

The objectives of this project proposal are studies on the synthesis and determination of the structure as well as both chemical and biological properties of new, hybrid biomaterials: polymer-hydrogel composites for dual targeted therapy for metastatic colorectal cancer.

The main goal of the project is to obtain peptide hydrogel embedded polymeric nanocarriers of antitumor drugs commonly used for colorectal cancer therapy. Due to their versatility, the peptide-polymer hybrid biomaterials are the most promising biomaterials in modern therapies of metastatic forms of neoplasms. Hydrogels will be prepared using several peptides with antitumor activity. The hydrophobic and cationic residues present in their molecules could help peptides self-assemble into hydrogels, and this could be used as a novel approach for the preparation of peptide-base hydrogels. Polymeric nanocarriers before being dispersed in a hydrogel matrix will undergo surface-modification with folic acid and its analogs, enabling enhancing the cancer targeting capacity.

The antitumor efficiency and the synergistics effect of the new system will be evaluated in vitro. At the final step, we plan to confirm the in vitro results by performing preliminary in vivo studies on a mouse colon cancer xenograft model for one of the most promising polymer-hydrogel composite.

We hope that the research conducted as part of the project will significantly contribute to the development of the new therapy for metastatic colorectal cancer.