

## **The Effects of AMP-Activated Protein Kinase Activators and Inhibitors on Polar Body Formation in Mouse Oocytes**

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AMP-activated protein kinase (AMPK) has been shown to have a key role in meiotic regulation in mouse oocytes. Previous studies have shown that AMPK activity is associated with the breakdown of the germinal vesicle at the beginning of meiotic maturation. The objective of this study was to determine whether AMPK is also involved with oocyte maturation in the later stages of meiotic maturation, particularly with that of polar body extrusion. The adenosine analog AICAR (5-aminoimidazole-4-carboxamide-1- $\beta$ -D-ribofuranoside) stimulates AMPK activity and compound C inhibits AMPK activity. After treatment with both AICAR and compound C, the percentage of germinal vesicle breakdown (GVB) was measured along with the percentage of polar bodies (PB) formed, and the percentage of oocytes which underwent parthenogenetic activation. While all groups had similar percentages of GVB (>92%), oocytes treated with AICAR had significantly higher percentages of polar body formation than control oocytes. In contrast, oocytes treated with compound C had drastically lower percentages of polar body formation than controls. Oocytes treated with compound C also had a higher percentage (27.9% and 23.7%) undergoing parthenogenesis than control oocytes (6.7% and 1.3%), while AICAR treatment blocked this activation completely. Using anti-PT172 antibody (binds to activated AMPK), immunofluorescent staining showed that AMPK is associated with chromatin throughout meiotic maturation, from GVB through polar body formation. In conclusion, AMPK appears to be associated with meiotic maturation in mouse oocytes from GVB through polar body extrusion at the completion of meiosis I. Moreover, AMPK may also function in preventing premature activation.