OFFICIAL ABSTRACT and CI)N

Nanoparticle Retinoid Delivery: A Novel Functional Inducing Cytotoxicity in Cancer

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Retinoids, effective skin care drugs, have been shown to arrest cancer proliferat apoptosis. Retinoid delivery, however, remains faulty as the drugs are metaboliz reaching the targeted cells. Iron oxide nanoparticles in combination with four reti ns retinoic acid, Adapalene, Tamibarotene, and Tazarotene—were used to overcor on and were tested for efficiency in treating leukemia and breast cancer cell lines. F loading process, dynamic light scattering indicated that all nanoparticles maintai hydrodynamic radius between 10-100 nanometers, therefore no aggregation occ er, spectrophotometry confirmed that Adapalene, Tamibarotene, and All-trans retinc successfully loaded into the nanoparticles; nonetheless, Tazarotene was undetectable. Additionally, the CellTiter-Glo assay was completed to determine the effectiveness of individual retinoids and the retinoid-loaded nanoparticles in inducing cytotoxicity. In the leukemia cells, Post Hoc Tukey tests revealed that Adapalene across all concentrations exhibited immense cytotoxic effects ($p<0.0001$); likewise, Tamibarotene and All-trans retinoic acid at their highest concentrations elicited similar effects ($p<0.05$). It was also observed that the Adapalene and Tamibarotene loaded nanoparticles exhibited a decrease in cell viability ($p<0.05$). For the breast cancer cells, neither the retinoids nor retinoid-loaded nanoparticles were cytotoxic ($p>0.05$). This study is the first to provide strong evidence to support the use of Adapalene as a leukemia killing agent, as well establishes a foundation for retinoid-based nanotherapeutics. In addition, it is the first of its kind to successfully load retinoids into iron oxide nanoparticles to improve drug delivery, possibly aiding in the development of better, more effective treatments.

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