Cancer is currently one of the greatest challenges of modern medicine. There are still attempts to obtain drugs that could cure a patient diagnosed with cancer, prolong life, or at least improve quality of life. The research is conducted on a large scale in the various fields of medicine, chemistry and biology.

One approach includes research on existing drugs and in-depth knowledge of the mechanisms of action of these drugs. Such an approach allows to develop more effective anticancer drugs. However, administration of any drug, whether from the older generation or a new targeted therapy, inevitably leads to the development of a resistant population of cells, a process scientists are trying to understand called Multi-Drug Resistance. This process bases on the phenomenon that the cell continuesly learns how to use its own metabolic reactions to eliminate drugs. These cells which are then better educated to overcome the lethal effect of the drug will survive and the treatment will be unsuccessful. P-glycoprotein is an example which is transmembrane pump. In a normal cell, it is designated to transport small particles across the cell membrane and produce a bile by the liver. Cancer cells fight for their survival in the presence of drugs learned how to use P-glycoprotein, which is now engaged to pump out drugs from the cell interior.

Stress Granules are an unexplored factor that may contribute to Multi-Drug Resistance by protecting cells immediately after administration of drugs. Stress Granules are formed in the cytoplasm as a consequence of some toxic exposure. The mechanisms which activate stress granules formation are quite well understood in stress caused by physicochemical factors such as UV radiation and oxidative stress (the state of imbalance between the toxic effects of reactive oxygen species and the biological capacity to their rapid detoxification or repair damage caused in the cell).

The main aim of this project is to examine Stress Granules activated by anticancer drugs and check their role in the development of short-term survival mechanisms. It seems that Stress Granules participate to the cell survival within the first hours after the drug administration. The cell is able to get enough time to develop other stable Multi-Drug Resistant factors, like P-glycoprotein.