Oleg Batrak/shutterstock.com

Abstract

The sensory systems of veterinary patients differ from that of humans in several ways, and as a result, their perceptions of sensory stimuli can differ. They may be able to smell things that we cannot (e.g., scents of other animals), be agitated by sounds that we take for granted or cannot hear (e.g., ultrasonic scalers), or see things that we cannot (e.g., the flicker of some light sources). Thus, they may interpret the experience of being in a veterinary hospital differently than we think or expect they should. If we, as healthcare professionals, better understand our patients' sensory systems and their sensory perception of being in the hospital, then we will be better able to minimize their stressful perceptions and maximize their positive ones.

CONTINUING EDUCATION

BEHAVIOR

Using Patients' Sensory Perception to Enhance Their Veterinary Visits

***Virginia L. Price**, MS, CVT, VTS (Behavior)*
St. Petersburg College Veterinary Technology Program, Largo, Florida

Development of sensory perception begins in utero and continues throughout the animal's lifetime. An individual's sensory perception is affected not only by genetics but also by learning from sensory experiences. Deprivation of sensory input during the developmental stages can lead to deficits in sensory perception. Both sensory deprivation during development and learned individual expectations affect perception. Individual variations between sensory systems and the manner in which the brain interprets sensory input can cause differences in how each patient perceives the experience of being in a veterinary hospital.

WHAT IS SENSORY PERCEPTION?

The 2 aspects of sensory perception are sensation and perception.

- **Sensation** is the stimulation of a sensory receptor and the resultant activation of a specific brain center, producing basic awareness of scent, taste, sound, touch, or sight (and other senses). An example of a sensation is an auditory stimulus, including its loudness, pitch, and location. For example, in a veterinary hospital, the ultrasonic sound waves from the ultrasonic dental scaler could cause a startle reaction in the patient because that sound is unfamiliar.
- **Perception** is the process or result of becoming

Take-Home Points

- Because the olfactory system plays a large role for dogs and cats, removing aversive scents and adding calming scents can improve their veterinary experience.
- Hospitalized cats are more likely to eat if food is fresh and meat flavored; dogs may respond well to hand feeding.
- Because dogs and cats have more sensitive hearing than humans, reduce hospital noise as much as possible, even sounds of which we may be unaware (e.g., high ultrasonic frequency).
- Touching animals in ways that they like may help build patient–healthcare worker trust.
- Slow movements seem less threatening to dogs and cats, and dimmed lighting is less stressful for cats.

aware of objects, relationships, and events by means of the senses, which includes such activities as recognizing, observing, and discriminating. An example of perception is a species-relevant auditory stimulus, such as the call of a predator, which may lead to escape or avoidance reactions. In a veterinary hospital, a cat can hear a dog barking and growling in the hospital. The cat may then perceive the dog's vocalization as a threat and react with fear, defensive aggression, or possibly an attempt to escape.

Both sensory sensation and perception can affect how patients respond to the veterinary hospital environment. The initial sensory sensation response can change behavior, causing a patient to startle. The sensory perception response can change emotions and behavior, causing a patient to react in a seemingly unpredictable manner.

SENSORY SYSTEMS

Each sensory system (olfactory, gustatory, auditory, tactile, or visual) works with other sensory systems to enhance or modify sensory perception. An example is the interaction of taste and smell. Patients with a deficient olfactory system often exhibit anorexia. Thus, it is possible to enhance taste for patients by strengthening the scent of the food.

Olfactory

Dogs and cats have 2 olfactory systems: the main olfactory epithelium where scent molecules enter through the nares and an accessory olfactory system that uses the vomeronasal organ (VNO), where pheromones and other volatile chemicals enter through a passage in the mouth or nose. Thus, olfactory information is collected through the nose as well as the mouth.[1]

Although these systems separately send signals to different parts of the brain, they work together to form olfactory perception. Because dogs and cats have large olfactory sensory and perception organs, their bodies spend energy and time on this sense, which helps veterinary professionals understand how important scent messages are to patients.

Behaviors associated with the VNO also differ between dogs and cats. Cats show a flehmen response to odors by wrinkling their lips and breathing in, whereas dogs do not show a flehmen response. Both dogs and cats may place their nasal planum and/or tongue on the surface containing scent. In mice, the VNO is necessary for innate stereotypic defensive behavior and for initiating endocrine release in response to odors of predators.[2] Thus, the purpose of the VNO in dogs and cats, in addition to collecting pheromones associated with sexual behaviors, may possibly be to collect pheromones associated with predators and to activate defense behaviors.

Gustatory

The sensory cells for taste are the taste buds, located on the tongue. Moisture in the food and/or saliva is used to create a mixture that taste buds can collect through taste pores (small openings in the tongue epithelium that allow dissolved food to contact the taste receptors), analyze, and send information to the brain to be interpreted.

The number of taste buds per species gives an idea of the differences in taste discrimination between species. Dogs have approximately 1700 taste buds; cats, around 470; and humans, 9000. Taste buds are sensitive to the following flavors: umami (characteristic of broths and cooked meats), sweet, salty, sour, and bitter. The salty receptors encompass a smaller area than the others.[3] Dogs do not have highly sensitive salt receptors, and they do not crave salt as humans do.[4] Because cats are obligate carnivores, their taste is focused on meat due to their umami taste buds, corresponding with cats' low number of taste buds. Because dogs are omnivores, they have a higher number of taste buds with a greater range of taste receptors for a variety of food sources.

Auditory

Cats have the largest auditory range of any known mammal, ranging from 48 to 85 000 Hz. Cats have a perforated septum in their middle ear that has a frequency-dependent effect on their ability to hear.[5] Dogs do not have this advantage. Nonetheless, Malkemper et al concluded that dogs likely hear at a similar range[5]; the reported hearing range for dogs is 65 to 45 000 Hz.[6] For reference, humans reportedly hear in the range of 20 to 20 000 Hz.[6]

Ear pinnae funnel the sound waves into the ear canal. Animals with erect pinnae collect sound waves more efficiently than those with dropped ear pinnae. Dogs and cats can move their pinnae to better collect sound, although dogs with dropped ears benefit less from it.

Dogs and cats can move their pinnae independently from each other. Hearing can be decreased when auditory sensory cells (hair cells) are damaged by injury, disease, loud sounds, or aging[7]; damaged hair cells are not replaced. Another cause of damage to hearing is medication, such as gentamicin.

Tactile

Tactile sensations, or somatosensory signals, come from the skin, muscles, and joints, where sensory cells collect mechanical, chemical, and thermal stimuli.[8] Some of these signals are felt consciously and others subconsciously. Some conscious signals are temperature sensations (thermoreceptors), pain (nociceptors), and pressure/touch (including vibrations). Some unconscious signals are blood pressure levels and oxygen levels in the blood.[8]

Hairs have free nerve endings surrounding the hair follicles within the skin, which measure hair bending and releasing.[8] Whiskers are specialized sensory hairs called vibrissae. Cats have facial and carpal vibrissae. Cats are believed to use their vibrissae to assess air currents, small vibrations, and object locations; protect the face; and direct food and prey into the mouth. Removal of vibrissae results in loss of tactile information.

Visual

Pupils let light into the eye; a larger pupil lets more light in, allowing more visual sensation. Elliptical pupils change size faster than round pupils, which enables cats to adjust quickly to dappled light at dusk and dawn. The lens forces light onto the retina and changes shape to accommodate changes in distance viewing, a limited ability for dogs and cats.

The 2 types of sensory cells in the retina are rods and cones. Rods function best in low light; they absorb light wave information about movement and contrast between objects.[10] Rods are more numerous in cat and dog eyes than in human eyes. Cones function best in high light by absorbing information about color and acuity.[10] Dogs and cats have 2 types of cones while humans have 3; thus, dogs and cats cannot distinguish between red, yellow, and green, making their color vision similar to red–green color blindness in humans.

Visual acuity is the ability to see the details of an object, separately from adjacent objects and not blurred. Visual acuity in cats is 0.2 times that of humans, 0.33 times that of horses, and 0.5 times that of dogs.[10] To look at visual acuity another way, think of the vision charts for which you have to cover 1 eye and read the letters you see on various lines. Humans without vision impairment have a visual acuity of 20/20 (i.e., an object 20 feet away can be seen sharply). Among animals, visual acuity differs among individuals and breeds. Some dogs have 20/20 vision; however, visual acuity for most dogs is 20/75 (i.e., the dog must be 20 feet away to clearly see an object that a human can see at 75 feet away). The range of cats' visual acuity is 20/100 to 20/200.

The tapetum lucidum is a shiny membrane located behind the retina in the choroid and enhances visual contrast and brightness.[11] The tapetum lucidum is more effective in cats than in dogs, creating higher contrast between sky and objects.[10,12]

Dogs and cats can see light in the ultraviolet (UV) range because they lack UV shielding on the cornea and they have a type of ocular media (aqueous humor) that transmits UV energy. Humans cannot see UV light because we have a UV light filter within our cornea that blocks the light from entering our eyes.

Dogs and cats can detect flickering (and buzzing) in electric lights that humans cannot, depending on the speed of the flicker. With a flicker fusion rate of 70 to 89 Hz,[10] dogs and cats can detect flickering lights that humans, with their flicker fusion rate of 45 Hz,[10] cannot. However, if the flicker is very fast, dogs and cats will not notice it.

Visual field (the entire area that can be seen when the eyes are directed forward) is associated with placement of the animal's eyes on the head. Animals can have binocular vision (visual fields from both eyes overlap) and monocular vision (information from only 1 eye is used to create visual perception). Variation of eye placement in dogs of different breeds affects their visual fields. When eyes are on the front of the head facing forward, as in humans, there is a large binocular field of vision (directly related to depth perception) and smaller monocular fields on each side. Cats have a similar or larger binocular field than humans. The monocular field of dogs and cats is larger than that of humans.

USING PATIENTS' SENSORY PERCEPTION TO ENHANCE VETERINARY VISITS

The value of reducing stress-causing sensations and perceptions in the veterinary hospital is directly associated with the damaging effects of stress, especially in cats (**TABLE 1**). Because sensory perception in humans can differ from that of dogs and cats, the veterinary team may be unaware that their patients may be experiencing stress.

Stress has both short- and long-term effects that reduce an animal's ability to function within homeostasis. Common behaviors that change when animals are feeling stress include appetite, grooming, elimination, social interactions, and physical activity.[13] With regard to the effects on hospitalized animals, stress (or illness) can cause them to lose their appetite and also prevents their immune system from working at an optimal level, creating opportunities for infection.

Olfactory

Animals use scent to communicate. Scent causes emotions and memories. In the veterinary hospital, patients leave their scent on every surface they touch. Odors are contained in many substances, including urine, sebaceous gland secretions, sweat, saliva, anal sac secretions, and feces. Odor is rubbed onto surfaces from sebaceous glands located on the face, chin, dorsal neck, paws, rump, and tail area of cats and the dorsal neck, paws, rump, and tail area of dogs.[14] These oily deposits contain long-lasting odors. When patients urinate or defecate in the hospital because they are fearful, these odors can be left behind on the surface and in the air.

Patients may feel threatened or excited by the scent of their own or other species, and they may find the scent of other species stressful. When veterinary patients smell odors left by a fearful patient, they may feel fear themselves. Both excited and fearful patients pose their own challenges by making them more likely to resist handling, diagnostics, and treatment. More employees will be needed to complete the veterinary procedures, which may take longer to accomplish and could result in pet and/or handler injury.

Removing Scents

Scent can be removed from objects by using odor eliminators, including products containing bacteria and/or enzymes. Dogs and cats can discriminate between odors well; odors cannot be masked with fragrance as they can be for humans. Some products remove odor from the air if sprayed; other products can be used on objects by coating the surface, waiting a certain amount of time (depending on the product), and then removing the liquid. Staff can also wash their hands with an odor-eliminating soap. We may neglect to remove odors because our olfactory system does not function at the same level as that of dogs and cats, which can easily identify odors that we may not notice.

Adding Scents

Scent can be placed on an object by having clients bring an object from home that smells like the patient and/or the client. To help the patient feel calmer and more relaxed while in the veterinary hospital, the object can be placed on the floor in the examination room, on the scale, on the examination table, on the table in the treatment room, or in the patient's cage or run. Familiar scents can be used to calm patients

TABLE 1 Stress Responses of Cats

STRESS TYPE	INDUCED BY CORTISOL[a]	INDUCED BY CATECHOLAMINES (EPINEPHRINE, NOREPINEPHRINE)[b]
Acute	• Energy mobilization, catabolic effects • Suppression of growth, immune function, digestion, and reproduction	• Energy mobilization • Pupil dilation, increased heart and respiratory rate • Peripheral blood vessel constriction
Chronic	• Physical and emotional pathologic conditions • Impaired brain function, depressive-like symptoms, and behavioral problems	• Wear of the body • Ulcers • Hypertension

[a]Activated by the hypothalamic-pituitary-adrenal axis
[b]Activated by the sympathetic-adrenal-medullary system

(e.g., species-specific pheromones, lavender). Scent can also be used to excite patients (e.g., peppermint).

Gustatory

Taste can be useful when interacting with a patient. Veterinary professionals can use taste to their advantage by associating procedures with food, causing the patient to feel a positive emotional valence (a pleasant emotional state associated with a stimulus) during the procedure. Veterinary team members can use a trail of food to entice a patient to walk onto a scale, and then reinforce this behavior by offering the patient food when on the scale to keep the patient still while obtaining its weight. If the patient does not readily follow and eat the food, desensitization and counterconditioning are indicated (see **ADDITIONAL RESOURCES**).

To facilitate medicating patients, veterinary compounding pharmacies can create medications with a better taste. Bitter tastes are associated with toxic substances and can cause animals to associate the entire oral medicating procedure with a negative emotion through classical conditioning. Because taste buds act independently, masking taste can be a challenge. When bitter medications are forced on patients, they learn to anticipate the bitter taste and unpleasant oral medicating, which increases stress and fear associated with receiving the medication. When patients respond with stress and fear, client compliance is affected and medication may not be given as directed.

Taste and smell are intimately connected. If the sense of smell is blunted by disease or physical damage, the sense of taste will be affected. To increase the patient's ability to smell food, moisture can be added to the food (adding water helps the odor molecules readily escape from the food). Heating food helps it release a pleasant aroma. Adding fats or oils changes the food's texture and enhances palatability. As obligate carnivores, cats have a strong preference for meat and meat tastes; adding meat to their food can be used to entice them to eat while hospitalized. Cats are sensitive to flavor changes associated with meat freshness and protein quality. Meat oxidizes over time, becoming rancid.[15] Cats are sensitive to this process and will refuse to eat food that is not fresh.

When patients are hospitalized, they may stop eating and drinking because their environment is stressful. They may need to have a person near them when they eat or have a person hand feed them by placing the food on a spoon or the fingers and allow the patient to lick it off. This works better for dogs because of their sociation facilitation (presence of others improves performance) associated with eating. Dogs also eat more if another dog is eating near them and will eat faster if a dog near them is eating faster.

Another taste issue is related to nausea. If a patient feels nauseated and is offered food, it will associate that food with the nausea and will learn not to eat it because of its association with feeling nauseated. The association between the food and nausea is stronger if the food is novel. For example, a cat with renal failure may feel nauseated, and if fed a new diet while hospitalized may quickly learn to avoid that food.

Auditory

Reducing Unavoidable Noise

Many sounds within the hospital are not heard by humans but are heard by dogs and cats, which hear within the ultrasonic frequency (high-frequency sound inaudible to humans, generally >20 kHz). Ultrasonic wavelengths come from electronic machines and electric light fixtures. These sounds can cause patients

Additional Resources

- Fox MW. *The Healing Touch for Dogs: The Proven Massage Program*. William Morrow Paperbacks; 2004.
- Fox MW. *The Healing Touch for Cats: The Proven Massage Program*. William Morrow Paperbacks; 2004.
- Howell A, Feyrecilde M. *Cooperative Veterinary Care*. 1st ed. Wiley-Blackwell; 2018.
- iCalmPet. Through a Dog's Ear and Through a Cat's Ear. Accessed August 9, 2023. https://icalmpet.com/streaming
- Martin D, Shaw J. *Canine and Feline Behavior for Veterinary Technicians and Nurses*. 2nd ed. Wiley-Blackwell; 2023.
- Yin S. Preparing the environment for the pet's visit. In: *Low-Stress Handling, Restraint and Behavior Modification of Dogs & Cats: Techniques for Developing Patients Who Love their Visits*. 1st ed. Cattledog Publishing; 2009:141-148.

to feel stress because they are novel, predictive of unpleasant interactions with veterinary personnel, and unpleasant to hear. To reduce ultrasonic sound, light bulbs can be changed from fluorescent bulbs to light-emitting diode (LED) bulbs. Ultrasonic scalers create a noise that humans can hear but also an ultrasonic noise that we cannot hear but dogs and cats can. Conscious patients can be moved farther away from the dental sink area, and strategies to muffle the sound can include closing doors and using sound baffles.

Loud and sudden sounds can cause patients to startle (an example of sensation) and become fearful (an example of perception).Take time to keep the latches of cages and kennels aligned and in good repair. Close cage/kennel doors quietly. For areas in the hospital with primarily hard surfaces, sound can bounce around and increase in intensity. Blankets and pads can be used in metal cages and kennels to reduce sound. Sound baffles can be used on hard walls to muffle sound, and white noise machines can be used to mask some sounds.

Minimizing Noise Sources

Canine patients can be taught to rest quietly instead of barking when exposed to sound or other sensory stimuli in kennels. For patients that are vocalizing, try to find the reason and resolve the issue. For example, if your hospital uses an anesthetic protocol that causes patients to wake up vocalizing and thrashing, which is stressful for that patient and can upset other patients, switch to a new protocol from which patients wake more calmly and quietly. For patients that vocalize because they are in pain, ask if pain medication can be given. For patients that vocalize because they have to eliminate, take them out for a walk to reduce their discomfort.

Veterinary team members should keep their voices low and speak to patients in a tone that induces positive emotional valence. Certain tonal qualities of sound have intrinsic meanings for our patients: high-frequency pure tones are associated with care soliciting and appeasement; low-frequency noisy tones are threat and alarm signals. No matter where you are, speak in tones to keep your patients calm. There are commercial sound products for calming dogs and cats. These musical sounds are based on scientific information regarding the tonal sounds that produce calm behavior in dogs and cats. Slow, simple, solo piano music is the basis of many of the products that can be used to create a calming wall of sound in the hospital (see **ADDITIONAL RESOURCES** for more information).

Tactile

Touch can change patients' emotional state to a positive emotional valence. Animals enjoy touch from people they accept and trust. However, keep in mind that patients are individuals and may enjoy different types of touch (e.g., stroking, scratching, different degrees of pressure) due to their genetics and learning history.

Reading and Projecting Body Language

Animals do not usually enjoy manipulation of their whiskers because these vibrissae are very sensitive and collect sensory information about pressure, object identification and location, and prey capture.[16] All hairs on the patient's body are connected to sensory cells that detect which way the hair is bending. Most animals prefer to have your touch move with the lay of the hair instead of against it. Animals that do not know the veterinary team member well may not allow some sorts of touch (e.g., scratching their ventrum).

Veterinary team members can build patients' trust by tossing them treats while obtaining a history from the client. This interaction will associate veterinary staff and the environment with a desired taste leading to a positive emotion. It can encourage the patient to approach you for touch, which enables you to engage with the patient on a more intimate level. It is important to use body language to communicate that you are a friendly person by staying at a distance, turning your side to the animal, and keeping your arms close to your body. As you build trust, patients then need to give consent for you to touch them. After the patient approaches you, you can assess whether it wants the tactile component.

Some patients may approach you to investigate you. They may even rub on you but not want you to touch them. It is important to observe their behavior and body language closely to decide your next move. One way to interact with a cat that rubs against you is to place your hand so the cat can rub against it. When the cat exhibits pleasure, you can try scratching just behind the ear pinna or the side of the neck. Soennichsen and Chamove found that cats prefer to be petted in their temporal area, between the eye and ear.[17] This area contains scent glands, and it may innately feel better to be touched there. When stroking patients, use firm

long strokes as these are calming strokes that reduce arousal. When scratching patients, use slow scratches, as fast scratches increase arousal, and increased arousal (even if the animal is happy) can reduce the veterinary team's effectiveness when interacting with them to complete tasks and procedures.

Animals generally enjoy dorsolateral touch because it is considered to be less of a threat than touch on the dorsal body and head. Using 1 hand, touch patients on the dorsolateral aspects of their body with a firm stroke or scratch, which may increase the chance for a successful pleasant touch interaction. Watch behavior and body language for confirmation that the patient is enjoying the type of touch you are using (**TABLE 2**).

Throughout your interaction with the patient, its emotions and reactions can change. Those that like the touch will lean into the touch, loosen their posture, have a contented facial expression, and come back for more when you stop. Areas that dogs and cats might not want to be touched are the top of the head (i.e., eyes, ears, and mouth), dorsum, ventrum, tail, anus, and genitals.

Cats may indicate that they do not want your touch by vocalizing rather than purring. There are touch techniques used specifically for calming, massage, and Tellington TTouch (ttouch.com). These techniques can help relax dogs and cats and can be used when an animal is hospitalized or receiving treatment.

If veterinary team members need to touch a patient for diagnostics and treatments, allow the patient to approach by using your body language to make you less of a threat. Examples include turning sideways, squatting down a short distance from the patient, and keeping arms close to the body. When patients get close and allow you to pet them, you can start touching them where they like to be touched and keep your hand in contact instead of removing it and touching again; putting your hand repeatedly on and off patients can cause them to startle and feel stressed. Once contact has been initiated, move your hand to the area that needs to be touched for the veterinary procedure. For example, if you needed to complete a nail trim, you could start scratching the dog on the side of the neck and then work your way down to the paw instead of grasping the paw immediately. Food can be used to create a positive association with the procedure. Every time you touch, no matter what the patient does, offer food. If the animal stops being relaxed, modify the touch to make it less intense. For cats, Hunt and McIntyre found that repeated touching and long-duration touching decreased touch sensitivity to a specific area; they also found that warming and cooling the skin decreased touch sensitivity.[18] (For more information on how to desensitize and countercondition patients to veterinary procedures, see **ADDITIONAL RESOURCES**.)

Modifying the Environment

Modifying surfaces can also support patients' positive emotional valence. Consider the tactile aspects of standing, sitting, and lying down. The surface should support patients physically while maintaining their comfort and homeostasis. Thermoregulation should be

TABLE 2 How Patients Indicate Whether They Want Your Touch

PATIENT	TOUCH WELCOME	TOUCH NOT WELCOME
Cat	• Ears held up, facing forward • Tail held up, sometimes bent at the end • Loose skin and muscles • Pupils normal size for lighting • Paws soft with claws retracted • Whiskers held to the side • Looking at your face • All 4 paws on the surface while standing or sitting	• Ears held back, sideways, or flat • Flicking or lashing tail • Twitching skin • Piloerection (hair standing up) • Pupils slit or very dilated • Claws extended • Whiskers forward • Legs or shoulders stiff • Looking at your hand • Raised paw
Dog	• Ears held up or loosely down • Leaning toward you with loose muscles • Wagging tail in slow, wide motion, level with rump • Loose skin and muscles • Loose lips without teeth visible • Looking at your face with a soft gaze • All 4 paws on the surface while standing or sitting	• Ears held flat or pulled back • Leaning away from you • Lowered or raised tail • Stiffening posture • Piloerection (hair standing up) • Showing teeth • Looking at your hand • Raised paw

considered. A cold, slippery surface can make patients feel threatened because they cannot get their footing, and hypothermia is a threat for patients that have trouble thermoregulating. The environmental temperature range considered acceptable for dogs is 10 °C to 29 °C (50 °F to 84 °F), although 10 °C seems too cold for many dogs, including sight hounds. Cats prefer temperatures of 30 °C to 36 °C (86 °F to 97 °F), and some say the upper range is 38 °C (100 °F). The ambient temperature of most hospitals is probably comfortable for some dogs and very few cats. Consider adding a heating device or blankets for hospitalized cats. Comfortable surfaces are more likely to make patients feel relaxed.

Some animals with tactile sensory discrimination deficits (difficulty identifying touch) will also exhibit social interaction deficits,[19] which could mean that if patients dislike touch even from people they trust, they may also have trouble interacting appropriately with all people. For these patients, medication may be necessary before examining or administering treatment.

Visual

To create and maintain positive emotional valence for patients, adjust your movements and proximity accordingly. Quick movements can elicit fear and fighting behaviors. Steady and calm movements can elicit trust. Sometimes remaining still will enable patients to calm themselves by acclimating to the environment. Some dogs and most cats are myopic (nearsighted) and unable to see the visual detail that people do[10]; they rely on movement and contrast to identify some objects and live beings. Use this information about their perception to think about how to introduce objects used for veterinary care to enable patients to become comfortable with them before moving the items toward their body.

Modify lighting to create a more relaxing environment for patients. Consider the brightness and type of lighting. A light source that does not produce a visible flicker for dogs and cats is ideal. At a flicker rate of 70 to 80 Hz, dogs and cats cannot see the flicker of the light.[10] Light bulbs have this information on the packaging to help you find appropriate bulbs. Some LED lighting has no visible flicker and can be dimmed. Dimmers are useful for creating bright light when needed for veterinary procedures and dimmer light for patient comfort. Cats especially prefer dimmer light because what they see appears brighter; however, brightness is not as likely to affect dogs. Compared with humans, brightness detection in cats is about 6 times better and brightness detection in dogs is about 2 times worse.[20]

Monitor patient responses to objects and images within the hospital associated with animal images or other images perceived as a threat or prey. For some patients, images of animals (e.g., pictures on the wall, models of animals used to help explain procedures to clients) may lead to increased arousal, fear, anxiety, and stress. Some dogs may react to life-sized stuffed dogs by lunging and biting them; for other patients, such items do not cause a problem. When items become a consistent problem, they should be removed from the patient area.

SUMMARY

As healthcare professionals, our perception of being in a veterinary hospital differs from that of our patients. If we understand and appreciate how our patients perceive the experience, we will be better able to modify our behavior and the hospital environment to improve their veterinary experience. TVN

References

1. Alvites R, Caine A, Cherubini GB, Prada J, Varejão ASP, Maurício AC. The olfactory bulb in companion animals—anatomy, physiology, and clinical importance. *Brain Sci.* 2023;13(5):713. https://doi.org/10.3390/brainsci13050713
2. Papes F, Logan DW, Stowers L. The vomeronasal organ mediates interspecies defensive behaviors through detection of protein pheromone homologs. *Cell*. 2010;141(4):692-703. doi:10.1016/j.cell.2010.03.037
3. Uemura EE. Olfaction and gustation. In: Reece WO, Erickson HH, Goff JP, Uemura EE, eds. *Dukes' Physiology of Domestic Animals*. 13th ed. Mosby; 2015:43-48.
4. Bradshaw JWS, Goodwin D, Legrand-Defrétin V, Nott HMR. Food selection by the domestic cat, an obligate carnivore. *Comp Biochem Physiol A Physiol*. 1996;114(3):205-209. doi:10.1016/0300-9629(95)02133-7
5. Heffner RS, Heffner HE. Hearing range of the domestic cat: short communication. *Hear Res*. 1985;19(1):85-88. doi:10.1016/0378-5955(85)90100-5
6. Malkemper EP, Mason MJ, Burda H. Functional anatomy of the middle and inner ears of the red fox, in comparison to domestic dogs and cats. *J Anat*. 2020;236(6):980-995. doi:10.1111/joa.13159
7. Uemura EE. Auditory system. In: Reece WO, Erickson HH, Goff JP, Uemura EE, eds. *Dukes' Physiology of Domestic Animals*. 13th ed. Mosby; 2015:49-56.
8. Uemura EE. Somatic and visceral senses. In: Reece WO, Erickson HH, Goff JP, Uemura EE, eds. *Dukes' Physiology of Domestic Animals*. 13th ed. Mosby; 2015:32-42.
9. Goutman JD, Elgoyhen AB, Gómez-Casati ME. Cochlear hair cells: the sound-sensing machines. *FEBS Lett*. 2015;589(22):3354-3361. doi:10.1016/j.febslet.2015.08.030
10. Ofri R. Vision in dogs and cats. August 17, 2018. Accessed May 14, 2023. https://www.americanveterinarian.com/journals/amvet/2018/august2018/vision-in-dogs-and-cats

11. Uemura EE. Visual system. In: Reece WO, Erickson HH, Goff JP, Uemura EE, eds. *Dukes' Physiology of Domestic Animals*. 13th ed. Mosby; 2015:57-67.
12. Miller PE, Murphy CJ. Vision in dogs. *JAVMA*. 1995;207(12):1623-1634.
13. Seksel K. Stress and anxiety—how do they impact the pet? Proceeding presented at: World Small Animal Veterinary Association World Congress; September 16–19, 2014; Cape Town, South Africa.
14. Moriello KA. Structure of the skin in dogs. Revised June 2018. Accessed July 24, 2023. https://www.merckvetmanual.com/dog-owners/skin-disorders-of-dogs/structure-of-the-skin-in-dogs
15. Arshad MS, Sohaib M, Ahmad RS, et al. Ruminant meat flavor influenced by different factors with special reference to fatty acids. *Lipids Health Dis*. 2018;17:223. doi:10.1186/s12944-018-0860-z
16. Prescott TJ, Mitchinson B, Grant RA. Vibrissal behavior and function. *Scholarpedia*. 2011;6(10):6642. doi:10.4249/scholarpedia.6642
17. Soennichsen S, Chamove AS. Responses of cats to petting by humans. *Anthrozoös*. 2002;15(3):258–265. https://doi.org/10.2752/089279302786992577
18. Hunt CC, McIntyre AK. Characteristics of responses from receptors from the flexor longus digitorum muscle and the adjoining interosseus region of the cat. *J Physiol*. 1960;153(1):74-87. doi:10.1113/jphysiol.1960.sp006519
19. Deschrijver E, Wiersema JR, Brass M. Action-based touch observation in adults with high functioning autism: Can compromised self-other distinction abilities link social and sensory everyday problems? *Soc Cogn Affect Neurosci*. 2017;12(2):273-282. doi:10.1093/scan/nsw126
20. Pretterer G, Bubna-Littitz H, Windischbauer G, Gabler C, Griebel U. Brightness discrimination in the dog. *J Vis*. 2004;4(3):241-249. doi:10.1167/4.3.10

Virginia Price

Virginia "Ginny" graduated from St. Petersburg Junior College's veterinary technology program in 1981 and began working in small animal hospitals as a credentialed technician, which continued until 2005. She began teaching at St. Petersburg College in 1995 and is currently an assistant professor where she teaches a variety of veterinary technology programs. Ginny has a master of science degree in psychology earned in 2007 from Walden University. She is a founding member of the Society of Veterinary Behavior Technicians and a charter member of the Academy of Veterinary Behavior Technicians (AVBT). She earned her VTS in behavior credential in 2010 by serving on the organizing committee. Ginny now serves at the pleasure of the AVBT board as parliamentarian and works on the speaker committee for the Clinical Animal Behavior Conference as well as helping with the conference. She served on the Committee on Veterinary Technician Specialties from 2019 to 2020, representing the AVBT.

Zenalpha®

(medetomidine and vatinoxan hydrochlorides injection)
Sedative, Analgesic
For Use in Dogs Only

CAUTION: Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian.

BRIEF SUMMARY: (for full prescribing information, see package insert)

DESCRIPTION: Zenalpha is a combination of medetomidine and vatinoxan hydrochlorides. Each mL of Zenalpha contains 0.5 mg medetomidine hydrochloride, 10 mg vatinoxan hydrochloride, 32.5 mg mannitol (USP), 4.16 mg citric acid monohydrate (USP), 1.8 mg methylparaben (NF), 0.2 mg propylparaben (NF).

INDICATION: Zenalpha is indicated for use as a sedative and analgesic in dogs to facilitate clinical examination, clinical procedures and minor surgical procedures.

CONTRAINDICATIONS: Do not use Zenalpha in dogs with cardiac disease, respiratory disorders, shock, severe debilitation, that have hypoglycemia or are at risk of developing hypoglycemia, or are stressed due to extreme heat, cold or fatigue.

Zenalpha is contraindicated in dogs with a known sensitivity to medetomidine or vatinoxan.

WARNINGS:
Human User Safety Warnings
Not for use in humans. Keep this and all medications out of reach of children and pets.

Avoid skin, eye or mucosal contact. Use caution while handling and using filled syringes. Absorption of the active ingredients is possible following exposure via the skin, eye or mucosa. In case of accidental eye exposure, flush eyes with water for 15 minutes, remove contact lenses then continue to flush. In case of accidental skin exposure, wash with soap and water and remove contaminated clothing. If symptoms occur, seek the advice of a physician.

In case of accidental oral intake or self-injection, seek medical advice immediately and show the package insert to the physician. DO NOT DRIVE as sedation, loss of consciousness, and changes in blood pressure may occur.

Persons with cardiovascular disease (for example, hypertension or ischemic heart disease) should take special precautions to avoid any exposure to this product.

Pregnant women should exercise special caution to avoid exposure. Uterine contractions and decreased fetal blood pressure may occur after accidental systemic exposure.

Persons with known hypersensitivity to any of the ingredients should avoid contact with Zenalpha.

Caution should be exercised when handling sedated animals. Handling or any other sudden stimuli, including noise, may cause a defense reaction in an animal that appears to be heavily sedated.

Note to physician: Zenalpha contains medetomidine, an alpha$_2$-adrenoceptor agonist, in combination with vatinoxan, a peripherally selective alpha$_2$-adrenoceptor antagonist. Symptoms after absorption or accidental self-injection may include dose-dependent sedation, respiratory depression, bradycardia, tachycardia, and hypotension.

Animal Safety Warnings
Zenalpha should not be administered in the presence of pre-existing hypotension, hypoxia or bradycardia. Due to the pronounced cardiovascular effects of alpha$_2$-adrenoceptor agonists, only clinically healthy dogs (American Society of Anesthesiologists [ASA] classes I and II) should be administered Zenalpha. Dogs should be monitored frequently for cardiovascular function and body temperature during sedation.

Zenalpha is not intended for use in cats. The use of Zenalpha in cats has been associated with hypotension.

PRECAUTIONS: Dogs should be monitored frequently during sedation for changes in heart rate, blood pressure, respiratory rate and body temperature. Tachycardia may occur in some dogs after recovery from sedation.

In the event of hypoxia or apnea, supplemental oxygen should be administered.

Following administration of Zenalpha, a decrease in body temperature may occur and an external heat source may be needed to maintain body temperature. Hypothermia may persist longer than sedation and analgesia.

The analgesic effect of Zenalpha will not last longer than the sedative effects. Additional analgesic(s) should be administered as needed.

Nervous, excited or agitated dogs with high levels of endogenous catecholamines may exhibit a reduced pharmacological response to Zenalpha (ineffectiveness). The onset of sedative/analgesic effects could be slowed, or the depth and duration of effects could be diminished or nonexistent. Therefore, allow the dog to rest quietly for 10 to 15 minutes after injection.

With the alpha$_2$-adrenoceptor agonist drug class, including Zenalpha, the potential for isolated cases of hypersensitivity, including paradoxical response (excitation) exists.

Repeat dosing with Zenalpha has not been evaluated.

Zenalpha has only been evaluated in fasted dogs; therefore, the effects on fed dogs (for example occurrence of vomiting) have not been characterized.

The concurrent use of anticholinergic medications and Zenalpha has not been evaluated.

Zenalpha may decrease serum glucose in healthy dogs and this effect may persist longer than sedation.

The safe use of Zenalpha has not been evaluated in dogs with hepatic or renal impairment, dogs younger than 4.5 months old, or dogs that are pregnant, lactating, or intended for breeding.

ADVERSE REACTIONS: The most common adverse reactions observed in the field study were decreased body temperature (not requiring external heat support), reduced respiratory rate, diarrhea, muscle tremor, signs of colitis, hypothermia (requiring external heat support).

To report suspected adverse events, for technical assistance or to obtain a copy of the SDS, contact Dechra Veterinary Products at (866) 933-2472. For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDA-VETS or online at http://www.fda.gov/reportanimalae.

MANUFACTURED FOR:
Dechra Veterinary Products
7015 College Boulevard, Suite 525
Overland Park, KS 66211 USA

Approved by FDA under NADA # 141-551

Zenalpha is a registered trademark of Dechra Limited; all rights reserved.

R 03 2021

Dechra

CONTINUING EDUCATION

Using Patients' Sensory Perception to Enhance Their Veterinary Visits

TOPIC OVERVIEW

This article describes sensory perception for dogs and cats in the veterinary hospital setting and how to improve the patient's hospital experiences. It also describes strategies for interacting with dogs and cats in the hospital and provides additional resources.

LEARNING OBJECTIVES

After understanding the sensory perception of their patients, readers will be able to develop strategies for reducing patient stress and fear associated with their knowledge of how dogs and cats perceive the world through their senses.

This article has been submitted for **RACE approval for 1 hour of continuing education credit** and will be opened for enrollment upon approval. To receive credit, take the test at **vetfolio.com** by searching the name of the article or scanning the QR code below. Free registration is required. Questions and answers online may differ from those below. Tests are valid for 2 years from the date of approval.

1. **What wavelength of light can dogs and cats see but humans cannot?**
   a. Ultraviolet
   b. Infrared
   c. Microwaves
   d. Visible light

2. **How do the amounts of rods and cones affect vision in dogs and cats?**
   a. They see more colors.
   b. They see more details.
   c. They see more contrast.
   d. They have better depth perception.

3. **How do visual perception differences affect the behavior of dogs and cats?**
   a. They are more likely than humans to react to details.
   b. They are more likely than humans to react to movement.
   c. They are less likely than humans to chase a blue object on a green background.
   d. They are less likely than humans to catch an insect in low-light conditions.

4. **How does having an erect pinna affect hearing?**
   a. It allows animals to move their pinnae more easily.
   b. It prevents animals from moving their pinnae.
   c. It prevents animals from seeing within their entire field of vision.
   d. It allows animals to collect more sound waves.

5. **How can you remove patient odors from objects within the hospital?**
   a. Odors are removed by using a product containing a masking fragrance.
   b. Odors are removed by using a product containing bacteria and/or enzymes.
   c. Odors cannot be removed from objects by using any available cleaning products.
   d. Odors are not a problem for patients; there is no need to remove them.

6. **For which sense is there a device to mask collection by this sense's sensory cells?**
   a. Olfactory
   b. Gustatory
   c. Tactile
   d. Auditory
   e. Visual

7. **What strategies can be used to help a patient accept touch needed for veterinary diagnostics?**
   a. Low-stress restraint
   b. Desensitization and counterconditioning
   c. An alcohol antiseptic
   d. A towel wrap or cat bag

8. **Where do most cats prefer to be touched?**
   a. On the head between the eyes and ears
   b. On the dorsum between the shoulder blades and pelvis
   c. On the base of the tail and the caudal rear limbs
   d. On the lateral shoulders and lateral thorax

9. **What taste/flavor do cats prefer?**
   a. Bitter
   b. Salty
   c. Sweet
   d. Umami

10. **In what range can dogs and cats hear sounds that humans cannot?**
    a. Subsonic
    b. Sonic
    c. Infrasonic
    d. Ultrasonic