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Novel theranostic agents against acute lymphoblastic leukemia: CD19-targeting gold nanourchins

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Acute Lymphoblastic Leukemia (ALL) is the first and second most common malignancy in children and adolescents. With a broad range of genetic causes, this disease may appear with various protein expression profiles, routing the researchers towards a more promising patient-specific treatment plan. Through our work, we aim to develop a nano-tool which is targeted towards the ALL specific CD19 surface protein via the strong antibody-antigen interaction. Specifically, we developed a gold nanourchin based vehicle for anti-CD19 using a surfactant free seed mediated synthesis protocol. By employing the Trypan Blue dye exclusion method, we show the highly significant cytotoxic effect of our targeted particles against CCRF-SB B-lymphoblastic leukemia cells as compared to the non-targeted ones, as well as to the free antibody molecule. Cell cycle analysis using flow cytometry, metabolic activity investigation by MTS assay and morphological analysis by TEM contribute with valuable additional insights to the conclusion that the anti-CD19 targeted nanourchins accomplish their therapeutic duty. Additionally, these anisotropic nanoparticles possess interesting optical properties such as plasmon resonances in the NIR domain and the efficient amplification of the nearby electromagnetic field, which provide them with valuable imaging features and the capability of being used as spectroscopic tags inside living cells.

Biography

Andra-Sorina Tatar has received her BSc in Biochemistry and Physics and MSc in Molecular Biotechnology from the Babes-Bolyai University, Romania. Having an interdisciplinary background, she has started her PhD work focusing on the design of antibody-conjugated nanoparticle-based systems and their application for the spectroscopic detection of circulating tumor cells and treatment of hematological diseases.

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