GSK-3 Kinetic Control by Calcium Signaling in *Rhipicephalus microplus* Embryo Tick Cell Line

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**INTRODUCTION:** Calcium is an intracellular messenger that triggers the activation of several proteins. The calcium signaling and calcium homeostasis in *Rhipicephalus microplus* and the enzymes involved in these processes are not known. Glycogen synthase kinase - β (GSK3β) was expressed during embryo development and it has been reported a role of GSK3β in the regulation of cell survival in *R. microplus*. A molecular simulation study reveals that Ca²⁺ can regulate the GSK3 by calcineurin stimulation. In Drosophila it was found a mechanism in which GSK3β activates calcineurin on egg activation. This study was performed to examine the interaction among calcium, GSK3β and calcineurin and its consequences on cell viability in *R. microplus*. **MATERIAL AND METHODS:** BME26 cells were treated with different concentrations of calcium and cell viability was determined by MTT. The effect of calcium on GSK3β activity was examined by using luminescence ATP detection. Sequence analysis of calcineurin was carried out using NCBI BLAST. Calcineurin activity was measured using a calcineurin cellular activity assay kit. **RESULTS/DISCUSSION:** Calcium decreased cell viability in a dose-dependent manner within the range of 1 and 25 mM. GSK3 activity increased after treatment of calcium which raised the possibility that GSK3 may be involved in the calcium signaling pathway. Multiple alignments identified conserved residues in calcineurin for cloning and sequencing of calcineurin gene in *R. microplus*. **CONCLUSIONS:** Activation of calcium signaling by extracellular calcium triggers GSK3 activation in BME26 cells, although no detectable calcineurin activity was found. Within this framework, it will be important to verify intracellular calcium levels and Ca²⁺-ATPase activity in those cells once this pump is an important regulator of calcium homeostasis. Finally, our data provide a platform for future studies of the system which encompasses the GSK3 and Ca²⁺-ATPases activity and controls the calcium homeostasis in tick cells.

Keywords: *Rhipicephalus microplus*, tick cell line, calcium, calcineurin, GSK3
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