

# Morpho-physiological Properties of Hippocampal Dentate Granule Cells in the Blm-s Knockout Mice

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BLM-s, abbreviates for BCL-2-like molecule short isoform, is a newly identified member of the Bcl-2 family. It is expressed in postmitotic immature neurons of the developing mouse brain and acts as an apoptosis sensitizer/derepressor in regulating developmental neuronal apoptosis. However, the role of BLM-s protein in the adult brain is totally unknown. Our preliminary study showed that the adult Blm-s knock-out (Blm-s<sup>-/-</sup>) mice exhibited heightened anxiety- and depression-like behaviors. In the adult mouse brain, Blm-s is expressed in the hippocampal dentate granule cells (GCs). Increased GC excitability is associated with higher susceptibility to stress-induced anxiety and depression disorders. Therefore, we investigated the electrophysiological and morphological properties of GCs in Blm-s<sup>-/-</sup> mice as a first step to understand the function of BLM-s in the adult hippocampus.

Here, we used whole-cell patch-clamp recording and post-hoc morphological reconstructions to investigate the electrophysiological and morphological properties of the mature GCs in male Blm-s<sup>-/-</sup> mice. Compared to those in their wild-type (WT) littermates, the Blm-s<sup>-/-</sup> GCs exhibited the following distinct features. First, the Blm-s<sup>-/-</sup> GCs had more hyperpolarized resting membrane potential and exhibited more action potentials (APs) in response to sustained depolarizing current injection. Second, the Blm-s<sup>-/-</sup> GCs generated APs with higher rising rates and shorter duration. Third, the Blm-s<sup>-/-</sup> GCs received both enhanced spontaneous excitatory and inhibitory synaptic transmissions. Finally, the complexity of the distal dendrites of Blm-s<sup>-/-</sup> GCs was reduced. Collectively, the enhanced excitability of mature Blm-s<sup>-/-</sup> GCs may account for the affective phenotypes of male Blm-s<sup>-/-</sup> mice.

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