

Preventing Motion Sickness in Dogs

If you work in a veterinary clinic, you likely know who the "car-sick" dogs are. They are the ones whose owners walk in and ask for a roll of paper towels and a bucket of water or need you to hold their dog while they go back outside, defeated, to clean up their car.

According to a 2006 pet owner market research study, approximately 7.2 million dogs suffered from motion sickness (kinetosis) that year, but only 25% of the dogs received veterinary treatment for the condition.¹ Motion sickness typically manifests as signs of nausea and discomfort, such as excessive drooling, pacing, panting, swallowing, or lip licking.² In some cases, these signs progress to abdominal heaving followed by vomiting.³ The nausea should fade once the car stops moving. Because of pharmacologic advances and a better understanding of how to prevent emesis, pet owners have more viable options for helping nauseated dogs.

WHAT CAUSES MOTION SICKNESS?

Although the cause of motion sickness is not fully understood, it is generally thought that it occurs when the inner ear is disturbed from repeated motion, such as the movement of a car, plane, or boat.⁴

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Motion sickness is most commonly reported in puppies and young dogs, many of which outgrow it.⁵ Unfortunately, many more do not outgrow it, and it becomes a lifelong problem.

The most popular hypothesis about the cause of motion sickness is that humans and animals become nauseated when mixed sensory signals are transmitted to the brain, such as when the eyes tell the brain that the body is not moving, but the inner ears sense motion.² For example, when a person is on a boat, he or she may be at ease on the top deck because the horizon provides a solid visual reference indicating that the boat is moving, which matches the sensation in the inner ears. However, when the individual steps below deck, he or she may become seasick because the inner ears still sense motion, but the visual reference is now lacking. The confusion between the two simultaneous signals can lead to a vestibular emesis response.²

Another hypothesis suggests that the sensory confusion signals the brain to respond in the same way as it would to ingestion of a neurotoxin.² When the brain receives the mixed signals, it decides to ignore the discrepancy between the visual sense and proprioception, and accepts toxin ingestion as the culprit.

This triggers a stress response of the sympathetic nervous system, which causes the stomach to empty its contents in an attempt to rid itself of a toxin.²

In dogs, motion sickness may lead to a behavior problem.⁶ Feeling nauseated and vomiting every time it is put in a car can cause a dog fear and anxiety. Some dogs anticipate the nausea they normally experience and may start to vomit even before the car is in motion.⁶ This can lead to a learned response, so even if the dog stops suffering from motion sickness, it may still continue to vomit in the car. Certainly, some dogs may be fearful of the car for reasons such as noise, traffic, or the association of going to “scary” places (e.g., the veterinary clinic).⁶ Dogs that are fearful may vomit because they are frightened, not necessarily because of motion sickness.⁶ This is why it is important to desensitize puppies to car rides. If an older dog is fearful, it may be difficult to determine whether the vomiting is from motion sickness or from fear. A behavior evaluation may be necessary to determine why the dog is vomiting.⁶

Regardless of the cause of motion sickness, the vestibular system is always involved. Numerous studies have been performed trying to induce motion sickness in both people and animals whose vestibular pathway had been interrupted or removed.⁴ In these studies, motion sickness could not be induced.⁴



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ALL DOGS THAT ARE FEARFUL of transport should be slowly desensitized to the car (or other vehicle) by first allowing them in it for “fun” time while the car is stationary.

When an animal becomes nauseous, certain receptors in the brain are stimulated. All vomiting stimuli, including those from the vestibular system, ultimately converge in the emetic center. The emetic center receives input from the gastrointestinal tract, the vestibular apparatus, and the chemoreceptor trigger zone (CRTZ).³ The emetic center has 4 receptors: neurokinin-1 (NK₁), serotonin, adrenergic, and glucocorticoid.³ The vomiting associated with motion sickness involves M₁-cholinergic receptors (located in the autonomic nervous system, central nervous system, and gastric glands) and H₁-histaminergic receptors (located in the smooth muscles, heart, and central nervous system) that ultimately send signals to the emetic center, causing vomiting.³

Ideally, treatment should be aimed at preventing signals from both receptor types.³ Unfortunately, little research has been performed regarding dogs and motion sickness, which may be related to the poor results when attempting to treat dogs. Luckily, newer advances in veterinary medicine have given hope to many pet owners.

EARLY INTERVENTION

Owners can do simple things at home to help set up their dog for success. First, it is important that any dog suspected of having motion sickness not be fed for at least a couple of hours before a car trip, as vomiting food becomes more likely if food is in the stomach.⁷ Once in the car, simply allowing fresh air in or allowing the dog to see out may help alleviate motion sickness in some dogs.^{7,8} This is particularly true for puppies, who tend to be either fearful or motion sick more often than older dogs.⁸

All puppies and adult dogs that are fearful should be slowly desensitized to the car (or other vehicle) by first allowing them in it for “fun” time while the car is stationary. Eventually, the car should be turned on while the owner offers a couple of treats or the dog’s favorite toy. The owner should then drive for 30 seconds to test for reactions and stop and reward the dog’s behavior if it tolerated the ride well. The time spent while the car is moving is gradually increased so the pet associates the car with positive experiences. During this time, it is important for the owner to teach the dog appropriate car riding etiquette (i.e., not jumping up or running around). If, at any point, the dog shows signs of fear or nausea, the training should be stopped and resumed at a level the dog can tolerate.

Appropriate desensitization takes many weeks to months, depending on the individual pet, and occurs so slowly that the dog barely notices a change.⁷ Owners looking to create a systematic desensitization protocol can always reach out to a trained specialist. Finding a

• **TECHPOINT** •

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board-certified veterinary behaviorist is a great start (dacvb.org/resources/for-the-public). Systematic desensitization works well for any puppy or dog that vomits because of anxiety or fear.⁸ However, an estimated 15% of all dogs suffer from true motion sickness.⁹ Behavior modification using systematic desensitization will likely not help a dog with a vestibular issue.⁸

When dealing with a dog with true motion sickness, owners have options in pharmaceuticals and alternative medicine. Each motion-sick dog is different, and what may work for one dog may not work for another.

PHARMACEUTICAL OPTIONS

Acepromazine and chlorpromazine, both phenothiazine drugs, are sometimes prescribed to treat motion sickness in dogs. While acepromazine is labeled for the prevention of motion sickness, chlorpromazine is not. Acepromazine is a sedative/tranquilizer and is generally prescribed to help reduce anxiety or fear.¹⁰ Chlorpromazine is generally used as an antiemetic and occasionally as a tranquilizer.¹⁰ While both drugs offer antiemetic properties, they also can cause a significant amount of sedation. Depending on the dosage, this sedation can last for a prolonged period.¹⁰ These drugs can also cause states of confusion and decreases in blood pressure.¹⁰ While they have been used to sedate dogs that travel, they are generally no longer recommended to prevent motion sickness.¹⁰

Dimenhydrinate and diphenhydramine are antihistamines that block the H₁-histaminergic receptor of the vomiting center.¹⁰ When an H₁-histamine blocking agent (diphenhydramine) is used, combination with a M₁-cholinergic receptor blocker (compazine) is suggested to obtain control of emetic signals originating from the vestibular apparatus.² The most common adverse reactions seen with many antihistamines are central nervous system depression (sedation) and anticholinergic

effects (dry mouth, urinary retention).¹⁰ Diarrhea, vomiting, and anorexia are less common.¹⁰ Antihistamines are not recommended for use in pregnant dogs.¹⁰ Administration of these medications about 30 minutes before the car ride is recommended, and the effects last 3 to 6 hours.¹⁰

Meclizine is an antihistamine and has antiemetic properties.¹⁰ In the past 3 years, it has increased in popularity as a treatment for vestibular disease.¹⁰ Its use as a treatment for motion sickness in dogs is considered off label, and its exact mechanism of action for the prevention of motion sickness is not understood.¹⁰ If used, the recommendation is to administer it 30 to 60 minutes before travel.¹⁰ Sedation has been reported as the most common side effect.¹⁰

Maropitant citrate (Cerenia; Zoetis, Florham Park, NJ) is used for the treatment and prevention of acute vomiting and the prevention of vomiting due to motion sickness in dogs. Cerenia is the first FDA-approved drug for preventing nausea and vomiting associated with motion sickness in dogs. It works by blocking the action of substance P, found in the highest concentration in the emetic center.¹¹ Substance P is a neuropeptide that helps regulate mood, anxiety, stress, respiratory rhythm, pain, nausea, and vomiting.¹¹ The receptor for substance P is NK₁.¹¹ NK₁ receptors are found in both the CRTZ and the emetic center.¹¹ When substance P binds to the NK₁ receptor, vomiting occurs.¹² Blocking the binding of substance P to NK₁ receptors interrupts vomiting stimuli. Several studies in dogs have shown that blocking substance P from the NK₁ receptor is very effective in preventing vomiting due to motion sickness.⁵ In a study of 122 dogs with a history of motion sickness dosed 2 hours before travel, only 7% vomited after being administered maropitant; in contrast, 55% of dogs in a placebo group vomited.¹¹

Approximately 2 hours before the car ride, the pet should be given the oral dose of maropitant in a small amount of food such as deli meat or peanut butter. If the patient has to take an unexpected car ride, maropitant may still be effective if given only 1 hour before the ride. In a clinical trial, many dogs dosed 1 hour before travel (86%) did not vomit.¹³ The most common side effect was hypersalivation, which affected approximately 12% of the dogs in the study.¹³ Unlike most other drugs used to help prevent motion sickness, maropitant does not cause sedation. It is not currently approved for use in pregnant or lactating dogs.¹¹

ALTERNATIVE OPTIONS

It has been suggested that acupressure and acupuncture may help treat motion sickness; however, their efficacy is unknown.^{14,15} More studies in humans show the benefit

of acupuncture than of acupressure.¹⁵ For many owners, however, acupuncture can be cost prohibitive. To date, no research has been conducted on continuous acupressure treatment methods in dogs. While some owners use pressure wristbands on the dog's carpal area as an acupressure zone, there has been no positive research supporting the role of acupressure in decreasing motion sickness.

More positive studies have shown that ginger may be effective in dealing with motion sickness in humans. Several studies have shown a reduction in motion sickness when ginger was used.^{16,17} The use of ginger appears to have some benefit in veterinary medicine as well,¹⁸ but how efficacious it is remains unknown. It does appear that ginger extracts must be administered, as opposed to consumption of products that contain some ginger (e.g., gingersnap cookies, ginger ale), for the effect to be seen.¹⁹

Other natural herbs, such as Panax ginseng, black horehound, chamomile, fringe tree, peppermint, meadowsweet, and lemon balm, may help with nausea as well.¹⁹ There is little to no published information regarding the safe and effective use of these herbs in dogs.¹⁹

THE ROLE OF VETERINARY TECHNICIANS

Because veterinary technicians are often the first (or last) staff members to speak to clients, they may be asked to clarify information about motion sickness. The client may have already tried some treatments and found them to be ineffective and may be unaware that new medications and options have become available.

During the initial puppy visit and annual visits, motion sickness can be addressed by asking the owner if the dog

became sick in the car on the way to the clinic. If the answer is yes, the veterinary technician can alert the veterinarian so he or she can speak to the owner about the options for treating motion sickness. If a puppy has motion sickness, it is important to speak to the owner about systematic desensitization to avoid a learned fear of the car later in life. Owners often assume that puppies will outgrow motion sickness, but without early intervention and treatment, motion sickness may become worse. ■

Glossary

Acupuncture: The treatment of disorders by inserting small needles into the skin at points where the flow of energy is thought to be blocked

Acupressure: The treatment of disorders by using manual pressure at points on the skin

Antihistamine: A drug that blocks the action of histamine

Desensitization: To make an animal less responsive to an overwhelming fear by repeated exposure to the feared situation or object in a controlled situation

Histamine: A compound released by immune cells that produces allergic reactions

Neuropeptide: A peptide released by the nervous system that carries communication between nerves

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