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Balancing hormonal symphony: the dynamics of reproduction and pregnancy

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Abstract
The biology and endocrinology of reproduction form a broad and dynamic research field that garners significant attention due to its impact on everyday life. This field involves the study of hormones and neuroendocrine factors that are either produced by or act on reproductive tissues, including the hypothalamus, anterior pituitary gland, ovaries, endometrium, and placenta.

Keywords Reproduction, Ovarian physiology, Fetal-placental unit, Endometrium

The biology and endocrinology of reproduction shape a huge and dynamic research discipline that garners sizable interest because of its impact on ordinary lifestyles. Hormones and neuroendocrine elements which can be produced with the aid of or affect reproductive tissues, which includes the hypothalamus, anterior pituitary gland, ovaries, endometrium, and placenta, are studied in this field. The hypothalamic-pituitary-ovarian axis should be precisely quantitatively and temporally regulated on the way to promote implantation and the prevalence of pregnancy [1]. Understanding of regular hypothalamic-pituitary axis feature is critical to apprehend reproductive endocrine pathology [2].

Consequently, the first aim of the current call for papers in BMC Endocrine issues on the topic of Endocrinology of reproduction and pregnancy is to highlight the modern-day advancements concerning diverse issues of hypothalamus-pituitary-gonadal axis, hormonal factors influencing sexual health and overall well-being, metabolic and reproductive issues of puberty, peri-conceptional care, contraception and menopause. Moreover, we aim to draw readers' attention to the evaluation of ovarian physiology (which includes ovarian reserve, premature menopause, ovarian ageing, and polycystic ovarian syndome), IVF protocols (together with ovarian response to stimulation, LH suppression techniques, embryo transfer modalities, and implantation failure), as well as the endocrine factors influencing endometrial receptivity and implantation. Moreover, we emphasize the importance of understanding the endocrine aspects of benign and steroid-dependent diseases. Current data indicates that recurrent implantation failure (RIF), one of the most common conditions affecting IVF outcomes, has shifted scientific interest in the endometrium during the last few decades. Given that genuine RIF is extraordinarily unusual in patients with euploid embryo transfers, signifies that RIF has possibly been overdiagnoses and over evaluated [3]. There is an urgent need for new techniques for the prevention, analysis, and treatment of male infertility, which has been unnoticed for several decades due to the usage of intracytoplasmic sperm injections (ICSI) [4].

Conversely, during pregnancy, the fetal-placental unit (FPU) releases protein and steroid hormones, as well as eicosanoids, which modify the function of all endocrine

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glands in the mother's body. This interface is considered the major site of protein and steroid hormone production and secretion. The endocrine changes associated with pregnancy are adaptive, allowing the mother to nurture the developing fetus [5]. The development of the fetus and the adjustment of the mother are controlled by different hormones. Hormones like hCG and sex steroids play a crucial role in regulating various biological processes in the mother's body during pregnancy, while the embryo also triggers changes in both itself and the mother.

The primary objective is to ensure the proper maintenance of the endometrial lining, facilitate the attachment and invasion of cytotrophoblasts into the endometrium, promote uterine angiogenesis, suppress the maternal immune system to prevent rejection of the developing embryo, prepare maternal metabolic systems, and ready the mammary glands for lactation. Disruptions in these complex processes can result in complications such as preeclampsia, gestational diabetes, thyroid dysfunction (hypo- or hyperthyroidism), secondary hyperparathyroidism, and microprolactinomas, all of which can impact maternal and fetal health outcomes, including morbidity and mortality [6–8]. Nevertheless, it should be emphasized that most well-managed pre-existing endocrine conditions have a negligible effect on maternal or fetal health. Recent research efforts are focused on identifying women at risk of adverse pregnancy outcomes and devising effective management strategies to mitigate these risks [9]. For instance, diagnostic tools like immunoassays that measure the ratio of serum soluble fms-like tyrosine kinase 1 (sFlt-1) to placental growth factor (PlGF) have been employed to predict preeclampsia in women hospitalized for pregnancy-related hypertensive disorders. Additionally, machine learning approaches are being explored for their potential to enhance risk prediction and management [10].

With this call for papers, we invite submissions that provide fresh insights into the molecular mechanisms governing hormonal regulation in both health and disease, outline innovative treatment approaches, or propose more effective strategies for managing endocrine disorders related to reproduction and pregnancy.

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NA.

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