

Nanodrops: recent developments in vaccination.

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ABSTRACT

In the past 100 years, vaccination has contributed immensely to public health by preventing a number of infectious diseases. Attenuated, killed or part of the microorganism is employed to stimulate the immune system against it. Progress in biotechnology has provided protective immunity through DNA vaccines. Various technologies have been employed for delivering drugs – needle–syringe, liquid jet injectors, micro needle arrays/patches and biolistic particle injection. The advantage of a needle-free system is that it is painless and more efficient in delivering drug, plasmid DNA and protein. It is a practical alternative to the needle–syringe route for targeted delivery of vaccines. In recent years, nanovaccine is a novel approach to the methodology of vaccination. Nanomaterials are delivered in the form of microspheres, nanobeads or micro-nanoprojections. Painless, effective and safe needle-free routes such as the intranasal or the oral route, or patches of microprojections to the skin are some of the approaches which are in the experimental stage at present but may have a great future ahead in nanovaccination. Many of the nanovaccines are non-invasive, delivered by the oral or nasal route, diffusion patches or microneedle arrays, thus allowing pain-free delivery with minimal damage. This is an advantage over conventional vaccines, which are usually multi-injection, multi-dose delivery systems. In recent years, the number of consumer products containing nanoparticles has nearly doubled, Nanomedicine is a cutting-edge area of research that combines the concepts of nanotechnology and medicine, and provides new hope for research in this field. The idea that a nanostructure could be designed, manufactured and introduced into the human body to improve health, including cellular repairs at the molecular level, is encouraging. Worldwide vaccination programmes have eradicated diseases such as smallpox, diphtheria, poliomyelitis and neonatal tetanus in most of the developed and some developing countries. Thus, immunization has reduced the incidence of such deadly diseases.