Leukemias are blood cancers related to uncontrolled growth of hematopoietic cells. Besides the progress in diagnostics and therapy, many of this disorders cannot be cured or/and develops resistance to therapy. The interactions between cancer cells and their microenvironment are crucial for the biology of cancer, including leukemias. Cell-cell communication within the leukemia microenvironment provides a suitable niche and conditions for cancer cell growth and survival. It has been already demonstrated that the stromal component of leukemia microenvironment provides protective signaling, and that leukemic cells lacking stromal component can become sensitive again. This indicates the important role of the leukemic bone marrow stromal microenvironment in disease development and progression as well as resistance to treatment and disease relapse. Till today, different types of cell-cell interactions have been observed. Recently, tunneling nanotubes (TNTs) have been considered as a new way of direct cell-cell contact and communication, mediating transfer of different cargos between two distant cells. Strong evidence suggest their critical role in the regulation of cell-cell crosstalk and signaling within the cellular networks.

Our previous studies showed that TNT structures are formed between stromal and leukemic cells, and that transfer of membrane vesicles from stroma to leukemia correlates with increased resistance to imatinib – first line treatment drug. We have also observed that functional groups of proteins are transferred together with vesicles from stromal to leukemic cells, with potential role in adaptation and resistance. Those data indicate a very important role of TNTs in promoting the stroma-mediated resistance of leukemic cells.

Even if intensive studies are undergoing, the general regulators of TNT formation are not known. Moreover, the specific inhibitor of TNT formation and cargo transfer in the leukemia microenvironment has not been developed, what might be a base for novel therapeutic strategy. In this studies we plan to look for such regulators and mechanisms leading to generation of TNTs formed between stromal and leukemic cells and regulation of transfer of vesicles.

Obtained data allow to bteter understand TNTs formation and functions in the leukemia microenvironment and maybe propose potential therapeutic target and therapeutic strategy in leukemias. Taking into account that TNTs are proposed as a very potent therapeutic target not only for cancer treatment, but also other diseases, our studies may have therapeutical implications, making our hypothesis more attractive and placing our studies in both basic and translational research fields.