

Abstract

There are an increasing amount of compounds in the environment that can have a negative effect on reproductive parameters in both male and female organism. There has been a worldwide decline of sperm quality during past decades and this fact lead to an increase of unnatural ways of conception through assisted reproduction techniques in the specialised centres.

Natural estrogens are one of these compounds and they get into waste water after being excluded from the body by the urine. They get back into the human body from drinking water or from the food, and they can interfere with function of endogenous hormones in very low concentrations. For these reasons it is up to date to deal with the influence of these compounds on mammalian sperm.

For many years, estrogens have been considered typically female sex hormones. It is now certain that they are also very important in the regulation of male reproduction. Endogenous estrogens in mammalian males are an important part of the endocrine system. Estrogens play an important role in the development of germ cells, spermatogenesis and processes leading to successful egg fertilization such as a capacitation or acrosomal reaction. Tyrosine phosphorylation is one of the essential steps for the properly ongoing process of capacitation in sperm followed by a fusion of plasma and outer acrosomal membrane of sperm and sequential exocytosis of the acrosomal vesicle followed by sperm-egg fusion.

We used laboratory strain of BALB/c mice for a detailed study of the effect of three natural estrogenic hormones 17- β -estradiol, estron, estriol and synthetic 17- α -ethynylestradiol on capacitation and acrosomal reaction *in vitro*. P-Tyr is exclusive indicator of a signal transduction pathway associated with sperm capacitation, therefore the effect of these estrogens was evaluated by the ratio of tyrosine phosphorylation in a sperm head during capacitation *in vitro* with the using of the fluorescent microscope and also SDS PAGE electrophoresis. Simultaneously, we evaluated the state of the acrosome after calcium ionophore induced acrosomal reaction.

The results obtained cannot unequivocally conclude that the exogenous addition of natural estrogenic hormones to the capacitation medium induces different levels of tyrosine-phosphorylated residues expressed in a mouse sperm head in comparison with the control. However, in the case of synthetic 17- α -ethynylestradiol, the increase in sperm head p-Tyr was detected. From the evaluation of CaI induced AR is evident that the increase in percentage of acrosome-reacted sperm was positively dependent on the time of the capacitation. The decrease in the level of AR was analyzed in 17- β -estradiol and estron influenced sperm samples in comparison with the control. Other significant differences occurred randomly and independently on the concentration, type of steroid, capacitation time or duration of CaI exposure. It can be concluded that increasing concentration of estrogens in the environment have an impact on the ability of sperm capacitation and AR *in vitro*.

Keywords: estrogens, sperm, capacitation, tyrosine phosphorylation, acrosomal reaction