**DESCRIPTION FOR THE GENERAL PUBLIC**

Over the past decades, the lanthanide nano-compound materials have been widely studied. Their unique optical (upconversion) and magnetic properties make them attractive for biomedical field. Upconversion is based on generation of higher energy photons, from UV, visible or near infrared (NIR) spectrum, using low energy photons from NIR spectral region. Excitation of lanthanide nano-compound (980 nm) at the "biological transparency window" minimizes the tissue autofluorescence and improves deep tissue penetration. They seem to be useful also in anticancer therapies such as photodynamic therapy (PDT) as well in photothermal therapy. They are believed to be safe, but the fact that nanomaterials can cross biological barriers and accumulate in the tissues for a long period of time, enforces detailed study of their potential harmful properties. Moreover, our studies shown high toxicity of $NaGdF_4:Yb^{3+}Er^{3+}$ toward normal cells. In our project, we would like to investigate the toxicity of bare upconversion nanocrystals on different cell lines with focus on immune system cells. We have chosen $NaGdF_4:Yb^{3+}Er^{3+}$ nanocrystals, due to their high potential for future MRI and optical imagining applications. In our project we will be using methods such as flow cytometry to apoptosis detection and mitochondrial damage, western blotting to proteins detection involved in apoptosis, autophagy and cellular stress. Moreover, we will use fluorescence microscopy with ability to detect an upconversion process to detect nanocrystals inside the cells. The results of our studies will show a cause of observed toxicity and may indicate a particularly sensitive type of cells to upconverting nanorcystals. This will allow to prevent some future sides effects of lanthanide nano-compound in biomedical applications.