

Regulation of Animal Vaccines Compared to Human Vaccines

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Commentary

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DESCRIPTION

The production of vaccines for animals and humans has always been linked, this relationship has been coined 'One Health', as at least 61% of all human pathogens originate from animals. Two main examples of this link are the rabies and smallpox vaccines. In many cases vaccinating animals is important not only to the animals' health but also to human health and prosperity. The term zoonotic disease defines a disease that can be transferred from animals to humans. A current and prominent example of a zoonotic disease is rabies. It is spread from an animal to humans and other animals through saliva, bites and scratches. Both domestic and wild animals can catch the rabies disease. Over 59,000 humans die of the disease each year, with 99% of cases occurring because of dog bites. There has been less than 20 documented cases of rabies survival without treatment to date. The majority of cases and deaths occur in Africa and Asia, as a result of limited healthcare. The vaccine for rabies can be administered prior or post to being infected, as a result of the long incubation period of the disease.

The proactive approach of vaccinating stray dogs, which helps to prevent the disease at its source, has been seen to be the most cost-effective prevention of rabies. In Bangladesh there was a mass dog vaccination campaign between 2010 and 2013, this resulted in a 50% decrease in rabies related deaths. The World Health Organization (WHO) has created the campaign of 'Zero by 30', to reduce the number of humans that die from dog related rabies to zero by 2030. During the last decade 75% of infectious diseases in humans had an animal origin. Thus, the notion coined 'One Health' was created, where both human and animal health is seen as being equally important. An example of a 'One Health' vaccine, where it can be distributed to both humans and animals that is currently going through clinical trials is Rift Valley Fever. Associate Professor Wartime from the University of Oxford states that this approach accelerates the design and development of the vaccine, and it also saves time and money.

There are possible solutions in terms of the issues in the sector of animal vaccinations. These include innovations in both the scientific and the regulatory fields. It has been suggested that regulations are converged between regions and all animal vaccines can be standardised with the same RNA or DNA backbone. It has been found that there needs to be a better mutual understanding between regulators, academia and industry. Some other solutions include: free rabies vaccine programs, subsidies as needed, form partnerships across regions (mainly in terms of vaccine banks), a decrease in government taxes, providing positive incentives for disease recording, and building partnerships between global and local manufacturers. Genomic analysis of pathogens and furthered understanding of the mechanisms of pathogens has resulted in the discovery of antigens and the development of recombinant veterinary vaccines. Currently the pathogens' genome is sequenced, the genes that cause the disease is identified, the genes of interest are cloned, a recombinant is constructed, and then one of three types of vaccines is produced (DNA vaccines, Subunit vaccines, Vectored vaccines). DNA vaccines induce antigen production in the host. It is a plasmid that contains a viral, bacterial or parasite gene. The animal's immune system recognizes the expressed protein as foreign, and this can lead to a cellular or humeral response. DNA vaccines overcomes the safety concerns of live-attenuated vaccines. Furthermore, subunit vaccines are short, specific pathogens that cannot replicate. Even though this vaccine is termed as safe, it does not replicate and thus studies have shown issues in relation to yield. Vectored vaccines is another next generation vaccine. This type of vaccine uses a vector to deliver either one or multiple proteins to the immune system of the animal. Currently, there is research being undergone into plant vaccines, which come under the category of vector vaccines.