

## Maternal smoking and changes in the fetal steroidogenesis – is there difference due to sex of child?

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**Context:** Smoking during pregnancy significantly influences the production of many fetal hormones. Children that have been exposed to smoking during prenatal development have more frequent cognitive function defects, behavioral disorders, attention problems, hyperactivity, psychological problems, and a higher tendency to become addicted. The effect of smoking during pregnancy on neuroactive steroids, which could play the role in behavior disorders, has not been systematically monitored.

**Objectives:** We followed changes in the production of steroid hormones caused by smoking during pregnancy in pregnant women and their children. We found the possible differences depending on the sex of child.

**Methods:** We focused on changes in steroidogenesis in the blood of mothers in their 37th week of pregnancy and in mixed cord blood from their newborns. Selected steroid hormones (cortisol, cortisone, dehydroepiandrosterone (DHEA), 7 $\alpha$ -OH-DHEA, 7 $\beta$ -OH-DHEA), 7-oxo-DHEA, pregnenolone, 17 $\alpha$ -hydroxy-pregnenolone, testosterone, androstenedione, progesterone, 17-OH-progesterone, corticosterone, estrone, estradiol, and estriol ) were measured by LC-MS/MS method. We separately analyzed hormonal changes associated with smoking according to the sex of newborns.

**Patients:** The study included 88 healthy women with physiological pregnancies (17 active smokers and 71 non-smokers). Ex-smokers and passive smokers were excluded from the study.

**Main Outcome Measure:** Male newborns steroidogenesis is more sensitive to maternal smoking.

**Results:** In women with male fetuses, we found higher levels of serum cortisone, DHEA, 7 $\alpha$ -OH-DHEA, 17-OH pregnenolone, testosterone, and androstenedione in smokers at the 37th week compared to non-smokers. In women with female fetuses, we found lower serum levels of 7 $\alpha$ -OH-DHEA and higher androstenedione in smokers at the 37th week. We found significantly higher levels of testosterone in newborn males of smokers and higher levels of 7 $\alpha$ -OH-DHEA in female newborns of smokers.

**Conclusions:** Smoking during pregnancy induces changes in the production of steroids in both the mother and her child. These changes are different for different fetal sexes, with more pronounced changes in mothers carrying male newborns as well as in the newborn males themselves.

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