

InTown Veterinary Group Newsletter

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Upcoming Doctor & Tech Continuing Education Lectures:

Our doctor and technician continuing education lecture series is taking a break for the summer. See you in the Fall! For an always current list of upcoming lectures, (& to register) go to www.InTownVet.com & click on CE Lectures. To register follow the links to CE lectures, doctor or tech lectures, fill out & submit the form.



New Online Radiology Interpretation Service now Available:

We are proud to announce a new online digital radiograph interpretation & data back up service for your hospital. If you already have digital radiography, or are considering upgrading your equipment, this service will be an excellent (and easy to use) addition to your practice. Go to www.InTownOnline.com for more details, a handy how-to guide and pricing information.



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Radiology of the Gastrointestinal Tract

Mason Holland, VMD, DAVCR

Interpretation of the gastrointestinal tract (GI) on abdominal radiographs is one of the most difficult tasks for a practitioner or radiologist to perform. The inherent variability of the shape, position and content of the GI tract makes detecting anything but the most obvious abnormalities a challenge. There are a few tips and principles which can make this job a little easier.

The Esophagus

The esophagus is the main part of the alimentary tract which is outside the abdomen. Since part of it is in the thorax, and it is fairly fixed in position, evaluation of this organ is more straightforward than the GI tract may be. For the most part, the esophagus cannot be seen unless it contains a gas, fluid or foreign material. A persistent gas pattern (seen on multiple rads) is suggestive of a motility problem, whether it be neuromuscular, inflammatory or due to foreign body. Beware of the effect of sedation or anesthesia – these can cause increased esophageal gas, even an outright megaesophagus. Esophageal foreign bodies most commonly get lodged cranial to the heart base or caudal esophagus. The most radiographically obvious esophageal abnormalities are megaesophagus and foreign body. To prove most other esophageal disease you will need an esophagogram or endoscopy.

Esophagography is tricky without fluoroscopy, but it can be done – it simply requires more barium swallows and more images. The main principles of esophagography are:

1. No sedation;
2. Get several good swallows of liquid barium and/or liquid barium mixed with food;
3. Document any suspected abnormal areas on multiple swallows;
4. Contrast should be cleared from the esophagus promptly (less than a minute) by peristalsis.

The esophagus, like the rest of the alimentary tract can look unusual in any given instant. What looks like a stricture on one image can be completely normal on the next, so be hesitant to make diagnosis on a single image. Only given repeatable findings can you be confident that it is abnormal. Also, as with other GI contrast procedures, radiographs following the procedure can be helpful in detecting any retained contrast, which can stick to eroded/ulcerated mucosa or porous foreign bodies.

The Stomach

The stomach can also be a challenge to interpret. Although its location is fixed, contractions and variable distension make its shape variable from moment to moment. The most obvious abnormalities are Gastric Dilatation-Volvulus (GDV) and radiopaque foreign body. If you see a severely distended, compartmentalized stomach on a right lateral view, you are dealing with a GDV (fig. 1). Fortunately, most GDVs have that typical appearance. Radiopaque foreign body is straightforward; more common, however, is the foreign material which looks like food. This can be anything from a sock to a bezoar to a torn-up Nerf ball. These are the more challenging cases. A few tricks to detect these are:

1. Repeat radiographs after 12 hour fast, if the content is food, it should be gone from the stomach;
2. Pass a stomach tube and blow or inject air (~12ml/kg) down the tube immediately prior to radiographs, this will usually surround foreign material;
- 3) Upper GI: taking radiographs after the contrast has emptied from the stomach. Barium will soak into a porous foreign body.

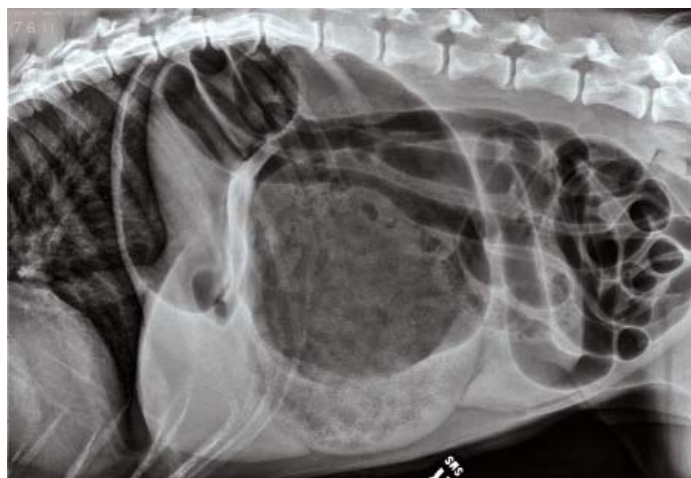


Fig 1: Typical GDV on a right lateral view. The stomach is greatly enlarged and compartmentalized.

An upper GI study is used to evaluate the stomach and small intestine. Use 6-12 ml/kg of barium (full strength or diluted 1:1). The lower dose range is for larger animals. Do yourself and your technicians a favor and give the barium by orogastric tube rather than laboriously syringing it into the mouth. Dogs, if there is no food in the stomach, should empty the barium from the stomach within 1.5 to 4 hours. Many other gastric problems (neoplasia, ulcers, gastritis) are best diagnosed with ultrasound or endoscopy.



Fig 2: Small intestinal obstruction. The intestine is abnormally dilated and shows "stacking" of bowel loops.

The Small Intestine

The small intestine is probably the most common site of GI pathology. One of the most common indications for abdominal radiographs is to determine whether an animal is obstructed. The most reliable signs of obstruction are:

1. An abnormally dilated segment of small intestine (over 12mm in the cat or 3 rib widths in the dog);
2. Stacking and hairpin turns of intestinal loops (think: balloon animals) (fig. 2);
3. Seeing unusual small intestinal content.

It can be hard to tell if that big, gas-filled intestinal segment is colon or small intestine. Getting the other lateral view (in addition to the lateral and VD view) can help. Another trick is to inject a little air in the rectum with a red rubber catheter (3-5 ml/kg) and repeat the radiographs. This technique is quick, essentially free and may help confirm the diagnosis. Although upper GI study is slightly labor intensive, it is a non-invasive, readily-available technique which will give you a clear yes or no answer within a couple hours about whether an animal is obstructed, if it's not clear from the survey radiographs. Linear foreign bodies usually don't cause a complete obstruction and are therefore harder to




Fig. 3: Note the shadowing square object on the right side of the image. This was a plastic block causing jejunal obstruction.

diagnose. Often you can see plication of the intestine and bizarrely shaped gas bubbles, but many times those telltale signs are not there. Recent studies have shown that in the hands of a skilled operator, ultrasound is better than radiographs in detecting small intestinal obstruction and foreign bodies (fig. 3). Small intestinal neoplasia is usually difficult to identify on radiographs and is also best suited to ultrasonographic diagnosis. Ultrasound also has the added benefit of allowing simultaneous evaluation of the

pancreas, mesenteric lymph nodes and remainder of the abdominal viscera.

The Large Intestine

Colonic disease is occasionally diagnosed radiographically. The easiest large intestinal problem to diagnose is constipation. Be sure to evaluate the pelvis for any signs of narrowing (fracture malunion) as the underlying etiology. Intussusception normally appears as a tubular soft tissue mass in the area of the ileocolic junction, which can be detected with palpation and/or radiographs. Intussusception is readily diagnosed with ultrasound. Most other large intestinal disorders (colitis, neoplasia) are tough to identify on radiographs. Here is another case where ultrasound or endoscopy can readily make the diagnosis. With the advent of endoscopy and its associated ability for visual examination and biopsy, barium enema, with its requirement for general anesthesia, has become fairly obsolete.

In general, I would always recommend getting at least two views and avoiding DV views (which are not useful for evaluating the abdominal viscera). If your initial radiographs are inconclusive and the clinical signs persist, consider repeating radiographs or performing contrast procedures. In addition, keep in mind that ultrasonographic evaluation of the GI tract is a powerful tool in the hands of a trained sonographer. There are often multiple options for getting an ultrasound from a local practitioner. I perform outpatient ultrasound Mondays - Thursdays at Port City. Prompt same-day appointments are generally available. 

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Elbow Dysplasia: A Synopsis of Diagnostic and Surgical Options

Lauren Blaeser, DVM, DACVS



Canine Elbow Dysplasia (CED) is a general term for a disorder of the cubital joint in the dog. CED is comprised of the ununited anconeal process (UAP), the fragmented medial coronoid process (FCP), osteochondrosis of the medial humeral head (OCD) and elbow incongruity (EI). CED is a disease first identified in young, actively growing large to giant breed dogs. The etiology of elbow dysplasia is considered multifactorial, with a combination of general and local factors being involved. The purpose of this article is to discuss the advantages and limitations of diagnostic modalities for CED and the surgical options for patients with CED.

Diagnostic Options:

Radiographs: Once a clinician identifies elbow pain, radiographs are the more traditional diagnostic test to confirm and isolate the cause(s) of CED. The advantages of radiographs are that they are easily accessible, inexpensive and require only sedation to perform. The elbow is a complex joint with numerous sites of overlying structures therefore a complete evaluation requires four projections: neutral mediolateral, flexed mediolateral, craniocaudal and craniolateral at 15 Degrees (caudomedial oblique).

Limitations of radiographs include a 2D view of a complex joint, substantial variation in radiographic appearance of the disorders and the inability to directly assess cartilage pathology. It is recognized that radiographic changes associate poorly with both clinical signs and gross pathologic disease. Even with the inclusion of multiple radiographic projections the reported sensitivity of imaging the medial coronoid process (MCP) ranges from 10-62%.

Nuclear Scintigraphy: Nuclear scintigraphy has been used in localizing the origin of thoracic limb lameness. The small size of the elbow joint and its inherent limited amount of surrounding soft tissue, means that it is only possible to localize an increase in radiopharmaceutical uptake to the elbow in general, not to specific regions of the elbow. This diagnostic modality has a high sensitivity for ruling elbow pathology in or out, but no benefit for isolating the cause of the pathology. Nuclear scintigraphy is often limited to academic settings due to the regulations for handling radioisotopes.

Ultrasound: Ultrasound is limited in its use for detecting CED by its depth of penetration and by the high acoustic impedance of bone. Bone is denser than soft tissue making it difficult to distinguish tissue architecture. Most sound is reflected at the soft tissue-bone interface creating a sharp hyperechoic line. If there are defects in the bone, such as osteophytes or cysts, it is possible to see an irregular hyper echoic line. If a destructive process is occurring in the bone a thin line might be seen during the scan of that area. With a FCP the surface of the MCP is often irregular or fragmented creating a disruption in the bone-soft tissue interface. The elbow OCD is difficult to isolate due to the superimposition of overlying cortical bone.

Computed Tomography (CT): CT scans have the advantage of alleviating the problem of superimposition of overlying structures and allowing for 3D reconstruction. The obvious disadvantages include the need for general anesthesia, the cost of the equipment and the use of ionizing radiation. In addition, with CT a complete image of the articular subchondral bone, but not the articular cartilage, is achieved. The subchondral bone changes that can be identified include sclerosis, fissures, necrosis, cysts and fragmentation (fig. 1). Elbow incongruity has been evaluated with CT modality although it has been found that positioning can affect the findings.

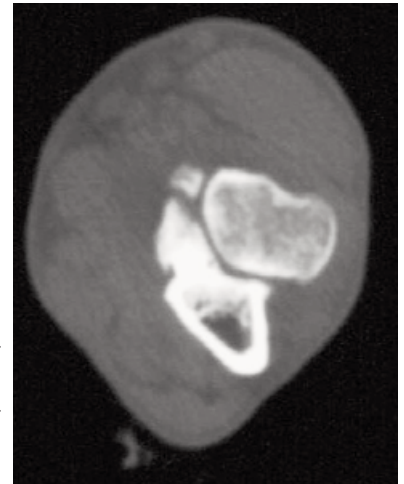


Fig. 1: CT image of a FCP
Image by:
Tonya Tromblee, DVM, MS, DACVR

Magnetic Resonance Imaging (MRI): MRI allows for imaging in multiple planes without repositioning or reformatting the image information, as well as better definition of medullary bone, subchondral bone, soft tissue, cartilage and tissue interface. These benefits make this diagnostic test more sensitive for subtle changes in bone architecture. MRI is limited by the small size of the elbow joint, its complex articulations and inconsistency of interpretation.

Surgical Options:

The ideal goal of surgical intervention is to return to normal function in the short term, with minimal to no progression of OA in the medium to long term.

Arthroscopy: The introduction of arthroscopy into veterinary surgery has changed the outlook of elbow dysplasia (fig. 2). In a retrospective trial over eight years, 518 joints from 421 dogs with fragmented medial coronoid process of the ulna (FCP) were evaluated. Forty-two percent (81/191) of the cases treated by arthrotomy, as compared to sixty percent (143/238) by arthroscopy, did not show any lameness. The results of the study show that arthroscopy, with its minimally invasive character, provides better functional results than conventional arthrotomy. The study also indicated that while arthroscopy is superior to medial arthrotomy and medical management, medial arthrotomy is **not** superior to medical management. Arthroscopy has a greater sensitivity, specificity and level of agreement between investigators than CT using an experimental model of radio-ulnar incongruence (RUI).

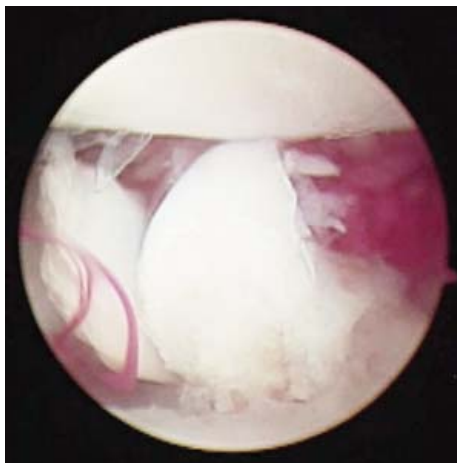


Fig 2: FCP taken during an arthroscopy

Dynamic ulna ostectomy has been proposed to treat moderate joint incongruity both in UAP and FCP. As the radius is the main (70%) weight bearing bone in the forearm, the ulna is usually selected for corrective osteotomies. In young dogs (4-6 months) that have joint incongruity and no osteophytes, a dynamic distal ulnar ostectomy (DUO) should be considered. The DUO is performed superiosteally by removing 4-5mm of the ulna with a rongeur 2-4cm, proximal to the distal ulnar physis. The advantages of the DUO is that it is relatively non invasive, avoids injury to the

radial periosteum, and weight bearing is encouraged from the day after surgery to promote the downward sliding of the proximal ulna before a callus is formed. Preliminary studies indicate better results when distal DUO is performed early, when incongruity and subtrochlear bone sclerosis are the only radiographic signs, and osteophytes are not yet seen.

Surgical Options Include:

1. Focal treatment of the FCP with fragment removal and curettage and/or a subtotal medial coronoidectomy;
2. Correction of the elbow incongruity with an osteotomy (Dynamic and lengthening ulna osteotomies or radial lengthening osteotomy); and/or
3. Redistributing the major joint forces away from the medial compartment (Sliding humeral osteotomy).

Conventional fragment removal, curettage, abrasion arthroplasty or osteostixis may provide short term resolution of clinical signs, but progression of OA continues and persistence of lameness is common. The role of the fragmented coronoid may be less important than the subchondral bone pathology or the underlying incongruity.

Aggressive arthroplasty to lower the joint surface of the FCP could possibly help decrease the stress and friction on the medial compartment. This procedure would also allow assessment of the subchondral bone underneath the FCP with debridement to more "normal" bone. The subtotal coronoid ostectomy, osteotomy from the medial articular edge of the MCP directed laterally toward the radial incisure, has been advocated to remove subchondral microcracks that might be contributing to long term lameness. One study looking at 263 dogs found that according to owner assessment, 82.2% of the treated limbs were sound long term with 16.5% treated with NSAIDs. This technique should be considered when the RUI is based at the apex of the MCP.

Developmental elbow incongruity is believed to play a leading role in the pathogenesis of elbow dysplasia. RUI does not seem to be present in all dogs with FCP. A recent study evaluating CT vs arthroscopic detection of RUI in dogs with elbow dysplasia found RUI in 14-22% respectively. When present the corrective osteotomies have been proposed to improve the joint congruity and to restore the correct joint forces. The correct surgical technique for correcting the RUI is dependent upon the changes noted.

The proximal ulna ostectomy, allowing caudo-medial rotation of the proximal ulna, is indicated in severe joint incongruity and in dogs at the end of limb growing. The proximal ulna ostectomy has a long recovery period with months of strict exercise restriction. It has been noted that after the ostectomy, the proximal ulnar articular surface is elevated above the radial articular surface and that varus deformity may result from the loading. This could lead to an increase in the medial compartment pressure, cartilage degradation and subchondral bone pathology. Therefore the proximal ulna ostectomy should be limited to selected cases based upon severe joint incongruity.

Many cases of elbow dysplasia find arthroscopic changes confined to the medial compartment of the joint, a region defined by the medial aspect of the coronoid process and the humeral condyle. Unicompartmental disease in the human knee has been treated with closing wedge osteotomies for over 40 years. The goal of the procedure is to take the joint forces away from the offending region over to the healthy side of the joint. The sliding humeral osteotomy attacks elbow dysplasia using these same principles. A cadaver study found that lateral translation of the proximal humeral diaphysis with respect to the elbow elicited a lateral shifting of the joint load. The forces along the medial articular surface of the ulna decreased by 25% while the forces along the lateral aspect only increased by 7-11%. A recent paper looking at 39 dogs with severe or persistent lameness associated with MCD found 21 limbs had lameness resolution with a complication rate of between 4-17%. The procedure is performed using locking drill guides to place a step plate along the medial aspect of the humeral diaphysis. The SHO should be considered for dogs with intractable pain of the medial compartment of the elbow joint, with a "normal"-appearing lateral compartment. This includes patients with full thickness cartilage loss of the medial compartment.

References available upon request.

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"Where'd I Bury My Bone Again?": Canine Cognitive Dysfunction & Other Behavior Issues in Senior Canines

Kathryn Wrubel, PhD

Senior canines can develop a myriad of behavior issues that can be frustrating for owners and difficult to resolve for the veterinary practitioner. The discovery of Canine Cognitive Dysfunction syndrome (CCD) has shed some light on the behavior of senior dogs. This article will focus on common behavior issues that develop in aging canines and provide tips on resolving them.

Owners report that elderly dogs are more mellow, less excitable, and more loving and faithful companions than younger dogs. However, any medical issue that makes a dog uncomfortable, painful, or results in sensory decline can cause anxiety or irritability; therefore a medical rule-out is essential when clients with senior dogs complain of behavior issues. Taking the time to discover the etiology of behavior issues is the key in determining the best plan for behavior modification, and helping clients to understand the issues contributing to their dog's behavior can make them more sympathetic and compliant.

Several issues can contribute to stress and behavior issues in senior dogs including changes in the dog's environment or routine, medical conditions causing the dog to be less adaptable or more sensitive, and owner frustration. Dogs should never be punished for behavior issues as this can lead to increased anxiety and conflict with the owners; on the other hand, owner reassurance of an anxious dog can inadvertently reinforce problem behaviors.

Separation Anxiety: Uncomfortable, painful, or senile older dogs may develop separation anxiety, and previously resolved separation anxiety may reappear, as the dog begins to seek comfort from its owners more frequently. This issue can be resolved by providing enrichment with food and toys while the owners are gone, desensitizing the dog to departure cues, downplaying arrivals and departures, practicing planned departures, independence training, and mood-stabilizing medication¹. Crates can result in barrier frustration and are not generally advisable for treatment. Keeping a dog on a schedule and reducing stress can help to prevent separation anxiety in senior dogs.

Nocturnal Separation Anxiety has the same classic symptoms (excessive vocalization, destructive behavior, and house soiling), but occurs at night when the owners are sleeping. In these cases the dog may be painful or uncomfortable and is seeking attention and care. Nocturnal Separation Anxiety is typically due to more serious medical conditions such as cancer. Efforts should be made to provide enrichment at night and make the dog more comfortable.



*Morgan, age 12
Photo Credit: Robyn Townsend*

House Soiling: House soiling is a common complaint from owners of senior dogs. A complete medical rule-out is essential for dogs that were previously housetrained as this behavior can also be the result of separation anxiety, marking, or Canine Cognitive Dysfunction. Treatment options include increasing the frequency in which the dog is let out, revisiting a puppy housetraining protocol, making it easier for the dog to get out of the house (dog door), proper clean up and the use of deterrents in previously soiled areas. Old stains can be found with a black light, and Zero Odor[®] is a great odor eliminator (www.zeroodorstore.com). For incontinent dogs, management options include providing a litter box, puppy pads, or having the dog wear an absorbent device.

Excessive Vocalization: Dogs vocalize for a variety of reasons and to communicate many different things. Senility, anxiety, and pain can cause excessive vocalization in senior dogs. Once the source of the vocalization and triggers are determined, a behavior modification plan can be put into place. Treatment includes making the dog comfortable, redirection, enrichment and training.

Phobias: Phobias of all types (thunderstorms, insects, car rides, fireworks, household appliances, motorcycles, etc.) can worsen as dogs age due to increased sensitivity and irritability. Treatment includes systematic desensitization (gradually, incrementally, and repeatedly exposing dog to the stimulus and teaching them that good things happen when it occurs) and medication for situational anxiety¹.

Aggression: Dogs with medical conditions that cause pain (arthritis, dental disease, etc.) may show pain-induced aggression when handled or touched in certain areas. Pain should be treated for and owners instructed on how to safely interact with the dog without causing discomfort. Medical conditions that make a dog uncomfortable, or cause sensory decline or anxiety, can also lower the threshold for aggression in dogs that already have aggression issues.

In addition, as an older dog becomes lame, ill, or senile, a younger dog in the home may begin to challenge it. The older dog may not be able to fend off the younger dog and as a result severe injuries can occur. This issue is often fueled by owner attention and intervention and can be very stressful for owners who are often bitten breaking up fights. Aggression is best dealt with by a behavior specialist.

Restlessness/Nighttime Waking: Dogs are crepuscular (most active at dawn and dusk). Elderly dogs often have alterations in the sleep-wake cycle, including decreased REM sleep. They may wake frequently during the night and engage in nighttime restlessness or pacing. Stereotypies may be due to a medical condition or Canine Cognitive Dysfunction if there has not been an identifiable change in the dog's environment. Increasing exercise, and daytime and evening activity can help with this issue. Melatonin may also be an option for regulating the circadian cycle¹.

Canine Cognitive Dysfunction: Symptoms, Diagnosis & Treatment: Senior dogs can develop a form of dementia known as Canine Cognitive Dysfunction syndrome (CCD), resulting in a gradual decline of cognitive function (learning, memory, awareness, perception). Symptoms of CCD include disorientation and confusion, decreased social interaction, altered sleep-wake cycles, decreased responsiveness to stimuli, decreased activity levels, and loss of prior housetraining. Owners of dogs with CCD report they don't respond to their names, don't seem to recognize them, forget commands, get lost in familiar locations, and go to the wrong side of a door or wrong door when coming in or out. Veterinarians may observe lack of self-grooming/hygiene and pacing or wandering aimlessly. A CCD Diagnostic Aid can be obtained at www.CDSindogs.com.

Aging canine brains can show similar alterations to human brains with Alzheimers Disease, including cortical atrophy, ventricular widening, and plaque deposition within the neurons containing β -amyloid protein (accumulation of this protein is correlated with the level of cognitive dysfunction in dogs).

There is no cure for CCD but some treatments can slow down its progression. Dietary enrichment with antioxidants, mitochondrial enzymatic cofactors, essential fatty acids, signaling and metabolic enhancement components, and brain strengthening components have been shown to combat the symptoms of CCD. The Hills Pet Nutrition Prescription Diet Canine "b/d"[®] diet contains many of these supplements and

has been shown to improve cognition in a variety of tasks within several weeks of treatment.


Selegiline (Anipryl[®]), a selective irreversible inhibitor of monoamine oxidase B, is another treatment option for CCD. Anipryl[®] is hypothesized to work by enhancing dopamine and catecholamine function in the brain. It also has antioxidant properties and some metabolites have stimulant properties. Due to interactions, Anipryl[®] should not be combined with antidepressants, MAO inhibitors, phenylpropanolamine, meperidine, or parasite control products containing amitraz. Interestingly Anipryl[®] has been found to increase lifespan in elderly dogs.

Owners should be instructed to provide dogs with CCD with mental enrichment, keep them on a consistent schedule, and provide few disruptions to their lifestyle. Placing auditory (television, music), tactile (rugs), and odor cues (scented candles, room fresheners) in certain rooms can help them to navigate around the house and maintain environmental familiarity.

Dogs with Canine Cognitive Dysfunction and humans with Alzheimers Disease show similar clinical signs.

Enrichment for Senior Canines: Senior dogs benefit from having a consistent and predictable schedule. They need have a reason to get up in the morning and things to look forward to throughout the day. Mental enrichment and exercise will help them to sleep through the night and keep their aging brain thinking and active. Toys should be rotated daily and can be scented with vanilla, anise, or hunting lure to make them more interesting. Five minute daily training sessions will keep a dog's mind busy (clicker training requires dogs to be more cognitively engaged than traditional food lure training). Having senior dogs eat out of food puzzles instead of a bowl requires them to figure out how to obtain their meal and keeps them interested. Food puzzles should not be given to dogs that guard food or toys. Popular food puzzles include the Kong[®], Twist 'n Treat[®], Everlasting Fun Ball[®], Buster Cube[®], and Talk to Me Treatball[®]. Nina Ottosson[®] toys test a dog's intelligence.

Since many senior dogs are arthritic or cannot withstand rigorous exercise I recommend that owners drive them to different locations for short walks. Car rides provide interesting sights and smells; novel environments for exploration offer excitement and new stimuli to process, each of which will activate all of the dog's senses.

Senior dogs can develop challenging behavior issues but these issues can be improved or resolved. Figuring out the cause of any behavior issue is the best way to determine the course of treatment. A senior dog may seem set in his ways but it is never too late to teach an old dog new tricks. 

References available upon request.

1: Anticholinergic and sedating drugs can cause increased risks in senior dogs so careful consideration should be made in determining the best drug to prescribe.

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