

## Embryonic development of fertilized rat oocytes induced to mature by an analogue of gonadotrophin-releasing hormone

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**Summary.** A gonadotrophin-releasing hormone analogue (GnRHa) was administered to hypophysectomized immature rats. Postovulatory mature oocytes obtained under these conditions were exposed *in vitro* to a sperm suspension for fertilization. Developmental ability of the fertilized ova was studied by transfer of the 2-cell stage embryos to oviducts of foster mothers. The potential of oocytes, undergoing maturation in response to GnRHa, to develop into 2-cell embryos was similar to that of oocytes stimulated by hCG (76.4% and 83.1% respectively). The 2-cell stage embryos obtained from such oocytes were equally able to implant in the uteri of foster mothers (25.7% and 21.2% respectively) and subsequently develop into live embryos (15.3% and 15.2%, respectively, at Day 20 of pregnancy).

**Keywords:** GnRH; oocyte maturation; rat; embryos

### Introduction

The physiological stimulus for resumption of meiosis is provided by luteinizing hormone (LH) (Lindner *et al.*, 1974), although it has been reported that gonadotrophin-releasing hormone (GnRH) can also promote oocyte maturation. Hillensjo & LeMaire (1980) found that exposure of isolated ovarian follicles to GnRH or its agonist analogues *in vitro* resulted in maturation of the oocytes within these follicles. The direct stimulatory action of GnRH on the ovary has also been demonstrated *in vivo*. Oocyte maturation and ovulation were induced in hypophysectomized rats after administration of GnRH agonists (Corbin & Bex, 1981; Ekholm *et al.*, 1981; Erickson *et al.*, 1983). Like the earlier reports (Hillensjo & LeMaire, 1980; Corbin & Bex, 1981; Ekholm *et al.*, 1981) we have also demonstrated that GnRH agonist analogues are potent inducers of resumption of meiosis in follicle-enclosed oocytes *in vitro*, as well as stimulators of oocyte maturation and ovulation *in vivo*, in hypophysectomized rats (Dekel *et al.*, 1983, 1985).

The studies discussed above demonstrated that, like LH, GnRH and its agonist analogues can stimulate the oocyte to mature and can trigger the follicle to release the mature oocyte. LH action results in the release of a functional fertilizable oocyte; after sperm penetration this ovum will develop into a normal embryo. The diagnosis of GnRH-induced oocyte maturation in all the studies mentioned above was based only on morphological markers and the functional performance of the matured oocytes was not tested (Hillensjo & LeMaire, 1980; Ekholm *et al.*, 1981; Dekel *et al.*, 1983). In a previous study we assessed the ability of oocytes undergoing maturation in response to GnRH to be fertilized (Dekel & Shalgi, 1987). Our present study is aimed at analysis of the potential of such fertilized oocytes to cleave into 2-cell embryos, to implant in uteri of foster mothers and to develop further to term.

