The diagnosis of "cancer" still sounds to the patient as a sentence. Despite many voices coming from the media about the "breakthrough in cancer treatment" and the spectacular headlines stating that " a new, effective treatment for cancer treatment has been invented" the patients reality is less optimistic. Cancer is the main cause of death worldwide, and one of the most serious problems of modern civilization. Every minute in the world, extinguishes one life and the reason for this is cancer.

Despite the introduction for the treatment the number of new medicines, some of the most commonly used chemotherapeutic agents, are anthracycline antibiotics (doxorubicin), which were invented in the 60's of last century. These drugs despite high efficiency, cause a number of side effects, while the most troublesome for the patient is toxic effect on the heart. Additionally devious tumor cells after exposure to the drug, produce specific defense mechanisms against it - the so-called developing resistance, which is a major cause of failure in therapy.

Both of these aspects of treatment - cardiotoxicity and resistance in the case of anthracycline antibiotics are result of their transformation into the corresponding metabolites in the body. These metabolites appear naturally in the course of intake, and what is worst - do not show toxicity against tumor cells and act toxic to heart muscle cells. Therefore their production is very undesirable.

The aim of the project is the synthesis of new compounds - derivatives of cinnamic acid, which task will be to block the enzyme that converts doxorubicin to damaging metabolites.

The newly synthesized molecules will be designed based on *in silico* research. Such tests are carried out using computer programs and allow to predict how the chemical structure would act with another. With guidance from the molecular modeling we can predict what changes to the parent structure will be beneficial for its actions and ensure blocking the enzyme responsible for the formation of toxic metabolites.

The synthesized compounds are tested on tumor cell lines to assess the ability of cells to overcome the resistance to anthracyclines. Cardioprotective effect will be determined using cardiomyocytes cell line. In addition, studies will be conducted to determine the ability of compounds to inhibit the transformation of anthracycline to dangerous metabolites, using proteins - enzymes responsible for this process. The research will be fulfilled by identification of the parameters exerting a key influence on whether a tested compound may be a drug - whether the compounds are able to penetrate the biological barriers, that are likely to achieve the appropriate concentrations at the site of action and if have toxic effect. The study will determine if and which compounds from the analyzed group will be molecule, both active, effective, and most importantly - safe for patients.