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Editorial

Nanoparticles Vaccines Now and Future!

While the advanced use of effective vaccines has had an extraordinary impact on global health, there remain many diseases for which vaccines are not available. The concept of therapeutic infection vaccines is based on the activation of the immune system against infection after the presentation of microbes' antigens to provide long-term protection against an infection. Nanoparticles (The term "nanoparticle" refers to a crystallite or primary particle measuring less than 100 nm in size.) have shown great potential as delivery systems for infection vaccines as they potentiate the co-delivery of microbe-associated antigens and adjuvants to antigens presenting cells, insuring effective activation of the immune system against microbes in order to develop a specific immune response able to protect or to cure infected animals. The nanoparticle vaccines comprised of a carrier, typically synthesized from organic materials, such as lipids, polymers or liposomes, having multiple copies of an antigen or combinations of different antigens displayed on the carrier, encapsulating an antigen or combinations of different antigens within such nanoparticles, with or without a targeting molecule displayed on its surface. However, several inorganic nano-sized carriers are under development, including magnetic particles, semiconductor quantum dots, calcium phosphate and colloidal gold. The use of nanoparticles in vaccine formulations allows not only improved antigen stability and immunogenicity, but also targeted delivery and slow release. This may suggest avenues for future work in designing and developing more targeted vaccine formulations for managing infection using nanoparticles.