Science Media Centre Fact Sheet

DNA vaccines

What is a DNA vaccine?
A DNA vaccine uses a gene from a virus or bacteria to stimulate the immune system. When the DNA vaccine is administered to a patient, the machinery in their cells makes a viral or bacterial protein which their immune system recognises as being foreign to the body. Like any vaccine the immune system will then recognise the bacteria or virus in the future – hopefully preventing illness.

How is this different to conventional vaccines?
Conventional vaccines are made of whole bacteria or viruses (either inactivated or dead) or a part of the bacteria or virus, such as a protein.

What are the advantages of DNA vaccines?

- They can be made in a short time span – it is easier to make large amounts of a gene than make proteins or grow up bacteria or viruses. Speed is important when making a vaccine to strains of bacteria or virus that are constantly mutating and changing.
- DNA vaccines are easy to transport and store – DNA is a very stable molecule and does not need to be stored at low temperatures making transportation and storage cheaper and easier than conventional vaccines.
- DNA vaccines may be very cheap to make – it is relatively easy to make and purify large amounts of DNA.
- There is no risk to those who are making the vaccine - some conventional vaccines require growing up the infectious bacteria or virus – and this carries a risk (all be it very small) to those who work making vaccine.

What are the disadvantages of DNA vaccines?

- Initial attempts to create DNA vaccines have not worked – they have not had a big enough impact on the immune system.
- No DNA vaccine has been licenced for use in humans yet - although some DNA vaccines are now in clinical trials, none are licenced for use – so they are an unproven method.

How is the DNA vaccine administered?
Many DNA vaccines are injected into the muscle, however, a method using a 'gene gun' is being developed that uses helium to propel DNA into the cells of the skin. If this is successful it will provide a 'needle free' vaccine.

Examples of DNA vaccines in development
Powdermed - http://www.powdermed.com/developmentPmed.htm has a flu vaccine, a hepatitis B vaccine, a genital herpes vaccine and a genital warts vaccine in clinical trials.

GlaxoSmithKline - http://www.gsk.com/research has a DNA vaccine for cancer, HIV and one multipurpose vaccine for viruses in early clinical trials

DNA vaccines in early development (pre-clinical trials):

- Leukaemia (Kings College London)
- Alzhiemer's disease (Tokyo Metropolitan Institute for Neuroscience)
- TB (Pohang University of Science and Technology in South Korea)
- Ebola (Vaccine Research Center near Washington DC)
- Multiple Sclerosis (Technion-Israel Institute of Technology)
- Malaria (Malaria Programme at the US Naval Medical Research Institute)

This is a fact sheet issued by the Science Media Centre to provide background information on science topics relevant to breaking news stories. This is not intended as the 'last word' on a subject, but rather a summary of the basics and a pointer towards sources of more detailed information. These can be read as supplements to our roundups and/or briefings.

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