

Summary

Steroid hormones in testis play an important role in spermatogenesis, maintenance of the male reproductive tract, production of semen and the maintenance of secondary sex characteristics and libido. They are also discussed as a target for substances called endocrine disruptors (EDs). No complex study was conducted on evaluation of relationships between EDs and steroid spectrum in 2 biological fluids; seminal plasma and plasma.

The aim of the PhD. thesis was to develop and validate a method for determination of bisphenol A (BPA) and steroid spectrum in plasma and seminal plasma and to shed more light into mechanisms of ED action and effects of BPA and polychlorinated biphenyls (PCBs) on human spermatogenesis and steroidogenesis.

Two new liquid-chromatography mass spectrometry methods for determination of BPA and 11 steroids in plasma and seminal plasma were developed and validated. The methods were used for estimation of analyte concentrations in 191 men with a different degree of fertility. Concurrently, the levels of six congeners of PCBs, gonadotropins, selenium and zinc in plasma were estimated. Partial correlations adjusted for age and BMI were calculated to evaluate relationships between these analytes.

Seminal BPA, but not plasma BPA, was negatively associated with sperm concentration ($r=-0.212$; $p=0.005$), sperm count ($r=-0.178$; $p=0.018$) and morphology ($r=-0.156$; $p=0.049$). These relationships were observed only in seminal plasma BPA, which indicates the uniqueness of seminal plasma in the ED research. BPA in seminal plasma negatively correlated with seminal steroid precursors (pregnenolone, 17α -hydroxy-pregnenolone), on the other hand, the opposite results were found for BPA and steroid precursors in plasma. The sum of PCB congeners was negatively associated with testosterone, free testosterone and dihydrotestosterone in plasma.

BPA negatively contributes to the final state of sperm quality. Moreover, the present data indicate that BPA influence human gonadal and adrenal steroidogenesis at various steps. Environmental levels of PCBs in our study population negatively correlated with androgen levels, but surprisingly without negative effects on sperm quality.