Cheng-Chang Lien <cclien.ym@gmail.com>

## Abstract Submission FENS 2016

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收件者: cclien@ym.edu.tw

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| Theme | **B. Excitability, synaptic transmission, network functions** |
| Topic | **B07a. Synaptic plasticity - Short-term plasticity** |
| Presentation preference | **Poster presentation** |
| Abstract title | **Rules for Wiring Specificity and Synaptic Diversity in the Mouse Lateral Central Amygdala** |

**The central amygdala (CeA) nucleus, a subcortical structure composed of mostly γ-aminobutyric acid-releasing (GABAergic) neurons, controls fear expression via projections to downstream targets in the hypothalamus and brainstem. The CeA consists of the lateral (CeL) and medial (CeM) subdivisions. The CeL strongly gates information transfer to the CeM, the main output station of the amygdala, but little is known about the functional organization of local circuits in this region. Using cluster analysis, we identified two major electrophysiologically distinct CeL neuron classes in mouse amygdala slices, the early-spiking (ES) and late-spiking (LS) neurons. These two classes displayed distinct autaptic transmission. Compared with LS neurons, ES neurons had strong and depressing autapses, which enhanced spike-timing precision. With multiple patch-clamp recordings, we found that CeL neurons made chemical, but not electrical, synapses. Analysis of individual connections revealed that cannabinoid type 1 receptor-dependent suppression of the ES, but not the LS cell output synapse. More interestingly, the efficacy of ES→LS or LS→ES synapse was approximately 2-fold greater than that at LS→LS or ES→ES synapse. When tested at 20 Hz, synapses between different neurons, but not within the same class, were markedly depressing and were more powerful to sculpt activity of postsynaptic neurons. Moreover, neurons of different classes also form synapses with higher degree of connectivity. Taken together, we demonstrate that ES and LS neurons represent two functionally distinct cell classes in the CeL and interactions between pre- and postsynaptic neurons dictate synaptic properties between neurons.**