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Effects of inhibiting nitric oxide synthase on cumulus expansion and nuclear maturation of sheep oocytes

Amale M. Heidari , Shahne A. Zare , Abavisani A., Nasrollahi S.:

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Nitric oxide (NO) is a biological signaling molecule that plays a crucial role in oocyte maturation of mammals. It is generated by the nitric oxide synthase (NOS) enzyme from L-arginine. Although

the effect of NO has been shown in oocyte maturation of some species, there is no report about its effect on the *in vitro* maturation of sheep oocyte. So, this study aimed to investigate the importance of NO/NOS system in the *in vitro* maturation of ovine oocytes. Different concentrations of L-NAME (a NOS inhibitor) (0.1, 1 and 10mM) were added to maturation medium to evaluate the effect of inhibiting NOS on cumulus expansion and meiotic resumption of sheep oocytes. After 26 h culture, low and medium concentrations of L-NAME (0.1 and 1mM) had no significant effect on cumulus expansion, however, its higher concentration (10mM) decreased percentage of oocytes with total cumulus expansion as compared to control ($P < 0.05$). The extrusion of the first polar body was also suppressed in a dose-dependent manner, so that the addition of 10mM L-NAME to maturation medium significantly stopped oocytes in GV stage ($P < 0.05$). Moreover, to confirm the results and to evaluate if this effect is reversible, 0.1mM sodium nitroprusside (SNP, a NO donor) was added only to the maturation medium which had the highest concentration of L-NAME (10mM). The

concomitant addition of NOS inhibitor with NO donor reversed the inhibitory effect of L-NAME on cumulus expansion and meiotic maturation. These results indicated that NO/NOS system is involved in the maturation of sheep oocytes.

Keywords:

sheep; oocyte maturation; nitric oxide; L-NAME

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