consumption was measured to determine if TUF1 affected other stress behaviors. We found that there was not a significant change in food consumption indicating that there wasn't an increase in stress from non-testing procedures, such as infusion.

Broader Impacts and Future Research

•Positive findings would suggest TUF1 as a new modulator in fear conditioning. If so, new treatments for fear conditions, such as phobias, could be developed.

•In any case, being a novel peptide, any new information will help identify TUF1's role in amygdala functions.

•Future research will examine context conditioning and the similarities and differences between the startle responses between context and discrete cue conditioning

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