

Endocrine disruptor compounds (EDCs) are substances that can affect the hormonal balance of both humans and animals. This group is very numerous and includes, among others, mycotoxins and bisphenol A (BPA) and its derivatives. Bisphenols are compounds used in the plastics industry. The use of BPA has been limited, and compounds with a similar structure have been introduced in its place. Nevertheless, scientists point out that they may not be safer than the basic form. Mycotoxins are secondary metabolites of mould fungi. Their presence in food is a consequence of contamination of crops with fungi, during plant growth or during improper storage of crops (i.e. elevated temperature of about 20-25°C and moisture). A number of studies indicate the negative impact of mycotoxins on human and animal health. Nevertheless, more and more studies also indicate that they can both stimulate and inhibit cancer cells.

Zearalenone (ZEA) is a mycotoxin that is the most common of all mycotoxins in foods. Alternariol (AOH) is a relatively "new" mycotoxin and its mechanism of action has not been sufficiently understood so far. BPA was a compound commonly used in the chemical industry. Nevertheless, its use was reduced and its analogues, such as bisphenol S (BPS) or bisphenol F (F), were introduced in its place. Due to the structural similarity of both mycotoxins and bisphenols to naturally occurring estrogens, they can impersonate them, thus disrupting the hormonal balance, and affecting, among others, fertility disorders. According to the European Food Safety Authority (EFSA), the daily tolerable dose for ZEA, which should not cause any side effects in humans, is 0.25µg/kg of body weight. A safe dose for AOH, BPS and BPF has not yet been determined. Since previous studies have shown that mycotoxins can act synergistically with BPA, assessing whether mycotoxins will also act synergistically with its derivatives seems necessary.

In previous studies, our team noted that ZEA can modulate the invasive potential of prostate cancer cells. Due to the fact that both mycotoxins and BPA derivatives are present in our daily diet and environment, it seems necessary to verify how they affect hormone-dependent cancers. Therefore, **this project aims to extend the current knowledge on the impact of BPS and BPF, compounds that are to be a potential BPA replacement, on the proliferation and invasiveness of ovarian and endometrial cancer cells. The research aims to determine the role of classical and non-classical estrogen receptors in response to BPS and BPF. In addition, the study will analyze the impact of a mixture of two environmental EDCs: estrogen mycotoxins (ZEA and AOH) and bisphenol compounds (BPS and BPF).** In order to assess this, *in vitro* studies will be conducted to verify the hypothesis and to check whether the effect of BPS and BPF can be modulated by estrogen mycotoxins. Based on current knowledge, we know that estrogenic compounds that can disrupt the hormonal balance play a key role in the process of carcinogenesis. Recent studies also indicate a very significant influence on the tumour microenvironment. Therefore, by introducing co-cultures of cancer cells with cells that are included in the tumour microenvironment, we will assess how the stimulated cancer cells will affect their differentiation. In the course of experiments, we will gain knowledge about the impact of bisphenol derivatives and estrogen mycotoxins on the human body. In addition, these results will be the basis for assessing the risk of taking these compounds with food, especially taking into account the coexistence of more than one EDC. The legitimacy of the research is emphasized by the fact that endometrial and ovarian cancer are the most common cancers of the reproductive system, and their formation is dependent, among others, on hormonal imbalance.