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Increased Retention of Nanoparticle by Small Molecule Inhibitor in Cancer Cells

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Abstract : Background: Nowadays, the nanoparticle is gaining unexceptional attention in targeted drug delivery. But before proceeding to this episode of accomplishment, the journey and closure of these nanoparticles inside the cells should be disentangle. Being foreign for the cells, nanoparticles will easily getcleared off without any effective outcome. As the cancer cells withhold these nanoparticles for a longer period of time, more will be the drug's effect. Chlorpromazine is a cationic amphiphilic drug which is believed to inhibit clathrin-coated pit formation by a reversible translocation of clathrin and its adapter proteins from the plasma membrane to intracellular vesicles. Chlorpromazine has a role in increasing the retention of nanoparticles in cancer cells. The mechanism of action how this small molecule increases the retention of nanoparticles is still uncovered. Method: Polymeric nanoparticle (PLGA) with Cyanine3.5 dye were synthesized by solvent evaporation method and characterized for size and zeta potential. FTIR was also done. Pulse and chase studies with and without inhibitor were done to check the retention of nanoparticle using fluorescence microscopy. Mean fluorescence intensity was measured by ImageJ software. Results: Increased retention of nanoparticle with inhibitor was observed in both pulse and chase studies. Conclusion: Our results demonstrate that by repurposing these small molecule inhibitor, we can increase the retention of nanoparticle at the targeted site.

Keywords : nanoparticle, endocytosis, clathrin inhibitor, cancer cell
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