

Enhancing Mitochondrial Activity and Metabolism in Aging Female Germ Cells: Synergistic Effects of Dual ROCK and ROS Inhibition

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Abstract : The combination of Y-27632 and Vitamin C significantly enhances the quality of aging germ cells by reducing reactive oxygen species (ROS) production, restoring mitochondrial membrane potential balance, and promoting mitochondrial fusion. The age-related decline in oocyte quality contributes to reduced fertility, increased aneuploidy, and diminished embryo quality, with mitochondrial dysfunction in both oocytes and granulosa cells being a key factor in this decline. Experiments on aging germ cells investigated the effects of the Y-27632 and Vitamin C combination. In vivo studies involved aged mice to assess oocyte maturation and ROS accumulation during culture. The assessment included mitochondrial activity, ROS levels, mitochondrial membrane potential, and mitochondrial dynamics. Cellular energy metabolism and ATP production were also measured. The combination treatment effectively addressed mitochondrial dysfunction and regulated cellular energy metabolism, promoting oxygen respiration and increasing ATP production. In aged mice, this supplement treatment enhanced in vitro oocyte maturation and prevented ROS accumulation in aging oocytes during culture. While these findings are promising, further research is needed to explore the long-term effects and potential side effects of the Y-27632 and Vitamin C combination. Additionally, translating these findings to human subjects requires careful consideration. Overall, the study suggests that the Y-27632 and Vitamin C combination could be a promising intervention to mitigate aging-related dysfunction in germ cells, potentially enhancing oocyte quality, particularly in the context of in vitro fertilization.

Keywords : ovarian aging, supplements, ROS, mitochondria

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