



## Toxic Stress and Corticosteroids in Premenopausal Period: A Case of Late Embedding?

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### Abstract

This Editorial aims at discussing premenopausal age decade as a period susceptible to osteoporosis and other adverse actions of endo- and exogenous glucocorticoids in excess, with probable interference on adaptation to pregnancy and lactation in female offspring.

**Keywords:** Glucocorticoids; Ontogeny; Premenopausal

Earlier we have shown that at least in the South of Brazil women have higher predisposition to various types of anemias during the whole fertile period that extends along several decades of age (10-49 y) [1]. Moreover, shortly later we justified that from all this period only a middle half (20-39 y) may be more adequate for pregnancy, since adolescent period is probably suboptimal because of underdeveloped uterus, whereas premenopausal decade has a disadvantage of lower sensitivity to estrogens in central part of hypothalamo-pituitary-gonadal axis [2].

However, the adaptation to pregnancy and even lactation may be diminished in general by stress and glucocorticoids (GC) [3] as the main candidates to the role of mediators for the phenomena of programming/imprinting and embedding [4,5]. Therefore, in the present Editorial we discuss what will be the situation in this regard for premenopausal period.

First of all, we must remember that toxic (or traumatic) stress is accompanied by higher exposure to increased blood levels of endo- or exogenous GC. On the other hand, the difference between programming/imprinting and embedding phenomena may be in their occurrence respectively before and after infantile transition

taking place at the age of approximately 1-2 y in humans [6], being associated with much higher sensitivity to growth-inhibitory GC action in perinatal period [7].

Now it is pertinent to remember that Hungarian researcher Gyorgy Csaba from Semmelweis University in Budapest introduced at first the term of hormonal imprinting and thereafter extended it to adolescence as an example of late imprinting [8]. Therefore, here we shall elaborate further these theoretical constructs, suggesting that long-term exposure to GC in excess may be capable to provoke in cumulative mode some sort of late embedding, even in premenopausal period.

Bibliographic search confirms that excessive utilization of corticosteroids during premenopausal period can result in higher predisposition of women to osteoporosis [9,10]. Moreover, GC are involved in etiopathogenic mechanisms of age-related cardiometabolic and neuropsychiatric disorders in general. However, the important question remains, why higher predisposition of women to affective disorders and to cardiometabolic diseases occurs in middle-age categories and in the postmenopausal period respectively [11,12].

Finally, if pregnancy occurs in premenopausal period, higher exposure of the fetus to endo- or exogenous GC in excess may be considered as early-life stress that accompanies probably several other adverse events, such as malnutrition, infections etc. [13,14]. In conclusion, the attention of health care professionals should be attracted to pregnancy not only in adolescence (article in press, in this journal), but in premenopausal period also.

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