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ASRM Abstract

MINERALOCORTICOID PRODUCTION BY MURAL GRANULOSA CELLS (MGCs) AS A MODULATOR OF STEROIDOGENESIS DURING OVARIAN STIMULATION FOR IN VITRO FERTILIZATION (IVF)

Authors:

Marli Amin, Prapti Singh, Christine Briton-Jones, David Hill, Gregorio Chazenbalk, Daniel Dumesic

Objective: In nonhuman primates, mineralocorticoid synthesis by the periovulatory follicle modulates ovarian steroidogenesis (1). To assess whether a similar phenomenon occurs during ovarian stimulation for IVF, follicle fluid (FF) steroid levels were correlated with mural granulosa cell (MGC) lipid content as a cholesterol source for steroidogenesis.

Design: Prospective cohort study

Materials & Methods: FF and MGCs were collected from 27 nonobese women (age, 36.2 ± 4.5 yrs; BMI, 22.6 ± 3.0 kg/m² [mean \pm SD]) undergoing ovarian stimulation for IVF. FF aspirated from the 1st follicle/ovary was used for steroid analysis by liquid chromatography-tandem mass spectrometry. MGCs were suspended in 4% paraformaldehyde, treated with lipid fluorescent dye BODIPY® FL C₁₆ and the nuclear marker DAPI, and quantified by confocal microscopy, using ImageJ software. Pearson correlation coefficients correlated FF steroid levels with MGC lipid content.

Results: Independent of patient age, BMI or gonadotropin amount administered, FF levels of the mineralocorticoid, 11-deoxycorticosterone (DOC, 113.5 ± 36.4 nM); the glucocorticoid, 11-dexocortisol (11DOC, 6.6 ± 3.5 nM); and its precursor, 17-hydroxyprogesterone (4.5 ± 2.3 μ M), were positively correlated with MGC lipid content (84 ± 43 , fluorescent units/sample) ($P \leq 0.05$, all steroids), implying 21 hydroxylase activity. Conversely, FF levels of the 11-hydroxylase-dependent steroids, corticosterone (5.6 ± 3.7 nM) and cortisol (163.4 ± 54.9 nM), were unrelated to MGC lipid content. In FF, DOC and 11DOC levels positively predicted progesterone (DOC: R^2 0.73, $P \leq 0.0001$; 11DOC: R^2 0.23, $P \leq 0.01$) and estradiol (DOC: R^2 0.23, $P \leq 0.01$; 11DOC: R^2 0.78, $P \leq 0.0001$) levels. Other FF steroid levels were unrelated to MGC lipid content.

Conclusions: Mineralocorticoid production by MGCs via 21 hydroxylase likely occurs during ovarian stimulation for IVF and may modulate steroidogenesis.

References:

1. Fru et al. Biol Reprod 2006;75:568

UCLA Depart of OB/GYN