

PROJECT ABSTRACT

In recent years, the discussion about the harmful effects of UV radiation on human functioning is increasing. The cosmetic products market containing sunscreens, which are to protect us from the harmful effects of UV radiation, such as sunburns, tumors with a particular focus on malignant melanoma, hyperpigmentation, photoaging of the skin continues to grow. The first group of solar filters are compounds absorbing the energy carried by solar radiation (chemical filters, including benzophenone derivatives), and the second group are chemicals reflecting UV radiation (physical).

In new generation cosmetics several UV absorbing compounds filters and physical filters are used in the same time, because this is the only way to ensure effective protection of the skin. One of the most common groups are benzophenone derivatives. Initially they were classified as compounds which main side effect was inducing allergy reactions and skin irritation. Numerous studies proving that they are penetrating through skin to the systemic circulation, lead to the determination of their effects on organisms. One of the best known effects are disorders of the endocrine system, and the compounds that cause them were classified as xenoestrogens because they have the ability to modulate endocrine with particular emphasis on estrogen receptors.

Increased exposure of xenoestrogen, observed for many years, is considered to be the main reason for semen parameters reduction and therefore the occurrence of an increasing number of cases of male infertility. Apart from their effect on the activity of steroid hormone receptors, benzophenones addition also changes ER expression in peripheral tissues and the expression of enzymes involved in the synthesis of sex hormones. All these actions can impair synthesis of testosterone in the Leydig cells and spermatogenesis. Particularly adverse effect on testicular function may have increased estrogens level occurring not only in the testes but also in the central nervous system, since estrogen through the inhibitory feedback mechanism strongly inhibit the activity of the hypothalamic-pituitary-testis axis.

The main hypothesis of the present research project is to demonstrate whether the 4-week exposure to benzophenone-2, similar to what a person is exposed to during the holidays, affects the process of spermatogenesis in the testes and the number, motility and morphology of sperm cells. The level of reactive oxygen species which can damage the seminiferous epithelium will be assessed. To properly determine the effect of BP-2 and its mechanism, the level of sex hormones and thyroid hormones will be examined. Since prolactin and thyroid hormones interfere with spermatogenesis, and on the other hand, it is known that BP-2 affects the levels of thyroxine and thyroid stimulating hormone in blood of rats the level of prolactin, the fraction of free thyroid hormones (fT3 and fT4) will be determined in blood in order to prove or exclude their participation in the operation of BP-2 on testicular function.

Basing on the knowledge gathered during this project it will be possible to determine new research direction for the future and reduction of the usage of benzophenone-2 as a component of cosmetics. This is an important issue because the increased awareness of the harmful effects of UV radiation results in increased use of BP-2.