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Carbon Dot Nanoparticle Synthesis and Gemcitabine Attachment for Cancer Theranostics

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Carbon Dot Nanoparticle Synthesis and Gemcitabine Attachment for Cancer Theranostics

The purpose of this research was to synthesize bi-functionalized nanoparticles (NPs) based on carbon dots (CDs), that can perform cancer theranostics in hopes to increase efficacy for both the diagnostics and therapeutics for cancer. In this study, CDs were synthesized using a microwave method. Samples were produced using different time and temperature settings to determine the process yielding the best results. After the initial and final screenings, 16 minutes at 180°C and 650 watts produced the highest yield of CDs with the greatest capacity for bonding to the cancer drug and targeting agent. Through a series of chemical reactions, folic acid, the targeting agent, was attached to the CDs to produce folic acid carbon dots (FACDs). Then the drug gemcitabine (GEM), used for early cancer detection and treatment, was attached to both CDs and FACDs using the non-covalent attachment method. These NPs were characterized using various spectroscopic methods. Future research will include measuring the dosage of GEM attached to the NPs followed by the testing of the NPs on 4 separate triple negative breast cancer cell lines.