

# NEWS FROM THE PIT

Arizona Poison and Drug Information Center



## News from the Dog House Edition

By: Anne Marie Guthrie, PharmD

We are nearly past the time of year when you should get your seasonal flu vaccine (though better late than never). As spring approaches bringing rattlesnake season with it, is there another vaccine to consider?

We know that getting bitten by a rattlesnake stinks. The physical, emotional, and financial strain cannot be overstated. When it comes to problems with big consequences, we naturally ask the question, "is this preventable?" The short answer to this question is yes, many rattlesnake bites are preventable, but personal awareness and fencing will not prevent every bite. So what else can we do? Is there a vaccine to prevent this? After all, we have lots of vaccines to help prevent and decrease other illnesses.

There is not currently an FDA approved vaccine against rattlesnake bites in humans. However, there is a vaccine given by some veterinarians to dogs and horses. While this may not be great news for us humans, it could be for our furry friends! Or is it?

### NEWSLETTER HIGHLIGHTS

The use and effectiveness of rattlesnake vaccines in dogs

**Image 1: Western Diamondback Rattlesnake (*Crotalus atrox*)**

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Pet owners are known to go to great lengths for the health and comfort of their animals. I am one such person. My family always had a variety of pets while we were growing up, and we were regulars at our local veterinarian's office for routine check ups, which includes things such as vaccine updates. Interestingly, we lived in an area where venomous snakes were common, yet I had never heard about a vaccine for rattlesnake venom until recently when I was asked to write this newsletter. Considering my fondness for furry friends, how could I say no? After all, the first thought that popped into my head was whether or not my pets should be getting vaccinated! If a dog is bitten by a rattlesnake, regardless if they have received the vaccine or not, they must be taken to a veterinary hospital for treatment and monitoring. Many dogs are bitten on their face due to generally exploring their surroundings with their noses, so the venom effects like pain, swelling, and possibly bleeding can impede the dog's ability to breathe. This makes venomous snake bites potentially lethal, and a vaccine would be a good preventative measure for families living in rattlesnake endemic areas.



**Our current family dogs, Ava (black and white) and Klio (brindle). They have not received the rattlesnake vaccine.**

Red Rock Biologics makes a *Crotalus atrox* toxoid that is given to dogs and horses as a rattlesnake vaccine to build immunity to the venom from a Western Diamondback rattlesnake. It was first released in California in 2003, before being available nationally in 2004. According to the manufacturer, this vaccine confers protection against the Western Diamondback as well as possible protection against other rattlesnake species (Northern and Southern Pacific, Prairie, Great Basin, Sidewinder, Timber, Massasauga) and Copperheads. A study in mice found the vaccine increased survival of mice exposed to Western Diamondback venom. However, fewer mice had the same effects after exposure to the Northern Pacific Rattlesnake, and when exposed to Southern Pacific Rattlesnake venom, no mice survived longer than unvaccinated mice. So while the vaccine may provide some protection against Western Diamondbacks, it may provide less protection against venom from other species of snakes. The initial vaccine series is two shots given 30 days apart. Ideally, this series is given to the dog one month prior to entering rattlesnake habitats. For dogs continually exposed or living in rattlesnake habitats, it is recommended that they receive booster vaccines every 6-12 months, depending how long they are exposed during a one year time period. According to the manufacturer of the rattlesnake vaccine, "vaccination can help reduce the impact of snakebite, reduce or eliminate the need for antivenom, and decrease other treatment costs."



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However, the vaccine has not been shown to reduce the need for antivenom or severity of the bite. Five veterinary emergency care centers in Southern California reviewed the records of 82 dogs envenomated by rattlesnakes over a six year period. They found that smaller dogs (less than 44 lbs) had more severe envenomations, which has been seen in previously published articles as well. Fourteen dogs (17%) had been vaccinated, however, they needed the same amount of antivenom and time admitted to the hospital as dogs that were not vaccinated. While these results are noteworthy, it should be said that only moderate and severe envenomations were included in this study and the number of vaccinated dogs not included due to having mild bites is unknown. For me personally, this study did not provide the solid evidence I would need to consider vaccinating our dogs against the financial cost of the vaccine (whatever that may be).

Though the effectiveness of the vaccine is questionable, it appears to be relatively safe to administer to dogs with few immediate adverse effects reported. There may be a risk of delayed issues, however. Unfortunately, there was a case report published of two vaccinated dogs, one in Phoenix, AZ, who developed severe anaphylaxis after being bitten by rattlesnakes. Generally to develop anaphylaxis, a patient needs to be exposed to the allergen at least one time prior, called a sensitization exposure. After sensitization if the patient is exposed to the allergen again, then they may develop anaphylaxis. The two dogs in this case report had never been exposed to rattlesnake venom, but they had been exposed to the vaccine toxoid. The authors speculated that the vaccine could act as a sensitizer in some dogs, and subsequent bites could be more severe if compounded by anaphylactic reactions. However, rattlesnake venom is known to be very allergenic and can create a massive immune system response that can look a lot like anaphylaxis. Therefore, it is difficult to draw definite conclusions if the vaccine caused these dogs severe symptoms or if it was simple the venom itself.

Like I said above, I love all my pets dearly, but I do tend to be a minimalist with regards to veterinary care outside of standard recommendations like rabies boosters. It's important to me to also consider the financial impact of their care. If our dog is bitten by a rattlesnake, she still needs to go to the emergency vet and may need antivenom even if she had received the vaccine. This makes the vaccine feel like an added cost, without much benefit. There are private companies and some humane societies that offer rattlesnake avoidance training to dogs that run around \$100-150 per dog. While this training isn't 100% effective either, it attempts to prevent bites from occurring in the first place, rather than mitigating effects after a bite has happened. Knowing our dogs are smart and very trainable, I would consider this option first, especially if it will avoid a bite altogether. The best case scenario in my eyes is that no bite is ever sustained compared to trying to minimize the effects of a bite.



**My cats Louise (left) and Sam (right)**