

Original Paper

## Effect of combination of Melatonin and All-Trans retinoic acid on maturation, fertilization and embryonic development of immature mouse oocytes

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### Abstract

**Background and Objective:** With respect to the antioxidant role of melatonin and retinoic acid, it seems to be effective both in the maturation and embryonic development. This study was done to investigate the effect of combination of melatonin and All-Trans retinoic acid (RA) on maturation, fertilization and embryonic development of immature mouse oocytes.

**Methods:** In this experimental study, cumulus - oocyte complex (COCs) were recovered from 4-6 week old female mice NMRI and were divided into 6 maturation medium groups including control, sham, experiment 1 (melatonin 100 nM, 1 and 2  $\mu$ M), experiment 2 (retinoic acid 1, 2, 4, 6  $\mu$ M), experiment 3 (melatonin 2  $\mu$ M+RA 4  $\mu$ M), experiment 4 (Mel 100nM + retinoic acid 4 $\mu$ M). The maturation rate was recorded after 24 hours of culture in a humidified atmosphere of 5% CO<sub>2</sub> at 37°C. The matured oocytes were fertilized with sperm. Fertilization and embryonic development rates to the blastocyst stage were recorded.

**Results:** Maturation rate in the control and sham groups were 50.6% and 49.4%, respectively. Maturation rate were 54.3%, 54.8%, 59.9% in melatonin group with concentrations of 100 nM, 1 and 2  $\mu$ M, respectively. Maturation rate were 51.6%, 51%, 59% and 49.6% in t-RA group with concentrations of 1, 2, 4, 6  $\mu$ M. Maturation rate were 60.4% and 54.2% in the experiment 3 and 4 groups, respectively. The maturation rates in the melatonin 2  $\mu$ M, retinoic acid 4  $\mu$ M and experiment 3 significantly increased in compare to control (P<0.05). The embryonic development rate in the melatonin with 100nM concentration and 4  $\mu$ M of retinoic acid increased significantly compared to controls (P<0.05). Although, embryonic development rate in experiment 3 was higher than control, but lower in compare to melatonin 100 nM and the retinoic acid 4  $\mu$ M. The embryonic development rate in experiment 4 significantly increased in compare to control (P<0.05).

**Conclusion:** Combination of melatonin and All-Trans retinoic acid in medium culture increase maturation rate and improved embryonic development in dose dependent manner.

**Keywords:** Melatonin, Retinoic acid, In-vitro maturation, Immature oocytes, Embryonic development, Maturation rate, Mouse

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