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Original Article

Nitric oxide acts through different signaling pathways in maturation of cumulus cell-enclosed mouse oocytes

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Abstract:

ABSTRACT

Background: Nitric oxide (NO) have a dual action in mouse oocyte meiotic maturation which depends on its concentration, but the mechanisms by which it influences oocyte maturation has not been exactly clarified. In this study different signaling mechanisms which exist for in vitro maturation of meiosis was examined in cumulus cell-enclosed oocytes (CEOs) after injection of pregnant mare's serum gonadotropin (PMSG) to immature female mice.

Methods: The CEOs were cultured in spontaneous maturation and hypoxanthine (HX) arrested model.

Results: Sodium nitroprusside (SNP, an NO donor, 10mM) delayed germinal vesicle breakdown (GVBD) significantly during the first 5 hrs of incubation and inhibited the formation of first polar body (PB1) at the end of 24 hrs of incubation. SNP (10^{-5}M) stimulated the meiotic maturation of oocytes significantly by overcoming the inhibition of HX. Sildenafil (a cGMP stimulator, 100 nM), had a significant inhibitory effects on both spontaneous meiotic maturation and HX-arrested meiotic maturation. Forskolin (an adenylate cyclase stimulator, 6µM) and SNP (10mM) had the same effects on GVBD. Forskolin reversed the SNP (10^{-5}M) stimulated meiotic maturation.

Conclusion: These results suggest that differences in pathways are present between SNP-inhibited spontaneous meiotic maturation and SNP-stimulated meiotic maturation in mouse oocytes

Keywords:

Nitric oxide; Sildenafil; Oocytes maturation; Signaling pathway

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