Abstract

According to the World Health Organization, depression is one of the most widespread diseases in the world. Contemporary psychiatry as a definition of depression states that it is a multifactorial mental disorder classified within the group of affective disorders. The most common form of its treatment is pharmacotherapy and psychotherapy. Most authors agree that sexual dysfunctions are a possible side effects of pharmacological treatment, recorded in every group of antidepressants applied in current treatment. It has been shown that their toxicity to reproductive cells is fundamental due to the possibility of genetic changes in the cells of future generations. Therefore, the toxicity of antidepressants becomes an important issue in the context of treatment efficacy.

The research hypothesis presented in this dissertation assumed that antidepressants are toxic to reproductive cells, which may be a direct cause of decreased male fertility. For this reason, the main scientific goal of the conducted research was the multilevel evaluation of the potential toxicity of antidepressants (amitriptyline, escitalopram, fluoxetine, imipramine, mirtazapine, olanzapine, reboxetine, venlafaxine) on the cells of the spermatogenesis pathway (GC-1 spg and GC-2 spd) in cellular, molecular and biochemical features *in vitro*.

Obtained results suggest cytotoxic properties of drugs directly related to the drug concentration and exposure time, disturbances in redox balance, failure of enzymatic and non-enzymatic cell protection mechanisms, impairment of mitochondrial functions and decrease in ATP production, cell cycle arrest associated with activation of p21 and p53 proteins and p16-dependent pathway, genotoxic properties characterized by DNA damage and overproduction of micronuclei. In addition, the initiation of intracellular adaptation mechanisms involved in the repair of DNA damage, protecting telomere fragments of chromosomes and stabilizing kariokinetic spindles were noted.

The techniques used in this study have made it possible to partially understand the pathomechanisms of the action of antidepressants and their

associated reprotoxicity towards cells of the male reproductive system. Undoubtedly, the development of new therapeutic approaches aimed at increasing the effectiveness or tolerance of existing drugs is very important. This goal can be achieved through the development of medicinal products using biotechnology tools, and from a clinical point of view, it is important to propose an answer to the question of which of the antidepressants has a more favorable profile of side effects in relation to the cells of the male reproductive system.