#### Add To Itinerary

#### Session 301 - Modulation: Pharmacology

# 301.01 / E21 - Chemogenetic control of hilar mossy cell excitability regulates emotional behaviors

Movember 14, 2016, 8:00 - 12:00 PM

♥ Halls B-H

#### **Presenter at Poster**

Mon, Nov. 14, 2016, 8:00 AM - 9:00 AM

## Authors

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#### Disclosures

K. Wang: None. C. Lien: None.

### Abstract

Hilar mossy cells (MCs), the glutamatergic neurons located in the hilus of the hippocampal dentate gyrus (DG), have been known to play an important role in network function and complex information processing such as pattern separation. However, their role in emotional behavior remains largely unexplored. To address this question, we bidirectionally manipulated the activity of MCs in the dorsal DG using a chemogenetic approach. Selective expression of designer receptors exclusively activated by designer drugs (DREADDs) was achieved by injecting a virus encoding Cre-dependent DREADDs into a mossy/CA3-Cre driver, a mouse line specifically expressing Cre recombinase in the hilar MCs and CA3 cells. By specifically expressing inhibitory DREADDs (i.e., hM4Di receptor) on the membrane of the MCs in the dorsal DG, we found that decreasing the activity of MCs increased the mouse anxiety level. Conversely, elevating the activity of MCs by expressing excitatory DREADDs (i.e., hM3Dg receptor) decreased their anxiety level. In addition, we tested the effect of manipulating the MC activity during and after contextual fear conditioning. We found that decreasing the MC activity induced the fear-like behavior in the retrieval phase, although mice performed normally during learning phase. In contrast, elevating the MC activity reduced the

freezing level in the retrieval phase. In summary, switching the MC activity of MCs by using chemogenetic manipulations, we demonstrated that MCs in dorsal DG would participate in controlling the anxiety- and fear-like behaviors.