

Breast cancer is the most common cancer in women and the second most common cancer. Worldwide, nearly 2.5 million new cases were reported in 2020. Early diagnosis and effective therapy remain the main challenge in the fight against cancer. Great hopes are associated with the development of modern therapeutic methods such as photodynamic therapy (PDT). It is based on delivering biologically active molecules, so-called photosensitizers, to the tumor and inducing their activity, which results in the elimination of cancer cells. One of such therapeutic agent is TMPyP4, which has a high specificity for cancer cells and shows low side effects. However, as it turns out, depending on the concentration and treatment time, it can also cause pro-cancer effects. Depending on the concentration, it may also be ineffective, but the appropriate selection of the dose and treatment duration can bring very positive effects. What's more, TMPyP4 is a compound that has the ability to inhibit the activity of the enzyme telomerase, which is considered one of the most important factors providing the immortality of cancer cells. Experience has shown that monotherapies fail to eradicate cancer. Hence the conclusion that the only effective solution may be a combination therapy, which would target different molecular pathways modulated in a specific and effective way. The idea of investigating the effect of TMPyP4 in a breast cancer model is based on solid literature data, but also on the latest results of our research. We believe that the obtained results will contribute to increasing the effectiveness of drugs used in the treatment of breast cancer, as well as their safety thanks to the use of modern compounds. In order to obtain conditions as close as possible to those in the complex human body, we plan to conduct experiments in a mouse model.

Undertaking innovative research on the possibility of multidirectional action of TMPyP4/PDT on cancer cells may contribute to increasing the effectiveness of breast cancer therapy.