P0316

The Effect of Granulocyte-Macrophage Colony Stimulating Factor (GM-CSF) on The Expression of IL-1 System mRNA in Mouse Embryos

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Granulocyte-macrophage colony stimulating factor (GM-CSF) is synthesized in the female reproductive tract and has been shown to play an important role in human and murine embryo development and implantation. However, the mechanism of GM-CSF on the embryo development is unknown. Recent studies suggested that GM-CSF may be increase the expression of implantation releated genes, such as interleukin-1 (IL-1) system. Our aim of this study was to compare the interleukin-1 α (IL-1 α), interleukin-1 β (IL-1 β) and interleukin-1 receptor antagonist (IL-1ra) mRNA between the GM-CSF supplemented group and control group in mouse embryos.

Mouse 2-cell embryos were cultured in P-1 medium supplemented with or without mouse GM-CSF (10 ng/ml). The number of total and apoptotic cell in blastocyst were assessed by TUNEL. And then, the expression of IL-1 α, IL-1 β and IL-1ra mRNA in blastocyst were examined by RT-PCR.

The rates of blastocyst formation and blastocyst hatching were both significantly higher ($P<0.05$) in the GM-CSF supplemented group (76.1 and 53.0%) in comparison with control group (65.5 and 35.2%). The mean cell number in blastocyst was significantly increased ($P<0.001$) in GM-CSF supplemented group (77.7 ± 13.8) compared to control group (49.3 ± 7.2). However, apoptotic cell number in blastocyst was significantly lower ($P<0.001$) in GM-CSF supplemented group (2.1 ± 1.7) than in control group (5.3 ± 3.6). The expression of IL-1 α and IL-1ra mRNA at blastocyst stage were lower in the GM-CSF supplemented group in comparison with control group. Unlike IL-1 α and IL-1ra, the expression of IL-1 β mRNA was significantly increased ($P<0.001$) in the GM-CSF supplemented group compared to control group.

Our findings suggest that GM-CSF may be play an important role in the regulation of pre-implantation embryo IL-1 system, an important factor in embryo-maternal molecular communication during the implantation process.

Key words) ***GM-CSF, IL-1 α, IL-1 β, IL-1ra, RT-PCR, TUNEL***