

### Poster Abstract Submission

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<b>Research Title</b>	Locus coeruleus neurons firing pattern is regulated by ERG voltage-gated K+ channels

#### Abstract:

Locus coeruleus (LC) neurons with their extensive innervations throughout the brain control a broad range of physiological processes. Several ion channels have been characterized in LC neurons that control intrinsic membrane properties and excitability. However, ERG (ether-à-gogo-related gene) K<sup>+</sup> channels that are particularly important in setting neuronal firing rhythms and automaticity have not yet been discovered in the LC. Moreover, the neurophysiological and pathophysiological roles of ERG channels in the brain remain unclear despite their expression in several structures. By performing immunohistochemical investigations using brainstem tissue dissected from young (P10) and adult (P60) mice (C57BL/6J), we found that ERG-1A, ERG-1B, ERG-2, and ERG-3 are highly expressed in the LC neurons. To examine the functional role of ERG channels current-clamp recordings were performed on LC neurons in brain slices dissected from adult C57BL/6J male mice (P40±10) under visual control. Approximately 70% of the recorded LC neurons were responsive to ERG channel block by WAY-123,398 a class III anti-arrhythmic agent. ERG channel blockade increased spontaneous firing activity and discharge irregularity of LC neurons. In this study, and for the first time we prove the presence of distinct ERG channel subunits in the LC where they play an imperative role in modulating neuronal discharge patterns. We thus propose ERG channels as important players behind the changes in, and/or maintenance of LC firing patterns that are implicated in the generation of different behaviors as well as in different diseases.