Combination antiretroviral (cARV) loaded nanoparticles: A potential alternative future for HIV patients

Subhra Mandal and **Christopher J. Destache**
Creighton University School of Pharmacy & Health Professions, Omaha, NE

Globally, an estimated 37 million people are living with human immunodeficiency virus (HIV)-1. In the United States, > 1.2 million people living with HIV and the most worrisome issue is that among these people, it is estimated that 13 % are unaware of their clinical status, leading to unacceptably high HIV transmission rate. Joint United Nations Programme on HIV/AIDS (UNAIDS) reported the use of antiretroviral drugs (ARVs) has resulted in about 45% drop in death caused by HIV/acquired immune deficiency syndrome (HIV/AIDS). Still (2015 report), about 2.1 million new infections have been reported worldwide, mainly due to high HIV transmission rate and patient's non-adherence to ARVs. Therefore, the focus during formulating novel effective therapeutics should not only be to improve the quality of life of HIV/AIDS infected people but also to reduces the possibility of infection transmission.

The cARVs has enhances the live expectancy of HIV patients, which was once considered to be a uniformly fatal disease. However, daily oral therapy is mandatory to achieve the goal of a nondetectable plasma viral load (pVL) along with a highly motivated, adherent patient. Therefore, cARV therapy faces major challenges including adherence, a daily large oral dose, with associated drug side effects, and economics. Here, cARV nanomedicine could be a potential alternative.

Various surveys on HIV-infected patients reflects that they are enthusiastic about long-acting parenteral nanomedicines. Thus, researchers are actively developing long-acting nanomedicines for HIV-1 prevention/treatment. To improve patient lifestyle and control the epidemic, HIV/AIDS therapeutics research goals for developing new ARV drugs are: potent, non-toxic or with few side effects, small dosages to ensure better adherence, and long-term viral load maintenance. High HIV/AIDS prevalence in areas of underdeveloped and developing countries, therefore cARV should be inexpensive as well as readily accessible to resource-limited countries.

To fulfill above prerequisite, we are formulating cARVs encapsulated polymeric nanoparticle (NPs) as nanodrug delivery system, that shows slow drug release and protects drugs from systemic clearance. Therefore, we predict use of cARV NPs will lead to monthly dosing, that potentially could overcome the adherence burden in the HIV patient. We are the first to report the use of PLGA encapsulated cARV drugs (i.e. TAF+EVG and/ FTC) NPs for prevention/treatment of HIV in a humanized mouse model.

Speaker Biography

Post doctoral researcher at Creighton university.

e: SubhraMandal@creighton.edu

Notes: