



## Modulation Effects of Cordycepin on Voltage-Gated Cation Channels on Hippocampal CA1 Pyramidal Neuron

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**SUMMARY.** The present study was carried out to investigate the modulation effects of cordycepin on voltage-gated cation channels (VGCCs) on the CA1 pyramidal neurons. All experiments were performed on the CA1 pyramidal neurons of hippocampal brain slices prepared from 15 to 22 days old Sprague-Dawley rats. The VGCCs currents, including  $\text{Na}_V$ ,  $\text{K}_V$  and  $\text{Ca}_V$  channel currents were investigated on the neurons before and after the cordycepin application by using a whole-cell patch clamp technique. Our results showed that cordycepin significantly decreased the amplitude of  $\text{Na}_V$  ( $I_{\text{Na}}$ ) and  $\text{Ca}_V$  ( $I_{\text{Ca}}$ ) channel currents reversibly. However, the amplitude of  $\text{K}_V$  channel currents, including transient outward  $\text{K}^+$  ( $I_A$ ) and delayed rectifier  $\text{K}^+$  ( $I_K$ ) channel currents were not altered in the presence of cordycepin. These results demonstrate that cordycepin selectively regulates the activity of VGCCs and therefore provides a novel potential mechanism for the modulation of brain physiology and pathology process.

**RESUMEN.** El presente estudio fue realizado para investigar los efectos de modulación de cordicepina en canales catiónicos activados por voltaje (VGCCs) en las neuronas piramidales CA1. Todos los experimentos se realizaron en preparados de neuronas piramidales CA1 de cortes de cerebro de hipocampo de ratas Sprague-Dawley de 15 a 22 días de edad. Las corrientes VGCCs, incluyendo  $\text{Na}_V$ ,  $\text{K}_V$  y canales de  $\text{Ca}_V$  fueron investigados en las neuronas antes y después de la aplicación de cordicepina mediante el uso de una técnica de patch clamp de célula completa. Los resultados mostraron que cordicepina disminuyó significativamente la amplitud de corrientes del canal  $\text{Na}_V$  ( $I_{\text{Na}}$ ) y  $\text{Ca}_V$  ( $I_{\text{Ca}}$ ) reversiblemente. Sin embargo, la amplitud de corriente de canal  $\text{K}_V$ , incluyendo la salida transitoria de  $\text{K}^+$  ( $I_A$ ) y el retraso rectificador de  $\text{K}^+$  ( $I_K$ ) de corrientes de los canales no se alteró en presencia de cordicepina. Estos resultados demuestran que cordicepina regula selectivamente la actividad de VGCCs y por lo tanto proporciona un nuevo mecanismo potencial para la modulación de la fisiología del cerebro y el proceso de la patología.

**KEY WORDS:**  $\text{Ca}_V$  channel, cordycepin, ;  $\text{K}_V$  channel,  $\text{Na}_V$  channel, VGCCs.

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