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Assessing Options for Rabies Control

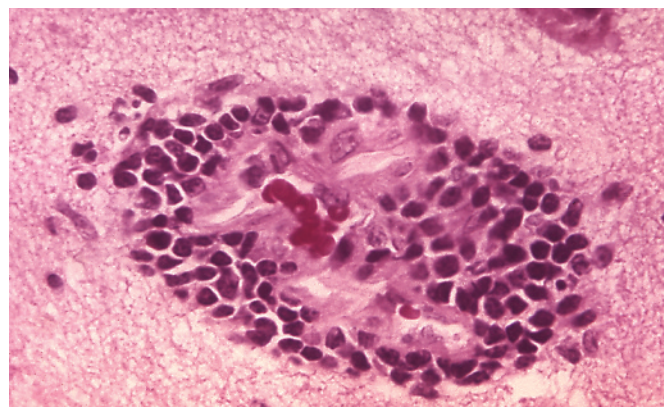
Zoonotic potential and public safety concerns make it important to determine how to vaccinate wildlife reservoir species (eg, striped skunks, raccoons, red foxes) against rabies virus while having minimal impact on the human population and nontarget wildlife. However, virus and host variations and residual pathogenicity in the environment have made this difficult. An oral rabies vaccine developed using a recombinant human adenovirus vector containing the ERA rabies virus glycoprotein gene has shown capability of eliciting immune response against rabies in laboratory and field settings. This study examined how this vaccine (ONRAB) persists within tissues and is shed via feces and saliva of target and nontarget animal species, thus exploring residual environmental risks to widespread distribution of the ONRAB baits for rabies control.

Oral and rectal swab samples were collected from 84 red foxes, 169 striped skunks, 116 raccoons, and 155 nontarget small mammals representing 10 species. The samples were tested for ONRAB DNA via real-time PCR. None of the samples analyzed exceeded the upper limit of ONRAB DNA previously applied to assess viral shedding. This study confirmed previous findings that viral replication and shedding following vaccination with ONRAB is likely short-lived and that, under normal circumstances, risk for transmission of ONRAB vaccine virus in the natural environment is minimal.

■ Commentary

Rabies vaccine delivered in baits for the control of rabies in reservoir wildlife species is not new; there is a long history of its successful application in Europe and North America. Earlier programs have used either live attenuated rabies virus (which risks residual pathogenicity) or recombinant vaccinia virus expressing the rabies virus glycoprotein. Recombinant viral vectored vaccines are safer, as there is no reversion to virulence when only a single rabies virus antigen is expressed by the “carrier” virus.

Apart from the control of rabies in wildlife reservoirs, use of oral vaccines delivered in baits has potential application for rabies control in free-roaming populations of domestic dogs in developing countries. There are successful canine rabies control programs in African and Asian countries, where rabies remains a prevalent and significant disease, accounting for an estimated 20,000 human deaths in India alone—primarily children who are more likely to be bitten by rabid dogs. Rabies control programs generally rely on



Micrograph depicting histopathologic changes associated with rabies encephalitis Courtesy Centers for Disease Control and Prevention

capture of free-roaming dogs, needle injection of killed adjuvanted vaccines, and sometimes neutering before release.

When at least 70% of a dog population can be vaccinated, excellent rabies control in dogs and humans can be achieved, and these bait programs are far more effective than culling free-roaming dogs. A useful adjunct to these programs would be the ability to vaccinate even more of the dog population via the use of oral vaccine delivered in baits. Concerns for children finding and ingesting baits has led to reluctance regarding this practice, but the improved safety of recombinant vaccines addresses some of these concerns.

The described approach provides an alternative vectored vaccine for oral delivery. Another approach has been to create a safer version of the traditional Street Alabama Dufferin (SAD)-attenuated rabies vaccine through a series of 3 genetic manipulations: engineering a mutation in the gene encoding the SAD rabies glycoprotein, deleting the gene encoding the P protein, and then enhancing immunogenicity by adding an additional glycoprotein from a different virus strain. This ORA-DPC vaccine is a candidate for incorporation into oral baits for rabies control in free-roaming dog populations. Such novel products will require regulatory approval but may significantly impact the global struggle for control of this devastating disease.—*Michael J. Day, BSc, BVMS(Hons), PhD, DSc, DECVP, FASM, FRCPath, FRCVS*

■ ■ Source

An assessment of ONRAB oral rabies vaccine persistence in free-ranging mammal populations in Ontario, Canada. Sobey KG, Walpole AA, Rosatte R, et al. *VACCINE* doi.org/10.1016/j.vaccine.2013.02.057.

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Hedgehogs & Salmonellosis

Since 2011, the CDC and the United States Department of Agriculture's Animal and Plant Health Inspection Service (USDA-APHIS) have been coordinating investigations into outbreaks of human *Salmonella* Typhimurium infections. Isolates have indistinguishable pulsed-field gel electrophoresis patterns linked to hedgehogs. Before 2011, cases were rare; however, they are increasing, with 14 human cases in 2011, 18 in 2012, and 2 as of February 2013 (this report's date). Infections have been identified in 8 states; there has been 1 death. Most patients (55%) are female; median age of patients is 13 years (range, <1–91 years). In 14 cases, direct or indirect contact between the patient and a hedgehog was reported the week before the illness. The hedgehogs were purchased from various breeders, many of whom were USDA-APHIS licensed. The reason for the outbreaks is unknown.

■ Commentary

Veterinarians are often asked about the best type of pet for a home. Not all pets are suitable for all homes, especially if there are household members at risk for contracting contagious diseases via direct or indirect contact (eg, immunocompromised individuals). Any household with individuals who may not comprehend appropriate sanitation measures (eg, hand washing after handling pets) should not consider any species that has a history of commonly harboring organisms such as *Salmonella* spp.—

Karen Moriello, DVM, DACVD

■ ■ Source

Notes from the field: Multistate outbreak of human *Salmonella* Typhimurium infections linked to contact with pet hedgehogs—United States, 2011–2013. Marsden-Haug N, Meyer S, Bidol SA, et al. *MMWR* 62:73, 2013.



Human Therapy to Treat Feline Cutaneous Neoplasia

Squamous cell carcinoma (SCC) is a common cutaneous neoplasia of cats. In humans, dermatologists treat non-melanoma skin cancers using curettage and diathermy, in which the tumor is scraped with a curette to remove friable tissue that sloughs easily until more resistant tissue is reached and pinpoint bleeding occurs. Diathermy of the entire base and circumference of the defect are then applied to a depth of 1–2 mm to extend the treated margin. Application of this technique was investigated and owner acceptance assessed regarding postoperative care, comfort, and cosmetic outcome. A single treatment with 3 cycles of curettage and diathermy was performed in 34 cats with actinic dysplasia and superficial SCC involving less than half of the nasal planum.

Results showed 94% nonrecurrence 12 months posttreatment, a rate similar to other superficial nasal SCC treatments. The technique produces tissue fragments, which may hamper histopathologic diagnosis. Tumor depth and margins could not be evaluated, and the severity of the lesion did not always correlate with the histological diagnosis. Regarding appearance, 79% of owners reported their cats looked “normal” or “almost normal.” Also, 91% of owners considered postoperative care to be “no problem at all” or “fairly easy.”

■ Commentary

This novel technique can be used in private practice, as it does not require complicated equipment, multiple anesthetic episodes, or specialized techniques. Other advantages include reduced financial burden when compared with other pallia-

tive techniques, minimal tissue invasion, and aesthetically acceptable outcome. Cats with lesions involving >50% of the nasal planum, deep tissue involvement, and/or distortion of the nose may not be good candidates. Alternative treatments (eg, nasal planum resection, combined intraleisional carboplatin and radiotherapy) may be better for extensive SCC in the nasal planum. Practitioners in areas with beautiful sunlight should consider this technique, as it may reduce patient morbidity or mortality.—Heather Troyer, DVM, DABVP, CVA

■ ■ Source

Curettage and diathermy: A treatment for feline nasal planum actinic dysplasia and superficial squamous cell carcinoma. Jarrett RH, Norman EJ, Gibson IR, Jarrett P. *J SMALL ANIM PRACT* 54:92–98, 2013.

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***Toxocara* spp: An Overview**

Dogs and cats harbor the enteric nematodes *Toxocara canis* and *T. cati*, which can be transmitted to humans via the fecal-oral route; humans are infected by ingesting larvae in undercooked infected meat; infective eggs from garden soil, sandpits, and playgrounds; eating unwashed vegetables; and/or poor hand hygiene. Reported infection rates in dogs in Western Europe range from 3.5%–34% depending on environments (eg, pet, shelter animal, stray, rural/outdoor) and from 8%–76% in cats. Increases in urban small rodent populations also attract predators (eg, foxes) that can be a reservoir for *Toxocara* spp. Toxocariasis in humans can result in ocular or visceral larva migrans and overt toxocariasis. Infection in humans has also been associated with neurologic symptoms, chronic airway disorders, chronic pruritus, and eczema.

Diagnosis is typically achieved by identifying eggs in feces. Eggs are resistant to adverse environmental conditions and remain infective for years. Strategic treatment of dogs and cats should emphasize treatment of puppies, kittens, and nursing dogs and cats. Preventive recommendations include administration of anthelmintics ≥ 4 times yearly to prevent patent infections within a population. Regular treatment q4–6wk would prevent most

patent infections; this can be achieved with monthly administration of macrocyclic lactones used for heartworm prevention. Deworming pregnant dogs and cats with the aim of reducing *Toxocara* spp is not generally advised, as current recommended doses of anthelmintics are not highly effective against the inhibited somatic larvae involved in intrauterine infection.

From the Editor■ **Commentary**

Environmental control of the ubiquitous roundworm can be difficult to regularly implement; however, monthly anthelmintic therapy virtually eliminates patent infections and significantly decreases risk to pet owners and other human contacts. The zoonotic and public health implications of roundworm infection and the ease and availability of monthly anthelmintics should urge the veterinarian to act in the interest of the greater public's health and to emphasize the importance of preventive medicine.
—Indu Mani, DVM, DSc

■ ■ **Source**

Veterinary and public health aspects of *Toxocara* species. Overgaauw PAM, van Knapen F. *VET PARASITOL* 193:395-406, 2013.