

ROLE OF KLOTHO AND N-ACETYLCYSTEINE IN OXIDATIVE STRESS ASSOCIATED WITH THE VITRIFICATION OF OVARIAN TISSUE

Sanghoon Lee, Sae Mi Lee.

*Department of Obstetrics and Gynecology, Korea University College of Medicine, Seoul, Korea,
Department of Obstetrics and Gynecology, Korea University College of Medicine, Seoul, Korea.*

Abstract Body

Background: Cryopreservation can cause mechanical and chemical stress, ultimately leading to the formation of reactive oxygen species (ROS) and oxidative stress. ROS inhibits the expression of antioxidant enzymes in cells, resulting in increased DNA fragmentation and apoptosis. Identifying substances that reduce oxidative stress-induced damage to the ovarian tissue has gained remarkable interest in recent years. The degree of protection of the ovarian tissue against oxidative stress by cryopreservation with vitrification following treatment with N-acetylcysteine (NAC) and the Klotho protein was evaluated.

Methods: The control group and the cryopreservation groups were randomly assigned, and treated NAC, Klotho, or the combination (NAC + Klotho). The cell morphological change, DNA damage, senescence, and apoptosis of each group after the freeze-thaw process were compared using transmission electron microscopy, immunohistochemistry, and western blot analysis.

Results: Both NAC and Klotho were found to be more effective at protecting against DNA damage than the control; however, DNA damage was greater in the NAC + Klotho group than in the group treated with NAC and Klotho, respectively. DNA damage and cellular senescence were also reduced during the vitrification process when cells were treated with NAC, Klotho, or the combination (NAC + Klotho). NAC increased apoptosis during cryopreservation, whereas Klotho inhibited apoptosis and NAC-induced apoptosis.

Conclusion: The innovative function of Klotho inhibits DNA damage, cell senescence, and apoptosis, as well as NAC-induced apoptosis. Klotho is an effective oxidative modulator in the vitrification of ovarian tissue.