A Glance at the Latest Advancements of Viral Nanoparticles in Cancer Treatment

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Researchers at the University of Alberta have published a review article in which the latest advancements in the applications of cowpea mosaic virus nanoparticles in cancer imaging and therapy have been presented.

Although the term "virus" is always synonymous with disease, the achievements of the past decade have shown that virus can also be considered as an opportunity to treat various diseases. Using viral nanoparticles (VNP) or self-assembling protein cages for diagnostic and curative purposes is long-lived. In fact, viral nanoparticles or protein cages are used as scaffolds to carry different drugs or chemical compositions.

Researchers at the Department of Oncology at the University of Alberta in Canada have published a review article in the Drug Delivery Reviews journal entitled "Cowpea Mosaic Virus Nanoparticles for Cancer Imaging and Therapy", supervised by Perine Betty and John Lewis, in which the use of cowpea mosaic virus (CPMV) as biocompatible platforms for tumor targeting and cancer therapy has been reviewed.

The use of this virus enjoys a wide spectrum of advantages such as non-pathogenicity, biocompatibility, low aggregation tendency, and biodegradability in mammalian systems as well as temperature and pH stability, making them an appropriate candidate for drug delivery applications. Among other considerable properties of such virus, high cargo loading capacity, facile external functionalization, and native immunostimulatory effect within solid tumor cancer models are worthy of mention.The authors endeavored to classify more than twenty advantages of CPMVs for tumor targeting applications to outline the possibility of this system for intravital imaging and cancer therapy.

For example, the viral nanoparticles can separately remain in the body without aggregation, allowing the high-resolution imaging of cancer tumors. They have provided documentary

information on the injection of these viral nanoparticles into mice body at different doses, which have exerted no detectable toxic and pathogenic effects.

One of the ways to optimize nanoparticles for drug delivery application is functionalization of the nanoparticles surface. Various functional groups capable of functionalizing CMPVs have been collected in this article. Some functional groups have been added to nanoparticles to create fluorescence properties for improving imaging quality. Folic acid-decorated CPMV nanoparticles are able to target tumor cells. A comprehensive list of these functional groups and the reasons behind their application in cancer diagnosis and treatment purposes have been included in this article.

The authors believe that this technology gives an insight into producing an effective vaccine against pathogens. In this regard, they have presented several examples of research on providing such vaccine for skin, breast, and uterine cancers.