

**Emerging nanotechnology approaches for HIV/AIDS treatment and prevention.**

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**ABSTRACT**

The HIV/AIDS pandemic is an increasing global burden with devastating health-related and socioeconomic effects. The widespread use of antiretroviral therapy has improved life quality and expectancy of infected individuals, but limitations of currently available drug regimens and dosage forms, alongside with the extraordinary adapting capacity of the virus, have impaired further success. Currently, there is no cure and no preventive vaccine for HIV/AIDS. Combination antiretroviral therapy has dramatically improved treatment, but it has to be taken for a lifetime, has major side effects and is ineffective in patients in whom the virus develops resistance. Nanotechnology is an emerging multidisciplinary field that is revolutionizing medicine in the 21st century. It has a vast potential to radically advance the treatment and prevention of HIV/AIDS. In this, we discuss the challenges with the current treatment of the disease and shed light on the remarkable potential of nanotechnology to provide more effective treatment and prevention for HIV/AIDS by advancing antiretroviral therapy, gene therapy, immunotherapy, vaccinology and microbicides. Alongside, circumventing the escalating number of new infections can only be attained with effective and practical preventive strategies. Recent advances in the field of drug delivery are providing evidence that engineered nanosystems may contribute importantly for the enhancement of current antiretroviral therapy. Additionally, groundwork is also being carried out in the field nanotechnology-based systems for developing preventative solutions for HIV transmission. Thus the AIDS patient is provided with the immune system so that he can defend himself from diseases. In India more than 50 lakhs of people are infected by this dreadly disease and it constitutes 10% of the total infected. This reviews recent advances in the field of nanotechnology-based systems for the treatment and prevention of HIV/AIDS. Particular attention is given to antiretroviral drug targeting to HIV reservoirs and the usefulness of nanosystems for developing topical microbicides and vaccines.