

Leptin enhances porcine oocyte maturation and embryo development

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Background

Leptin is a peptide hormone essential for regulation of body weight and body fat. Recent evidence suggests that leptin is also plays important role in female reproduction, including control of ovarian function. However, whether leptin influences porcine oocyte maturation and early embryo development is largely unknown.

Objectives

- To investigate the temporal expression of the leptin receptor in the porcine oocyte
- To investigate the influence of leptin on oocyte maturation and embryo development

Results

1. Expression of the leptin receptor is highly dependent on the stage of follicle growth and oocyte maturation, with maximum expression in oocyte from medium follicles and at germinal vesicle breakdown (GVBD) during oocyte maturation (data not shown).
2. Leptin influences nuclear maturation by increasing the proportion of oocytes reaching the MII stage (Table 1), and influenced cytoplasmic maturation by increasing Cyclin B1 protein (a marker for cytoplasmic maturation; data not shown).
3. Leptin enhanced pre-implantation development of porcine embryos. When included in embryo culture medium, leptin improved blastocyst rate from 24% to 38% (Table 1).

Table 1: Influence of leptin on oocyte nuclear maturation and preimplantation development of embryos derived from *in vitro* fertilization (IVF)

Leptin (ng/ml)	Oocyte Maturation (MII; %)	Cleavage (two cell stage embryo; %)	Blastocyst embryo (%)
0	65.6	70.7 ± 3.4	23.9 ± 2.1
10	79.8*	85.1 ± 2.3*	38.1 ± 2.2*
100	84.2*	71.9 ± 3.4	30.7 ± 2.9

*p<0.05

Take Home Messages

- Leptin enhances porcine oocyte maturation and early embryo development. Inclusion of leptin in the medium during *in vitro* oocyte maturation and culture of embryos derived from IVF or cloning may be beneficial.

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