vaccines

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Advances in DNA Vaccines

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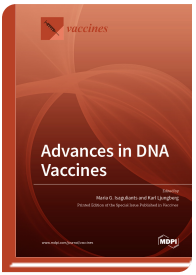

DNA is a rapidly developing vaccine platform for cancer and infectious and non-infectious diseases. Plasmids are used as immunogens to encode proteins to be further synthesized in vaccine recipients. DNA is mainly synthetic, ensuring enhanced expression in the cells of vaccine recipients (mostly mammalians). Their introduction into the host induces antibody and cellular responses. The latter are often more pronounced, and mimic the events occurring in infection, especially viral. There are a few distinct ways in which the vaccine antigen can be processed and presented, which determine the resulting immune response and which can be manipulated. Routinely, the antigen synthesized within the host cell is processed by proteasome, loaded onto, and presented in a complex with MHC I molecules. Processing can be re-routed to the lysosome, or immunogen can be secreted for further presentation in a complex with MHC II. Apart from expression, vaccination efficacy depends on DNA delivery. DNA immunogens are generally administered by intramuscular or intradermal injections, usually followed by electroporation, which enhances delivery 1000-fold. Other techniques are also used, such as noninvasive introduction by biojectors, skin applications with plasters and microneedles/chips, sonication, magnetofection, and even tattooing. An intense debate regarding the pros and cons of different routes of delivery is ongoing. A number of studies have compared the effect of delivery methods at the level of immunogen expression, and the magnitude and specificity of the resulting immune response. The progress of research aiming at the optimization of DNA vaccine design, delivery, and immunogenic performance has led to a marked increase in their efficacy in [illegible] nd humans.

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