A Novel Approach to Drug Delivery for Hepatities C Virus (HCV) for High Immune Responses

W. T. Chen and C. Zhang
University of Saskatchewan, Saskatoon, Canada

Hepatities C Virus (HCV) is a significant health problem worldwide due to the lack of effective vaccines. HCV plasmid DNA (pDNA) vaccine represents a promising means to induce a Th1-biased cell-mediated response which tends to be associated with HCV clearance. However, the immune responses induced by naked pDNA vaccine in large animals as well as in humans are usually too weak to show sufficient protection against new infections. Therefore, it is interesting to look for new ways to deliver HCV pDNA vaccine. In this research, carbon nanotube (CNT) is used as a carrier to deliver the pDNA vaccine of HCV to induce high immune responses, because CNT has some excellent properties such as high strength and good biocompatibility. One of the key approaches to make this idea work is to treat CNT so that it can bind with HCV pDNA with good stability. An approach called 1, 3-dipolar cycloaddition of azomethine ylides was modified. We analyzed the complex of f-CNTs combined with pDNA vaccines expressing HCV E2 protein by using Enzyme-linked immunospot (ELISPOT) or Enzyme-linked immunosorbent assay (ELISA) assay *in vitro*. The result showed that the CNT approach can induce stronger protective immune responses than the needle delivery of naked pDNA vaccine. We have also found an optimal way to treat CNT in light of the highest immune response in the same testing environment. The success of this research will warrant testing HCV vaccine in large animal models and human clinical trials.