RITUXIMAB FUNCTIONALIZED GOLD NANOPARTICLES AS MOLECULAR THERAPY IN B CELL ACUTE LYMPHOBLASTIC LEUKEMIA

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ABSTRACT

B cell acute lymphoblastic leukemia (B cell ALL), also known by acute lymphocytic leukemia, is a disease characterized by overproduction of abnormal lymphoblast. The pathology is found with a higher incidence in children of 2-5 years age and young adults. Treatment strategies usually include active chemotherapy agents that trigger a period of disease stagnation.

Nowadays molecular medicine offers a lot of research studies for cancer cure, especially using nanoparticle delivery systems, designed to enhance the drug action at target site and to limit side effects and high toxicity. Noble metal nanoparticles are used in various molecular therapies due to their multiple advantages like high stability, low coefficient of variation, stability and versatility. Moreover at nanoscale, gold develop a lot of physical-chemical properties enabling easy surface conjugation with different molecules enhancing their effects in target therapy.

Therefore our study main objective is to develop and to investigate the therapeutic effect of rituximab conjugated gold nanoparticles in B cell acute lymphoblastic leukemia. Gold nanoparticles were synthesized using Turkevich-Frens method and then were conjugated with rituximab, an anti-CD20 monoclonal antibody-based drug for achieving a delivery nanosystem and evaluating its therapeutic effects in B cell ALL. The nanoparticle system was characterized in order to determine the particle size distribution and zeta potential as well as the efficiency of rituximab conjugation through UV-Vis absorption spectroscopy. The therapeutic effects of gold nanoparticles conjugated with rituximab were followed *in vitro* on CCL-120 ALL cell line using viability and internalization assays.

The nanogold-based system delivery enhanced the therapeutic effect of the drug due to its conjugation on the surface, making it more accessible to leukemia cells through internalization mechanisms. Rituximab nanogold conjugates showed a superior therapeutic effect on B cell ALL cells on culture compared with the drug alone.

The rituximab functionalized nanogold delivery system can represent a model of targeted therapy of B cell acute lymphoblastic leukemia.