

# Effect of Rat Bone Marrow Stem Cell Administration to Rats (*Rattus norvegicus*) Using Infertile Model on Oocyte Apoptosis

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## Effect of Rat Bone Marrow Stem Cell Administration to Rats (*Rattus norvegicus*) Using Infertile Model on Oocyte Apoptosis

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**Keywords :** Apoptosis, Rat Bone Marrow Stem Cell, oocytes, rats of infertile model.

### INTRODUCTION

Many factors can cause infertility of cattle, and endocrine abnormality is the most frequently found factor. High infertility rate will be of disadvantage because it will decrease the reproductivity and productivity of cattle. Nowadays, the utilization of stem cell to cure various diseases is increasing as Rat Bone Marrow Stem Cell (RBMSC) is able to express genes or certain cells in the body. In infertility case, Rat Bone Marrow Stem Cell administration can improve folliculogenesis process and the quality of oocyte ovulated. The objective of the study is to find out the effect of RBMSC administration on oocyte apoptosis of rats. The significance of the study is a new innovation to utilize stem cells for reproductive disorders.

### MATERIALS DAN METHODS

The study was an experimental research with post test only control group design using 32 rats of infertile model randomly divided into 2 groups, that is, Group 1 (Control), a group of rats of infertile model given minimum engle medium (MEM) as RBMSC solvent and Group II (Treatment), a group of rats of infertile model given RBMSC therapy with a dosage of  $1.10^7$ /rat. Oocyte apoptosis was evaluated using tunnel coloring.

### RESULTS AND DISCUSSION

From the results of the statical analysis, the number of apoptotic oocytes of the rats of infertile model treated with Rat Bone Marrow Stem Cell can be seen in the table below.

Table 1. Mean and standard deviation of the number of apoptotic oocytes of the rats of infertility model after given Rat Bone Marrow Stem Cell treatment

Group	(X±SD)	Significance
Control	6.25 <sup>a</sup> ± 3.96	.000
Treatment	4.67 <sup>b</sup> ± 1.42	

The Rat Bone marrow stem cell treatment with a dosage of  $1 \times 10^7$  / rat was able to improve the process of folliculogenesis and egg quality. It can be seen from the number of oocytes collected, the figures of apoptosis decreased. In addition, the administration of the Rat Bone Marrow Stem Cell could increase the number of eggs ovulated. This treatment was also able to improve the egg quality of the rats of infertile model. In contrast, the infertile group without Rat Bone Marrow Stem Cell therapy the number of ovulated egg cells was reduced, even no oocyte was ovulated, whereas the frequency of apoptosis increased. This proved that administration of Rat Bone Marrow Stem Cell treatment repaired the process folliculogenesis and oocyte competence. The administration of Rat Bone Marrow Stem Cell to the rats of infertile model could reduce apoptosis than the control group ( $p < 0.05$ ).

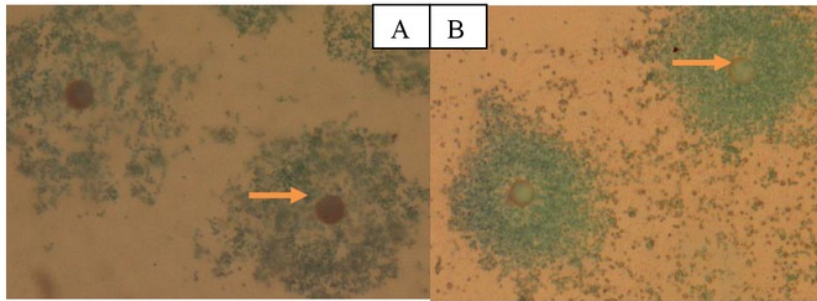


Figure2. apoptotic oocytes (A) and not apoptotic oocytes (B)

In the control group the low number of ovulated oocytes showed that the endocrine system disruption occurring continuously due to the injection of testosterone would cause disorders to the GnRH, so the LH and FSH were not secreted, thus resulting in disorders to the development, maturation and steroidogenesis in the ovary (Maeda, 2000). In normal condition the secreted FSH stimulated follicle development. The administration of Rat Bone Marrow Stem Cell treatment was able to restore normal FSH secretion, so that it would stimulate the secretion of estrogen. High circulating levels of estrogen would induce sharp increase in LH and normalize the condition of folliculogenesis and maturation in the ovaries so de graff follicles would be ovulated (Noakes, 2001). This could be seen in the treatment group given the Rat Bone Marrow Stem Cell treatment that there was an increasing number of oocytes ovulated and a decrease in the number of oocytes undergoing apoptosis.

#### CONCLUSION

The Rat Bone Marrow Stem Cell treatment to the rats of infertile model could reduce apoptosis of oocytes.

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