DESCRIPTION FOR THE GENERAL PUBLIC

1. The aim of the project

When you think of cancer treatment, such solutions as surgery, chemotherapy, and radiotherapy come to mind. All of them, although often life-saving, are either highly invasive procedures or have severe side effects. The good news is that in the case of certain types of cancer (especially skin cancer) it is possible to apply a photodynamic therapy. In this method a special substance called photosensitizer is applied to a tumor and then the tumor is irradiated by visible light at a specific wavelength (usually it is red light). It causes activation of the photosensitizer and production of toxic species such as singlet oxygen and free radicals. Both of them initiate a cascade of reactions that ultimately lead to death of cancer cells. The photodynamic therapy has been a tool known in oncology for more than 30 years. However, it is not commonly used due to some limitations. Among them, the most important one is a difficulty in applying photosensitizer directly to cancer cells. A relatively new group of polymers, called dendrimers, might help to overcome this problem. Dendrimers are regular, globular molecules and they can be used as carriers of photosensitizers. The aim of our project is to apply phosphorus dendrimers to transport photosensitizers to cancer cells.

2. Planned experiments

Previously, we used cancer cell lines that were cultured in a laboratory. We were able to prove that phosporus dendrimers created stable complexes with photosensitizers. Photosensitizers that were carried by dendrimers were more effectively transported to cancer cells and they were much more toxic in cancer cells. The results turned out to be so interesting that we decided to patent them. Encouraged by the promising outcome, we plan to continue the studies, this time using animals. Moreover, we plan to use a completely new system transporting a photosesitizer that is based on a stable conjugate with the dendrimer. We will start *in vivo* experiments from tumor cell transplantation to mice. Then tested compounds will be applied and the tumor will be irradiated. We will follow the effect of the therapy to choose the best transporting system. The project will be executed in a close collaboration with the French team that will synthesize dendrimers and conjugates – the Laboratoire de Chimie de Coordination, CNRS, in Toulouse. A part of the *in vivo* experiments will be done in the Laboratory of Experimental Anticancer Therapy in Wroclaw (led by Prof. Joanna Wietrzyk).

3. Expectations

We hope that in the future transporting systems of photosensitizers based on dendrimers will be qualified for clinical studies and that they will be new drugs applied in a photodynamic therapy.