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# Maternal Restraint Stress Diminishes the Developmental Potential of Oocytes<sup>1</sup>

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Although studies of both humans and animals suggest detrimental effects of psychological (restraint) stress on reproduction, reports concerning the direct effect of psychological (restraint) stress on the oocyte are few and conflicting. In the present study, a restraint system that allows mice free intake of feed and water while restraining their movement was established, and effects of maternal restraint on oocyte competence were examined by observing embryo development in vitro and in vivo. The results indicated that restraint stress applied to both gonadotropin-stimulated and unstimulated females during oocyte growth and maturation increased their plasma cortisol level but impaired ovulation and oocyte developmental potential. Injection of cortisol also decreased oocyte developmental potential in both stimulated and unstimulated mice. However, whereas restraint stress reduced the plasma follicle-stimulating hormone (FSH) level of unstimulated mice, injection of cortisol did not. Because the stimulated mice had received very high doses of FSH and luteinizing hormone from injection with equine chorionic gonadotropin injection, the results suggested that whereas cortisol acts directly on the ovary to damage the oocyte, restraint stress impairs oocyte competence by actions on both the hypothalamic-pituitary-gonadal and the hypothalamic-pituitary-adrenal axes. However, exposing the cumulus-oocyte complexes (COCs) to physiological levels of cortisol did not affect

oocyte nuclear and cytoplasmic maturation in vitro. Thus, cortisol might have impaired ovulation and oocyte potential by an indirect effect on ovarian tissues other than the COCs.

Restraint stress during oocyte growth and maturation increases plasma cortisol while impairing ovulation and oocyte developmental potential.

- **cortisol follicle-stimulating hormone (FSH/FSH receptor) gamete biology oocyte competence oocyte development psychological stress restraint stress stress**

## Footnotes

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