

Stem cell factor and maturation of human oocytes in vitro

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Introduction: Stem cell factor (SCF) is expressed in human granulosa cells and its receptor e-kit is present in human ovaries. Reports suggest that follicular fluid concentrations of SCF are positively correlated with the fertilization of oocytes during in-vitro fertilization (IVF). We studied the effect of SCF on immature human oocytes cultured in vitro.

Materials and methods: Germinal vesicle (GV) or metaphase I (MI0 stage oocytes, taken as “spare” eggs from patients undergoing IVF and intracytoplasmic sperm injection (ICSI) were used in this study. The IVF oocytes were inseminated before determining their stage of maturity. Following removal of cumulus cells, oocytes which were inferilized but immature and morphologically intact were cultured. Oocytes taken for ICSI were denuded and their stage of maturity confirmed. Immature oocytes were not injected with spermatozoa. 24h after oocyte retrieval, oocytes remaining at GV or MI stages were randomly allocated into two groups. They were cultured in maturation medium (TCM 199) containing 10% fetal calf serum, 0,075IU/ml follicle stimulating hormone (FSH), 0,5IU/ml human chorionic gonadotrophin (HCG), 0,29mM pyruvate and antibiotics either with SCF (0,250 μ m/l) (n=21) or without SCF (n=21, controls). The oocytes were assessed daily to detect evidence of GV breakdown and polar body extrusion.

Results: In total, 42 GV or MI oocytes derived from IVF (n=34) or ICSI (n=8) were cultured. Each came from a different patient. After 24-48 hours in culture, of oocytes treated with SCF, five (24%) remained immature, seven (33%) matured to the MII stage and nine (43%) showed pronuclei and commenced cleavage. In the control group, 15 (71%) remained immature, four (19%) reached the MII stage and two (10%) divide. Dividing oocytes from both groups were cultured until the 8-cell stage. This study suggests that the administration of SCF to immature oocyte culture improves the chances of maturation (χ^2 10,27, 2 degrees of freedom, $p \sim 0,006$).