Rare neoplasms, often diagnosed in children and adolescents, pose a significant problem for the medical community due to the lack of effective therapies.

Rhabdomyosarcoma (RMS), although the predominant neoplasm of soft tissue in children, should be considered a rare neoplasm. The prognosis for patients with advanced RMS is poor, especially in the presence of metastases.

The reasons for the development of RMS are not fully understood, but its development seems to be linked to errors in the stem cells. Interestingly, recent studies have found small populations of cancer stem cells in RMS.

The epithelial-mesenchymal transition (EMT) process can be defined as a series of changes that increase mobility, invasiveness, and the ability to metastasize. EMT has been shown to affect some of the properties of cancer stem cells, including their ability to metastasize and resistance to chemotherapy and radiation.

The SNAIL family of transcription factors (TFs) plays a key role in EMT. Our team found members of SNAIL family TFs in RMS cells. We also found that SNAIL expression positively correlated with the growth of RMS tumors in vivo.

A number of teams have shown that cancer stem cells are a key factor in tumor progression and resistance to therapy. Defined populations of RMS stem cells have recently been discovered, opening up the possibility that RMS growth and progression is also driven by these cells.

These data allow us to make an interesting hypothesis that SNAIL directly or indirectly affects cancer stem cells and thus promotes growth, metastasis and resistance of RMS to therapy.

In our project, we will use established human RMS cell lines and xenografts from RMS patients to determine the role of SNAIL in cancer stem cell biology.

By defining the role of SNAIL in the biology of cancer stem cells, we have the opportunity to better understand the complexities of RMS. As therapy aimed at destroying cancer stem cells is considered a promising therapeutic approach in anti-cancer treatment, we believe that our data will help in the development of new, more effective therapies for RMS patients in the future.