Life Sciences, Vol. 35, pp. 389-398
Printed in U.S.A.

Pergamon Press

GONADOTROPIN RELEASING HORMONE: REGULATION OF PHOSPHOLIPID TURNOVER AND PROSTAGLANDIN PRODUCTION IN OVARIAN GRANULOSA CELLS

Zvi Naor, Moshe Zilberstein*, Haim Zakut* and Nava Dekel

Department of Hormone Research
The Weizmann Institute of Science
Rehovot 76100, Israel
and
*Department of Obstetrics and Gynecology
Sackler Faculty of Medicine
Tel Aviv University
The Edith Wolfson Hospital
Holon, Israel

(Received in final form May 14, 1984)

Summary

The direct effect of gonadotropin releasing hormone (GnRH) upon ovarian function, is initiated by a rapid receptor-mediated increase in phosphatidylinositol (PI) turnover (~ 5 min) followed by prostaglandin E (PGE, 120 min) and progesterone (120 min) formation, oocyte maturation and induction of ovulation. In contrast, luteinizing hormone (LH) stimulation of oocyte maturation and induction of ovulation is mediated by increased adenosine 3',5'-monophosphate (cAMP, 15 min), progesterone (30 min) and PGE (180 min) production. Both LH and GnRH stimulation of oocyte maturation are inhibited by dibutyryl cAMP and 3-isobutyl-1-methylxanthine, whereas induction of ovulation by the two hormones is blocked by indomethacin. GnRH and LH differ, therefore, in the mechanism leading to PGE formation, but thereafter share a common mechanism responsible for oocyte maturation and independently for induction of ovulation.

Pituitary gonadotropin biosynthesis and release is regulated by the decapeptide gonadotropin releasing hormone (GnRH). Paradoxical antifertility effects of GnRH *in vivo* have led to the findings that the peptide and its potent analogs exert direct effects on the gonads (1).

The inhibitory effects of GnRH on FSH-induced estrogen production and LH receptor formation in the ovary, might be explained by findings that GnRH analogs reverse the inhibitory effect of FSH on phosphodiesterase activity and progressively inhibit adenylate cyclase activity (2). In addition, the inhibitory effects of GnRH on FSH-induced progesterone production can result from inhibition of the side-chain cleavage enzyme and the increase in 20-hydroxysteroid dehydrogenase activity (3). However, the mechanism by which GnRH exerts its direct 'gonadotropin-like' effects on PGE and progesterone formation, oocyte maturation and ovulation, and the relationship between GnRH and LH actions are not yet clear (4-7).

0024-3205/84 $3.00 + .00