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Pleiotropic Impact of Vitamin-E Coated Lipid Nanoconstructs as Liver Sentinels on Optimal Upkeep of its Viral Inflammation

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A platform with a high potential to deliver an antiviral drug to the liver infected with hepatitis B is a major concern in hepatology. Vaccination has had a prime effect on lowering the emerging numbers of new cases of infection. However, the total elimination of the hepatitis B virus (HBV) from the body requires prolonged therapy. In this work, we aimed to target the liver macrophages with entecavir loaded lipid polymer hybrid nanoparticles (LPH) with modulated lipidic corona as a platform for the sustained delivery and increased macrophage uptake. For this purpose, the outcomes arising from the use of two methods for drug incorporation, either direct drug encapsulation into the polymeric core or via drug-polymer conjugation technique had been thoroughly characterized and tailored so as to control the drug release in the proposed systems. The results showed that vitamin E coated LPH extended the release up to one month for drug-polymer conjugate LPH respectively, while keeping the particle size ≤ 200 nm. The biocompatibility and cytocompatibility of LPH were proven by low hemolytic effect on rats' RBCs (< 5%) and negligible effect on J774 macrophage cells viability. Moreover, the negative charge of the proposed system was able to evade the adsorption of plasma proteins and subsequently kept the system stable under physiological conditions. The presence of vitamin E coat on LPH remarkably increased the macrophage uptake in comparison to uncoated ones. Prolonged muscular residence and high liver uptake were confirmed by in vivo imaging of the proposed system which is positively correlated with the in vitro release results after single intramuscular injection.

Speaker Biography

Mohamed Hamdi has completed his MSc in Pharmaceutics on 2020 from Faculty of Pharmacy, Ain Shams University. He is also working as at Faculty of Pharmacy, University of Sadat City. He is currently a PhD student at Faculty of Pharmacy, Ain Shams University where his project focuses on the utilization of biomimetic nano carriers for cancer immunotherapy. His research covers nanotechnology, biodegradable nanoparticles, experimental design, formulation optimization, lipid-based systems, immunotherapy and tumor targeting.

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