

Examinations of footshock-induced traumatic events alter the rewarding and aversive effect of morphine in the prelimbic cortex and basolateral amygdala by optogenetic approaches

Fang Chih Chang, Ying Hao Yu, and Andrew Chih Wei Huang*

Department of Psychology, Fo Guang University, Yilan County 26247, Taiwan

Abstract

Why are patients with post-traumatic stress disorder (PTSD) vulnerable resulting in drug addiction and dependence remains interesting issue. However, to date, no research examined that the early PTSD experiences alter morphine-induced reward and aversion. The present study used the optogenetic approach to modulate the glutamate systems of the projection from the prelimbic cortex (PrL) to the basolateral amygdala (BLA). Moreover, the study would address how to alter the paradoxical effect—reward in conditioned place preference and aversion in conditioned taste aversion—induced by morphine. The results showed that the photoinhibition via the eNpHR virus in the PrL, which was infected virus from the BLA, decreased the rewarding effect and increased aversion in conditioned taste aversion; however, photostimulation via the virus Chr2 did not affect the rewarding and aversive effects. Interestingly, the photostimulation (excitatory virus Chr2) did not affect morphine-induced CTA effect; however, it could enhance morphine-induced CTA effects. Excitatory Chr2 virus photostimulation in the PrL decreased morphine-induced CPP effect; however, inhibitory eNpHR virus photoinhibition also decreased morphine-induced CPP effects. The present data provide some implications and insights for developing novel treatments for ameliorating morphine addiction.

Keywords: post-traumatic stress disorder, the paradoxical effect hypothesis of abused drugs, morphine, reward, aversion, glutamate, optogenetics

