

Affiliation Genetically Modified Vaccines

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Genetically Modified Vaccines and Modern Immunization

The article has discussed the field of genetically modified vaccines that are based on vectors. It has collected, synthesized and analyzed all the data regarding the recently available, applied and newly formed vectors for the purpose of providing an overview of the utilization of vector-based technology in genetically modified vaccine development (Ramezanpour, Haan, Osterhaus & Claassen, 2016). One of the most important points highlighted in this study is that poxviruses and adenoviruses are some very significant vectors in the field of genetically modified vaccines. The vector-based vaccines constitute a significant part of all the genetically modified vaccines. The vaccine vector technology will prove to be very important in the future, and the authorization of the first vectored human vaccine is proof of it.

Through this article, the author has tried to convey the message that techniques of genetic modification assist in the design of smarter vaccines. For human diseases like AIDS and other neoplastic disorders, no vaccines have been developed yet, but novel GM technologies will contribute to their development (Ramezanpour, Haan, Osterhaus & Claassen, 2016). Moreover, this technique also can lead to cheap methods for the development of vaccines against diseases for which no proper or beneficial vaccine has been generated.

Viral Vectors, Antigen Expression, and Immune Response

The genes of interest in genetically modified vaccines are those that encode antigens that are responsible for inducing immunity. These genes of interest are then carried by the vectors so that they can be introduced from one organism into the genome of another organism, like the vaccinia virus (Ramezanpour, Haan, Osterhaus & Claassen, 2016). This is the characteristic feature of the vaccine development through the GM technology. The purpose of these genes is to produce immunity against the diseases. The genes of interest are also known as foreign genes. Therefore, the organism which expresses this foreign gene is known as recombinant.

Furthermore, when the desired gene is injected into the recombinant organism, it replicates and produces an adequate amount of the foreign protein for the stimulation of a specific immunogenic response against the disease (Ramezanpour, Haan, Osterhaus & Claassen, 2016). This is the intended

purpose of the desired gene. The interesting fact about biotechnology is that organisms like bacteria and viruses that affect the immune system of the human body are employed as useful tools in the field of genetically modified vaccine development. As mentioned above, the gene of interest can only be inserted into a vector, and these vectors are of three types such as bacteria, viruses, and plasmids (Ramezanpour, Haan, Osterhaus & Claassen, 2016). This is the way in which organisms such as viruses and bacteria can be used as a beneficial tool in biotechnology.

In addition to this, these vectors are capable of fully replicating and causing abortive infection, permitting the expression of the required immunogens. As mentioned in the article, poxviruses and adenoviruses are very significant vectors in GM vaccine development (Ramezanpour, Haan, Osterhaus & Claassen, 2016). The most significant advantage of GM vaccine technology is that the required immunogens can be synthesized, permitting the induction of antibodies and immunity mediated through the T-helper cells. Moreover, it also induces protective cytotoxic T-cell responses to mimic the natural immune response against the immunogens. This fully balanced pathway was not accessible initially and has opened new ways. Particularly, the stimulation of CD+8 CTL responses is of greater interest for the vaccines against diseases like cancer (Ramezanpour, Haan, Osterhaus & Claassen, 2016). Genetically modified vaccines are a cost-effective method for developing vaccines for diseases that have not been curable up till now. The possible cons of this technology can be that this phenomenon is unpredictable and, therefore, can be dangerous if the gene is not accepted by the body in which they are inserted (Ramezanpour, Haan, Osterhaus & Claassen, 2016).

Benefits, Risks, and Ethical Concerns in Genetic Modification

On the other hand, genetically modified organisms are organisms, either plants or animals, whose genetic makeup has been exploited artificially by the insertion of foreign genes into the organism to be modified. There are many pros and cons of genetically modified organisms. For example, animals can be made healthier and more desirable by implanting new genes in them. Similarly, resistant crops can be produced by genetic engineering. This organism was developed to improve the yield and quality of crops or animals and remove any defects that were initially existing in them.

However, there are certain cons associated with genetically modified organisms as well. The organisms formed after genetic modification are very unpredictable because the gene sequence found in them is not natural. Similarly, genetically modified foods like soy or corn lead to the risk of liver and kidney diseases. Many forms of allergies are also associated with GMOs. The GMOs were initially developed to reduce the usage of pesticides. This article has only described the pros of genetically modified vaccines, whereas other articles also highlight the limitations of these vaccines as well. The basic concept of the technique discussed in this article and other articles is the same, but this article has not discussed the limitations of the technology, which is the major discrepancy found in the selected article.

Moreover, in this article, genetically modified vaccines are considered to be the cost-effective alternative, but in another article, it is regarded as a more costly vaccine when compared with traditional vaccines. It results in a contradiction between facts. Other sources have highlighted the fact that except hepatitis B vaccine, no other GM vaccine has been approved yet for human use. They are not only costly but also less reactogenic and immunogenic as compared to other normal vaccines. The antigen for such vaccines requires more purification and has many potential limitations.

References

Ramezanpour, B., Haan, I., Osterhaus, A., & Claassen, E. (2016). Vector-based genetically modified vaccines: Exploiting Jenner's legacy. *Vaccine*, *34*(50), 6436-6448.
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