



# Oocyte maturation in humans: effect of insulin-like growth factor system and its interaction with gonadotropins in hyperstimulated cycles

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## Introduction:

Experimental and clinical evidences suggest that a multitude of factors participate, either directly or indirectly, in follicle development and oocyte maturation. A large body of evidence has shown that insulin-like growth factor I (IGF-I) and its binding protein 3 (IGFBP-3) are likely to regulate the maturation of oocytes in humans and other species. This prospective, randomised study was designed to investigate whether follicular fluid IGF-I and IGFBP-3 concentrations were influenced by different gonadotropins, and also to determine the relationship between these growth factors and oocyte maturation.

## Methods:

Twenty consecutive infertile women (mean age 33 years, range 28-40) undergoing in-vitro fertilization participated. All women underwent pituitary down-regulation with gonadotropin-releasing hormone analogue (GnRH-a), and then ovarian hyperstimulation with one of the commercially available gonadotropins – a-follitropin, b-follitropin or urinary-follitropin. Follicle growth was monitored with serum oestradiol levels and transvaginal ultrasonography. On the day of oocyte retrieval, the follicular fluid of each aspirated follicle was collected, stored and later analysed for IGF-I and IGFBP-3 concentrations. Oocyte maturation, assessed by a standard maturation scale, was compared with follicular fluid concentrations of IGF-I and IGFBP-3.

## Results:

A good response to ovarian stimulation occurred in all women, and overall, 70 follicular fluids were collected. Although different gonadotropins were administered, there was no difference in the follicular fluid concentrations of IGF-I and IGFBP-3 between the study groups. A statistically significant relationship was observed between IGF-I and IGFBP-3 ( $r=0.41$ ,  $p=0.001$ ). Also, oocyte maturation correlated in a positive manner with higher levels of IGF-I ( $r=0.34$ ,  $p=0.01$ ) and lower levels of IGFBP-3 ( $r=0.29$ ,  $p=0.03$ ).

## Conclusions:

Follicular fluid IGF-I and IGFBP-3 concentrations do not vary as a function of gonadotropin preparations, hence showing a similar responsiveness to hyperstimulation. In humans, maturation of oocytes is strongly correlated with IGF-I. Therefore, treatments leading to a further amplification of this peptide may result in a positive effect on the ovarian dynamic. Collectively, these data suggest that IGF system and gonadotropins act synergistically to regulate mitosis and steroidogenesis in the ovary.

