

Review Article

Fetal endocrinology

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ABSTRACT

Successful outcome of pregnancy depends upon genetic, cellular, and hormonal interactions, which lead to implantation, placentation, embryonic, and fetal development, parturition and fetal adaptation to extrauterine life. The fetal endocrine system commences development early in gestation and plays a modulating role on the various physiological organ systems and prepares the fetus for life after birth. Our current article provides an overview of the current knowledge of several aspects of this vast field of fetal endocrinology and the role of endocrine system on transition to extrauterine life. We also provide an insight into fetal endocrine adaptations pertinent to various clinically important situations like placental insufficiency and maternal malnutrition.

Key words: Endocrinology, fetal, hypothalamic, pituitary

INTRODUCTION


A gamut of transition factors and epigenetic events act in coordination with autocrine, paracrine, and endocrine network of hormones and growth factors leading to maternal-placental-fetal interactions and evolution of fetal endocrine systems. Hypothalamus and pituitary provide the baseline controlling framework.

Anterior pituitary develops from Rathke's pouch by 5th week.^[1] By 7th week hypothalamus, pituitary stalk, and posterior pituitary develop.^[2] Hypothalamic pituitary portal vessels formation starts by 12th-17th week, which matures till 30th-35th weeks of gestation. Hypothalamic cells develop by 15th-18th weeks. Dopamine, thyrotropin releasing hormone (TRH), gonadotropin releasing hormone (GnRH), and somatostatin are present in hypothalamic tissue by

10th-14th weeks of gestation. Lactotropes, somatotropes, corticotropes, thyrotropes, and gonadotropes are discernible by 7th-16th weeks. Growth hormone (GH), prolactin (PRL), thyroid-stimulating hormone (TSH), luteinizing hormone (LH), follicle-stimulating hormone (FSH), and adrenocorticotrophic hormone (ACTH) are detectable between 10 and 17 weeks. The current article focuses fetal endocrine axes maturation and adaptation to extrauterine life. We have referred to development in animals, mostly in sheep and in rat.

HYPOTHALAMIC-PITUITARY GONADAL AXIS

GnRH stimulates LH and FSH release from gonadotropes. In sheep fetus, LH, FSH, and GnRH are present at mid-gestation or before. Prior to the maturation of the fetal pituitary, chorionic gonadotropin (CG) from the placenta stimulates fetal gonadal growth, differentiation, and secretory activity. CGs levels are greater in female fetuses and show pulsatile secretion during fetal period. Hypothalamus-pituitary-gonadal (HPG) axis activity peaks at 30-40% gestation in the sheep fetus, decreasing until birth.^[3] In the rat fetus tissue concentrations of GnRH, LH, and FSH increase continuously until birth.

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