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Field evaluation of immune response to oral rabies vaccination for stray/inaccessible dogs

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Introduction: Rabies, a vaccine-preventable, zoonotic disease, is virtually 100% fatal once symptoms appear. Chiang Mai is one of the top ten tourist cities in Thailand, so providing a healthy and safe environment is essential for the city's reputation. Before 2020, there had been no human or canine rabies cases for over 10 years; since 2020, five incidents of canine rabies have hit the city. The virus clearly exists in the area; preventing its re-emergence depends on rabies control management. Certain kinds of dogs are not accessible for parenteral mass rabies vaccination, which needs to cover 70% of the dog population; for this reason, oral rabies vaccination (ORV) is an essential adjunct to traditional prevention. Preliminary clinical trials of ORV (in which study design controls variability) have occurred with a small number of dogs. This study aims to evaluate antibody responses to oral administration of the rabies vaccine in a field trial.

Methods: Oral rabies vaccine strain SPBN GASGAS titer 108.2 FFU/ml filled in sachet was used. Strays known as "temple dogs" were chosen for the ORV study; the animals were semi-accessible and lived in temples so they could be retained for follow-up. They either have a history of vaccination against rabies or have never received a vaccination. A total of 63 temple dogs received the vaccine orally. Blood samples were collected beforehand and then one month after ORV administration. The evaluation of blood samples for antibody to rabies vaccine was performed using CEE-cELISA.

Result: Out of 63 dogs, seven had never received any rabies vaccination and 56 had received parenteral rabies vaccination(s) in previous years. The seven dogs were confirmed to have no rabies vaccination history by undetectable antibodies against rabies. Before oral vaccination, 34.9% (22/63) had no antibodies to the rabies vaccine. The average level of anti-rabies antibodies before ORV was 4.05±5.02 EU/ml. One month after ORV, 95.2% (60/63) of the dogs had antibodies with an increasing level of 8.61±7.60 EU/ml. Three dogs (4.7% or 3/63) remained unresponsive to ORV despite previous parenteral vaccinations. Seven dogs with no vaccination history all (7/7) responded to ORV with an antibody level of 7.46±1.56 EU/ml. After ORV, 13.3% (8/63) of the dogs—specifically, the group that had received past rabies vaccinations and still had antibodies to the vaccine before ORV—had slightly decreased antibody levels.

Conclusions: Oral rabies vaccine strain SPBN GASGAS stimulated efficiency and high immune responses in primary and booster vaccination in the temple dogs. Ongoing studies of unvaccinated dogs are intended to confirm that ORV induces an efficiently strong response in primary immunization. Temple dogs in this study represented a stray dog model or real-world data which was more precise than clinical studies. Field trial data was collected in the context of real-world routine delivery with dogs representing different demographics and vaccination histories. Ultimately, field evaluation of oral vaccination for stray and inaccessible dogs should be a tool for eliminating human and canine rabies altogether.