NanoFusion: Revolutionizing CRISPR/Cas9 Delivery to MCF-7 Adenocarcinoma via Exosome-Liposome Synergy

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In recent decades CRISPR/Cas9 has emerged as a promising cancer treatment. Using CRISPR knockout plasmid to target the CDK11 cell proliferation gene within cancerous cells could force said cells into apoptosis. However, CRISPR needs a delivery system into cells to be effective. This delivery vesicle has been liposomes for many years but they have their limitations. To combat these limitations, exosomes have been investigated to fuse membranes with liposomes to reap the benefits and eliminate the limitations of both nanoparticles. Here exosomes were isolated from MCF-7 adenocarcinoma via ultracentrifugation. Their membranes were fused with liposomes that had been lipofected with a CDK11 CRISPR KO plasmid. Spheroids were made for a 3D trial to better simulate the in vivo environment. All treatments were added to their respective variables and an MTT assay was run after 72 hours. An ANOVA test run for both 2D and 3D trials came back with a p-value of virtually zero thus implying that it's unlikely the differences in variables were due to chance. The 3D trial showed significant spheroid degradation with hybrid treatment as opposed to what was shown in the liposome treatment. Exosome-liposome hybrids provided a much better means of treatment delivery and efficacy than standard liposomal delivery. This study, namely its 3D trial, has great implications for how this system could work in vivo. As this is a novel study, more research and testing is needed, however, the results achieved here provide a good outlook on the future of this treatment.

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