



IMMUNITY AND CANINE RABIES VACCINE

PRINCIPLES OF RABIES CONTROL THROUGH DOG VACCINATION

Dogs are the key reservoir for rabies in humans, but when at least 70% of the dog population is vaccinated as part of an annual mass-vaccination campaign then the disease can be eliminated.^{1,2,3} Therefore, the focus of rabies control campaigns should be on vaccinating dog populations. This is central to the Global Strategic Plan to reach zero human deaths by 2030 which is supported by WHO, FAO, OIE and GARC,⁴ as well as being the approach taken by organisations such as Rabies Free Africa and Mission Rabies in endemic regions.⁵

THE IMMUNE RESPONSE AND RABIES VACCINATION

High quality rabies vaccines are effective in protecting dogs against rabies. This protection is achieved by the cell mediated and humoral immune responses working together. This means that immunity, and therefore protection, following vaccination is not solely determined by the level of circulating antibodies (i.e. serology). Furthermore, the serological response of dogs to rabies vaccination depends on several factors, including breed/size and age.^{6,7,8,9}

The Ph. Eur. monograph 0451 on Rabies vaccine for veterinary use states that for protection the mean rabies virus neutralising antibody titre of the vaccinated group must be at least 0.5 I.U./ml, and not more than 10% of the animals have an antibody titre less than 0.1 I.U./ml.¹⁰ Interestingly, the published serological protective rabies virus neutralising antibody titre cut off level of ≥ 0.5 I.U./ml. for veterinary rabies vaccines was derived from the cut off level for human sera set by the WHO. Following vaccination, most dogs will show a serological response of ≥ 0.5 I.U./ml. However, a titre below 0.5 I.U./ml does not necessarily mean that a dog is not protected. It has been shown that 95% of dogs with rabies virus neutralising antibody titres (RFFIT) ≥ 0.05 and < 0.1 I.U./ml are protected against a challenge, and 100% of the dogs with titres ≥ 0.1 I.U./ml are protected against a challenge.¹¹

THE BENEFITS OF HIGH QUALITY VACCINES

Vaccines that are produced in compliance with Good Manufacturing Practice (GMP) certification in the European Union (EU) are developed in accordance with the EU Pharmacopoeia with challenge studies undertaken to establish the correct immunogenicity for dogs.¹⁰ In such experiments, as in the field, both immune systems, cell mediated and humoral, work together to achieve protection. The results of the challenge experiments form part of the dossier submitted for registration purposes. This means high quality vaccines produced to EU GMP standards and licenced in the EU have been proven to be effective and can be used with confidence.

CONCLUSION

Protection is not solely determined by the level of circulating antibodies and low rabies virus neutralising antibody titres (0.05-0.5 I.U./ml) can still provide good protection. Therefore, diverting scarce resources to widespread serological monitoring after a vaccination campaign has little value. Instead, the focus should be on applying high quality vaccines, which have proven efficacy, at high coverage. By vaccinating over 70% of dog populations, the goal of zero human dog-mediated rabies deaths can be achieved.

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