



American Association of Feline Practitioners/Academy of Feline Medicine Panel Report on Feline Senior Care

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According to surveys conducted by the American Veterinary Medical Association Center for Information Management, the percentage of owned cats six years of age and over has risen from 24% in 1983 to just over 47% in 1996, nearly a two-fold increase in 13 years. By designing and delivering individualized, comprehensive feline senior health care programs, veterinarians have the opportunity to positively impact the lives of a large and growing population of feline patients and owners.

Although the aging process induces complex and interrelated physiologic changes that frequently complicate the health care management of geriatric cats, age itself is not a disease. For this reason, management decisions should not be based solely on the age of the patient. Many conditions that affect older cats can be acceptably controlled, if not cured, such that the quality of an older cat's life can often be significantly improved by appropriate and timely medical intervention.

Changes in senior cats occur across a fairly wide age range. While many cats begin to show clinically significant changes between 7 and 10 years of age, most do so by 12 years of age. Because geriatric disorders tend to be chronic and progressive, veterinarians treating aged cats must be adept at managing and monitoring chronic disease, and if possible, preventing disease progression. As in the pediatric patient, therapy and maintenance care must be tailored to meet changing needs. However, the senior patient is more likely to experience multiple medical problems simultaneously. The veterinarian must carefully evaluate the risks and benefits of treatment of a given condition while considering its impact on other co-existing problems. In addition to medical decision-making, family and ethical issues often come into play in the management of senior feline patients. Management of the patient must include special consideration of the strong bond that frequently exists between senior cats and their owners.

The objectives of the AAFP/AFM Panel Report on Feline Senior Care are to promote the longevity and improve the quality of life of senior feline patients by: recognizing and controlling health risk factors; detecting disease during the preclinical phase; correcting or delaying the progression of existing disorders; and improving or maintaining residual function. These guidelines are designed to aid practitioners in delivering consistent high-quality care to their senior feline patients by establishing

a minimum standard of care. It is important that the program be individualized specifically for the needs of each patient; in some situations, the components may be more complex than those detailed here. From the cat owners' perspective, the program must be affordable, manageable, and consistent with their philosophy. The term 'senior' is more acceptable to our clients and implies preventative or 'wellness' care which improves the quality and length of life of their beloved older cat.

Summary of health care programs for senior cats with and without clinical signs of disease

Initiation of a senior preventative health care program is recommended for cats starting between 7 and 11 years of age, and should continue throughout the remainder of the cat's life.

Old age is not a disease in and of itself. Therapeutic decisions in older cats should not be made on the basis of age alone, but rather on the basis of the cat's general state of health, expected length of life, and anticipated quality of life with therapy.

Health care program for senior cats with no clinical signs of disease

- * a complete medical and behavioral history at every patient evaluation
- * a thorough physical examination at least every 6 months
- * weight evaluation, weight comparisons, and body condition scoring with every patient evaluation
- * selected diagnostic testing at least annually, including a *minimum* of:
 - complete blood count including: hematocrit; red blood cell count, indices, and morphology; white blood cell count; differential white cell count evaluated by cytology; total protein; and platelet count
 - serum creatinine
 - serum potassium
 - serum alanine aminotransferase (ALT) and serum alkaline phosphatase (AP)
 - total T₄ by RIA
 - complete urine analysis (including urine specific gravity, urine sediment cytology, glucose, ketones, bilirubin, and protein) collected by cystocentesis
 - blood pressure (Panel members were divided on whether blood pressure determination

should be evaluated on senior cats with no clinical signs of disease.)

- feline leukemia virus (FeLV) antigen test and feline immunodeficiency virus (FIV) antibody test if not performed previously, or if cat is at risk of exposure. Cats at risk of exposure include outdoor cats, indoor/outdoor cats, stray cats, cats with bite wounds, escapees, feral cats, and cats from multi-cat households, FeLV- or FIV-positive households, and households with unknown FeLV or FIV status.

Health care program for senior cats with clinical signs of disease

- * a complete medical and behavioral history at every patient evaluation
- * a thorough physical examination at least every 6 months, depending upon the medical condition and health status of the patient
- * weight evaluation, weight comparisons, and body condition scoring with every patient evaluation
- * selected diagnostic testing, as appropriate for the condition, at least every 6 months, including a minimum of:
 - complete blood count including: hematocrit; red blood cell count, indices, and morphology; white blood cell count; differential white cell count evaluated by cytology; total protein; and platelet count
 - chemistry profile with electrolytes
 - total T₄ by RIA
 - complete urine analysis (including urine specific gravity, urine sediment cytology, glucose, ketones, bilirubin, and protein) collected by cystocentesis
 - blood pressure
 - feline leukemia virus (FeLV) antigen test and feline immunodeficiency virus (FIV) antibody test if not performed previously, or if cat is at risk of exposure, as described above.

oral anti-thyroid medication, used at the minimum effective dose. These patients should be monitored carefully.

Chronic renal failure

- * Due to the exceptional concentrating capacity of the feline kidney, cats with renal insufficiency may have urine specific gravities greater than 1.035.
- * Potassium depletion is common in geriatric cats, especially those with renal insufficiency. Oral potassium supplementation is recommended when serum potassium levels fall below 4 mEq/l.
- * Moderate restriction of protein and phosphorus intake may reduce clinical signs of uremia. Consumption of a diet with moderately restricted protein has not been proven to slow progression of renal disease.

Hypertension

- * Systemic hypertension in cats is usually secondary to chronic renal disease or hyperthyroidism.
- * Blood pressure can be measured indirectly by the Doppler method, taking the average of a minimum of five measurements.
- * It is important to measure cuff size carefully, as an improperly sized cuff will give an incorrect value.

Cancer

- * Adequate nutritional support and pain management are essential components in the care of cancer patients.
- * Paraneoplastic syndromes may induce a disease at least as harmful as the primary neoplasia.

Summary of overviews

Hyperthyroidism

- * In the treatment of a hyperthyroid cat, special care should be taken to monitor renal function following therapy. The glomerular filtration rate will decrease regardless of treatment modality. Renal parameters should be checked 1 month following initiation of therapy. If concurrent hyperthyroidism and renal failure exist, the treatment of choice is

Diabetes mellitus

- * Evaluation of blood glucose curves is the best method to determine insulin type, dose, and frequency of administration.
- * Urine glucose and single random blood glucose determination can be misleading in the assessment of glycemic control. If single blood glucose determinations are utilized, they should be timed to coincide with peak insulin activity, as ascertained by a previous blood glucose curve.

- * As with all disorders common to senior cats, owner observation of appetite, body weight, activity level, mental state, water consumption, and urination are essential components of management.

Inflammatory bowel disease

- * Anorexia or weight loss may be the only clinical sign associated with inflammatory bowel disease.
- * The only means of establishing a definitive diagnosis is by intestinal biopsy. If partial thickness endoscopic biopsies are obtained, it is critical that a sufficient number (nine to 12) of good quality samples be submitted to avoid misdiagnosis.

Behavior

- * Behavioral changes, though often subtle, are common in senior cats, and are frequently associated with treatable underlying medical conditions. The following conditions may contribute to behavior changes in older pets: organ disease or dysfunction, dental disease, sensory decline, endocrine disorders, conditions that lead to discomfort or decreased mobility, and cognitive dysfunction. In addition to treating the underlying medical problem, behavior problems that persist can be treated with behavior modification techniques, environmental management, or behavioral drugs.

Analgesia

- * Short- and long-term pain management is important in disease management of senior cats. Conditions requiring pain management include degenerative joint disease, dental disease, surgery, and neoplasia.

Anesthesia

- * The small physical stature of cats, along with age-related changes in drug metabolism, make close anesthetic monitoring and maintenance of body heat critical in the older cat.

Nutrition

- * Diets for senior cats should be highly palatable, potassium replete, non-acidifying,

easily digestible, and should contain protein of high biologic value. Not all diets labeled as 'senior diets' fit these criteria.

- * Nutritional status and dietary changes should be evaluated on an individual basis.
- * A change in diet may not be necessary for the older cat in good body condition consuming a nutritionally complete and balanced diet. However, age is a risk factor for calcium oxalate urolithiasis. Cats consuming acidifying diets should instead be given a diet that maintains a more neutral urine pH.
- * Attention should be paid to fluid intake since many disorders of older cats can lead to dehydration.

Dentistry

- * Although not always clinically apparent, oral cavity and periodontal disease are significant sources of morbidity. Odontoclastic resorptive lesions and broken teeth may cause significant oral discomfort.
- * Dental radiographs should be performed if any oral or dental lesions are noted or if a resorptive lesion is suspected.
- * Veterinarians should advise owners of proper preventive dental care.

Pet loss

- * Veterinarians must be sensitive to the owner's wishes regarding euthanasia.
- * Client presence during euthanasia may be beneficial to the grieving process. If the owner is present, intravenous catheterization, sedation prior to euthanasia, and intraperitoneal euthanasia should all be considered.
- * Veterinarians should understand the bereavement process and offer compassionate care and support. Clients should be made aware of pet loss hot-lines, support groups, and other support options. Communication should occur after euthanasia or death in the form of a card or telephone call to the owner, and/or a memorial made in the cat's honor.

Physiology and pharmacology of aging

Physiology of aging

Research on the physiology of aging in cats is lacking, and most of what is known has been

learned by observation of diseases associated with aging. Following is a system-by-system discussion of age-related changes observed in other species, and believed to occur in felines as well.

Immune system

Aging cats may be immunologically compromised as compared to younger cats. Aging is associated with a decline in normal immune function and host defense mechanisms. Chronic diseases associated with aging can further impair immune function. Decreased hydration, a feature of some of the common feline diseases of older cats, causes decreased blood flow and decreased cell-mediated immunity.

Blood

There is no change in basal hematopoiesis in animals as they age. However, an animal's ability to respond to increased demand declines in old age. This may be especially important in cats, with the high prevalence of renal insufficiency and associated decrease in erythropoietin levels. Anemia of any cause is of increased concern in senior patients.

Integument

The collagen and elastin content of skin is decreased in elderly animals. Geriatric skin is thinner, has decreased blood flow, and is less elastic. Because of these changes, the skin is a less effective barrier to invading pathogens, and infection is more likely. These geriatric changes can also make assessment of hydration by skin turgor more difficult. Senior cats groom themselves less effectively than younger cats, which can result in hair matting, odor, and dermatitis, as well as a decline in cat/owner interaction and satisfaction. Senior cats often have overgrown, thick, and brittle claws which may be a reflection of decreased activity, or may be associated with physiological or pathological age-related changes.

Central nervous system

In humans and dogs, neurochemical alterations, amyloid deposition, cerebral atrophy, a decrease in neurons, and an increase in glial cells contribute to memory loss and personality changes often referred to as cognitive dysfunction or senility. It is unclear whether all of these changes occur in cats, but amyloid deposition similar to that seen in dogs and humans has been identified in the brains of elderly cats showing signs consistent with cognitive decline

(wandering, excessive vocalization, disorientation, and lack of social interaction).

Auditory system

Hearing loss is common in cats of advanced age. Cochlear hair cells are known to decline progressively from birth in other species. Hearing loss may also be associated with neurological degeneration, chronic otitis, or arthritis of the auditory ossicles.

Visual system

Nuclear sclerosis is a normal age-related change in cats. Iris and ciliary muscle atrophy are common, and are not of pathological significance. These changes do, however, result in decreased pupillary light responses, and must be taken into consideration during neurological examination. Retinal changes occur in aged cats secondary to other diseases, especially diseases associated with hypertension.

Oral cavity

Dental disease is extremely common in senior cats and can impair function of the oral cavity and cause pain in oral structures. Decreased olfaction has been anecdotally observed in feline senior patients. In healthy senior cats, decreased olfaction may be primarily responsible for a diminished interest in food. However, the discomfort associated with dental disease is the most likely cause of anorexia or difficulty eating in older cats.

Cardiovascular system

There is no change in normal heart rate associated with aging. Hypertension can develop secondary to disease of the renal or endocrine systems. Radiographically, older cats may demonstrate increased sternal contact of the cardiac silhouette and a tortuous, redundant aorta. It is not clear whether these changes are normal or part of a pathological process.

Respiratory system

Aging lungs have reduced elasticity, tidal volume, and expiratory reserve. Age is also accompanied by a diminished cough reflex. The consequences of these changes in cats are unclear. Primary pulmonary disease is rarely a cause of morbidity and mortality in old cats. Some increase in background lung density on radiographs is a function of advanced age.

Gastrointestinal system

Studies in human beings and rats have shown such age-related changes as decreased gastric

and intestinal mucosal turnover, decreased smooth muscle innervation, delayed colonic transit time, increased small intestinal motility, and decreased absorption of water, electrolytes, and some vitamins and minerals. Such gastrointestinal clinical signs would be expected to be more severe in senior cats. However, it is not clear whether a significant age-related decline in ability to digest and absorb nutrients occurs in all healthy geriatric cats. Protein synthesis and metabolic functions decline in the aging liver, but most common feline liver problems are not routinely associated with age-related changes in hepatic function.

Urinary system

Kidney size, renal blood flow, and glomerular filtration rate decline in cats as part of the normal aging process. Potassium handling is impaired in aging animals, and disorders of potassium balance occur frequently in elderly cats. Nephroliths are uncommon in the cat, but a striking feature of the older feline kidney is the tendency of the renal pelvis to mineralize. The cause and clinical significance is unknown, but this common age-related change should not be confused with nephrolithiasis. Cats, fortunately, do not experience many of the lower urinary tract changes found in human and canine senior patients. Primary urethral sphincter incontinence is extremely rare, and even cats with profound polyuria are usually able to store and void their urine voluntarily. Age has been identified as a risk factor for calcium oxalate urolithiasis in cats, but this relatively recent phenomenon might be related to the increased feeding of urine acidifying diets.

Endocrine system

Physiological changes in the aging feline thyroid gland are not well studied. Thyroid nodules, commonly found during physical examination of senior cats, are not always associated with thyrotoxicosis. Although many veterinary endocrinologists consider it likely, it is not known if these 'cold' nodules progress to hyperfunctional nodules and clinical hyperthyroidism. Alternatively, these nodules may be a type of non-toxic nodular goiter. In humans and rats, pituitary peptides decline significantly in old age. These changes are not documented in cats, and the clinical significance is not known. Islet amyloid is found in the pancreas of older non-diabetic cats, but diabetics have a much greater number of islets with amyloid deposits. Impaired glucose tolerance increases with age in cats.

Skeletal system

Cartilage changes are common in aging animals. These include decreased proteoglycan content, tensile strength, and collagen content of cartilage, and decreased chondroitin sulfate, keratin sulfate, and hyaluronic acid production. Although overt lameness is rare, development of degenerative joint disease is common and should not be overlooked in older cats. Mineralization of costochondral junctions and spondylosis are common findings on radiographs of senior cats, but are of unknown significance.

Pharmacology of aging

Several important age-related changes occur in the way the feline body handles drugs. Aging induces changes in volume of distribution and body composition (decrease in water content, and decrease or increase in fat content). Clearance of drugs, whether by renal or hepatic routes, decreases with age. Drug clearance and metabolism can also be altered by disease or by co-administered drugs. These pharmacological changes increase the likelihood of adverse reactions, and drug toxicities. As a result, drugs should be used with caution in senior feline patients. Starting doses should be relatively low, dose escalation should be approached conservatively, and the possibility of drug toxicity should be kept in mind. Dosage adjustments should be made if disease of the clearing organ is present. For example, if a drug is cleared by the kidneys and chronic renal failure is evident, formulas can be used to calculate proper dosage, or the intervals between doses, accordingly:

$$\text{New dose} = \text{old dose} \times \frac{\text{normal creatinine concentration}}{\text{patient creatinine concentration}}$$

$$\text{New interval} = \text{old interval} \times \frac{\text{patient creatinine concentration}}{\text{normal creatinine concentration}}$$

Senior health care program

Initiation of a senior health care program is recommended for cats starting between 7 and 11 years of age, and should continue throughout life. Components of a feline senior health care program include: regularly scheduled office visits during which a complete medical and behavioral history is gathered, a systematic

physical examination is performed, and appropriate diagnostic tests are evaluated; vaccination and parasite control; and client education.

Regularly scheduled office visits

Semiannual office visits are recommended since changes associated with aging and disease progression in the senior cat can occur within a relatively short period of time. Cats with significant disease often appear healthy, and frequent serial comparisons of historical and examination findings assist in the early detection of disease. Regularly scheduled visits also allow for implementation of other aspects of the senior health care program.

Complete medical history

Owners of older cats often notice health problems or behavioral changes but consider them to be age-related or untreatable, and therefore not worthy of reporting to the veterinarian. For example, an owner may erroneously attribute inappropriate elimination behavior, changes in activity, or an alteration in eating or drinking habits to age, not recognizing that such changes may be associated with disease. Changes may be subtle or insidious in onset, so rather than depending upon the owner to volunteer information, specific questions should be asked. A questionnaire is an excellent means of ensuring that all potential problems are addressed (see [Appendix C](#) - Chart courtesy of Dr Gary M. Landsberg). A monthly checklist can also be provided to owners to help them recognize health problems (see [Appendix D](#) - Chart courtesy of Dr I. Rodan).

Information about past and current medical problems, lifestyle, litterbox use, and the cat's environment should be sought. All prescription and non-prescription medications currently being administered should be recorded, and any adverse reactions should be noted. All foods being fed, including nutritional supplements and treats, should be noted, along with any changes in eating habits (including the amount consumed) and body weight.

Systematic physical examination

A thorough physical examination should include a systematic evaluation of all organ systems, with particular attention paid to those commonly affected by disease in senior cats. If behavioral changes were noted in the history, a neurologic

Table 1. Feline body condition score

Score	Classification	Characteristics
1	Very thin	Ribs: easily palpable with no fat cover Bony prominences: easily palpable Abdomen: severe abdominal tuck
2	Underweight	Ribs: easily palpable with minimal fat cover Bony prominences: easily palpable Abdomen: obvious waist, minimal abdominal fat palpable
3	Ideal	Ribs: palpable with slight fat cover Abdomen: well proportioned waist, minimal abdominal fat pad
4	Overweight	Ribs: difficult to palpate, moderate fat cover Abdomen: little or no waist, abdominal rounding, moderate abdominal fat pad
5	Obese	Ribs: very difficult to palpate, thick fat cover Abdomen: distended with extensive fat deposit, no waist Fat deposits over lumbar area, face and/or limbs

examination should be performed. Weight should be recorded at each visit. However, the body condition score (see [Table 1](#)) is a more accurate determinant of lean body mass, and its evaluation is encouraged. Almost every aging cat not receiving regular dental care has some dental or periodontal disease. A thorough oral examination without sedation is usually sufficient to determine whether sedation or anesthesia is warranted for a more detailed oral examination. The use of an examination form, a copy of which can be provided to the client, is encouraged (see [Appendix E](#) - Chart courtesy of Dr I. Rodan).

Diagnostic testing

Selected diagnostic tests performed at appropriate intervals may facilitate the detection of

disease in a pre-clinical stage, allowing for early medical intervention that may delay disease progression. For example, renal disease in older cats is often subclinical during its early stages, and owners may be unaware of subtle changes in their cat's appetite, thirst, or urination habits. In such cases, detection of disease in the absence of laboratory data is difficult. Likewise, other common senior diseases such as hyperthyroidism can be detected earlier by routine laboratory screening. Routine testing also provides trend information for the individual patient (see [Appendix F](#) - Chart courtesy of Dr. Diane Eigner). For screening procedures to be most useful, they should be tailored to the patient, sensitive enough to detect early disease, minimally invasive, and cost effective.

However, indiscriminate diagnostic testing of senior patients with no clinical signs can have drawbacks. For a number of reasons, even healthy animals occasionally have abnormal test results, and erroneous interpretation of values lying outside the normal range may lead to incorrect diagnosis and inappropriate therapy. Conversely, abnormal individuals may have test results within the normal range. As more tests are added to the profile, the likelihood that a healthy animal will receive an abnormal test result increases. Proper interpretation of diagnostic test results requires integration of the patient's history, clinical signs, and examination findings. Baseline or trend data can be especially helpful in these cases. Recognizing potential test interferences and methodologic idiosyncrasies will further improve interpretation of test results.

Diagnostic testing for senior cats with no clinical signs of disease

Based on the frequency of certain diseases in the older cat population and the goal of early intervention, selected diagnostic tests should be performed annually (most conveniently at every other office visit). Diagnostic tests should consist of a minimum of the following: a complete blood cell count (including hematocrit; red blood cell count, indices and morphology; white blood cell count; differential white cell count evaluated by cytology; total protein; and platelet count); creatinine (preferred over blood urea nitrogen as a screening test because it is less influenced by non-renal factors. Thin older cats often have false decreases in serum creatinine due to decreased muscle mass); serum potassium; serum glucose; total T₄ (determined by radioimmunoassay); alanine aminotransferase; and alkaline phosphatase.

Feline leukemia virus antigen and feline immunodeficiency virus antibody testing should be included for those cats whose infection status is not known or for cats at risk of exposure. A complete urine analysis should include physical evaluation (color, turbidity, and specific gravity), chemical evaluation (protein, glucose, bilirubin, occult blood, and pH), and microscopic examination of the urine sediment. The sample should be collected by cystocentesis.

The panel was divided as to whether blood pressure should be routinely determined in senior cats with no clinical signs. Panelists not in favor reasoned that hypertension is usually secondary to disorders that would be revealed by other test results or examination findings. Since blood pressure is affected by environment and stress, concern arose over harm that may be done if a non-hypertensive cat is treated inappropriately. Panelists in favor of routine measurement reasoned that the procedure is non-invasive and usually simple to perform, and even though primary hypertension is believed to be rare, its true incidence is not known. In addition, since hypertension is frequently associated with hyperthyroidism and renal failure, blood pressure determination at the initial visit may preclude the need for an additional visit should screening tests confirm the presence of either of these common diseases of senior cats.

Diagnostic testing for senior cats with clinical signs of disease

Selected diagnostic tests should be performed at each semiannual visit, however, the frequency of testing and the choice of tests may vary depending upon the individual needs of the patient. At a minimum, the semiannual tests should include the following: a complete blood cell count (including hematocrit; red blood cell count, indices, and morphology; white blood cell count; differential white cell count evaluated by cytology; total protein; and platelet count); a complete biochemical profile (including albumin, blood urea nitrogen, creatinine, serum glucose, alanine aminotransferase, alkaline phosphatase, gamma glutamyl transpeptidase, total bilirubin, sodium, potassium, chloride, calcium, phosphorus, total CO₂, and anion gap); and total T₄ (determined by radioimmunoassay). It is important to fill tubes completely in order to accurately assess total CO₂ status; otherwise pseudo-metabolic acidosis will be diagnosed. It is also important to centrifuge and separate the serum promptly. Feline leukemia virus antigen and feline immunodeficiency

virus antibody testing should be included for those cats whose infection status is not known or for those at risk of exposure. A complete urine analysis should include physical evaluation (color, turbidity, and specific gravity), chemical evaluation (protein, glucose, bilirubin, occult blood, and pH), and microscopic examination of the urine. The sample should be collected by cystocentesis. Blood pressure measurements should also be obtained at least semiannually in senior cats with clinical signs of disease.

Vaccination and parasite control

Vaccinations should be administered based on individual risk assessment (see *AAFP/AFM Feline Vaccination Guidelines*), and in compliance with local laws. Fecal analysis and parasite control should be undertaken for individuals at risk of exposure to internal and external parasites.

Client education

Clients aware of senior changes and the benefits of preventive intervention are more likely to seek veterinary attention and comply with recommendations and suggested diagnostics. Knowledge that many behavior changes and abnormalities are caused by underlying medical conditions which may be corrected or controlled is of extreme importance. Owners should be instructed to watch for changes in behavior, attitude, activity, mobility, food and water consumption (including how the cat consumes the food, since cats with painful mouth conditions often chew on one side, drop food, or exhibit chattering teeth), urination and defecation (volume, frequency, and location), and body weight. They should also monitor for vomiting, diarrhea, grossly visible or palpable masses, skin changes, coughing, sneezing, odors, breathing difficulty, and sleeping position (cats with breathing difficulty may only sleep in sternal recumbency). Dental care and grooming needs should be discussed during the consultation. Nutritional advice should be tailored to the patient and will depend on the cat's current diet and health status; client preferences and economics may also need to be taken into account. Because screening tests for specific types of cancer are not available in veterinary medicine, owner awareness is especially important in early cancer detection (see [Table 2](#)). Early detection is of the utmost importance for treatment success, but may be

Table 2. Common signs of cancer in animals^a

1.	Abnormal swellings that persist or continue to grow
2.	Sores that do not heal
3.	Weight loss
4.	Loss of appetite
5.	Bleeding or discharge from any body opening
6.	Offensive odor
7.	Difficulty eating or swallowing
8.	Hesitation to exercise or loss of stamina
9.	Persistent lameness or stiffness
10.	Difficulty breathing, urinating, or defecating

^a Developed by the Veterinary Cancer Society.

complicated by concurrent chronic illnesses or by the owner attributing warning signs to advancing age. Client education can be streamlined and reinforced with written materials.

Overviews

Selected feline senior considerations

The following are select points that may not be widely known or followed. By no means are these points meant to encompass all aspects of the disease.

Hyperthyroidism

Serum total T₄ is the recommended first-line screening test for hyperthyroidism. Some hyperthyroid cats have serum total T₄ levels within the normal range (usually moderate to high normal). In such cases, a T₃ suppression test, thyrotropin releasing hormone (TRH) stimulation test, free T₄ analysis by equilibrium dialysis, or thyroid radionuclide uptake can aid in the diagnosis. However, free T₄ levels may also be elevated in cats with nonthyroidal illness (eg, alimentary lymphoma), and is not recommended as a single screening test. A combination test of serum total and free T₄ might be advantageous. The TRH stimulation test has been associated with significant side effects following TRH administration.

Hyperthyroidism is associated with increased renal blood flow and increased glomerular filtration rate. As a result, hyperthyroidism may mask underlying renal disease. The glomerular filtration rate will decrease following treatment

of hyperthyroidism regardless of treatment modality. Therefore, in addition to routine post-treatment monitoring, renal parameters should be evaluated one month following initiation of therapy. If renal failure is known to exist concurrently with hyperthyroidism, the treatment of choice is oral antithyroid medication used at the minimum effective dose. Renal parameters should be closely monitored during therapy with antithyroid medication.

Chronic renal failure

The normal feline kidney has exceptional concentrating capacity, and the endpoint which indicates an adequate population of functional nephrons to prevent clinical signs of renal failure is not known with certainty. Experimental studies suggest that cats retain considerable urine concentrating ability even with dramatic reduction in renal mass; consequently, renal insufficiency may not be accompanied by isosthenuria. Some cats with renal insufficiency have urine specific gravities greater than 1.035. Still, determination of urine specific gravity—a measure of renal tubular function—is necessary to differentiate pre-renal from primary renal azotemia. Significant proteinuria in the absence of occult blood and/or WBCs in the sediment suggests glomerular leakage, and can occur before there are changes in urine specific gravity, blood urea nitrogen, or creatinine.

Potassium depletion is common in senior cats, especially those with renal insufficiency. Potassium replete, non-acidifying diets should be fed to help control hypokalemia. Although oral potassium supplementation of all cats with chronic renal failure has been advocated by some, there is presently not enough evidence to support such a recommendation. However, oral potassium supplementation is recommended when serum potassium levels fall below 4 mEq/l. Potassium gluconate or potassium citrate can be used to correct hypokalemia, and either correct or prevent associated effects such as hypokalemic myopathy, reduced renal function, and anorexia. These supplements also provide an alkalinizing effect and may limit progressive renal injury.

Regular testing for, and correction of the following abnormalities should be included in any long-term monitoring of chronic renal failure: hypertension, anemia, azotemia, hyperphosphatemia, hypokalemia, acidosis, dehydration, pyuria, bacteriuria, and proteinuria (as a marker of progression).

Decreased urine specific gravity predisposes cats to bacterial urinary tract infections. Urine culture and sensitivity is indicated in cats with low specific gravities because urine analyses do not always detect these infections. Pyelonephritis requires a minimum of 4 weeks of appropriate antimicrobial therapy.

Chronic renal disease in many cats can be successfully controlled for months or even years. Treatment options to consider in the management of chronic renal failure include: prescription diets low in phosphorus and protein; H₂ blockers such as famotidine to reduce nausea, increase appetite, and control vomiting (cats may be nauseous even if they do not vomit); intravenous fluids for decompensated chronic renal failure; client administration of subcutaneous fluids at home; antihypertensives such as amlodipine; erythropoietin; intestinal phosphate binders; potassium supplementation; calcitriol; and sodium bicarbonate. Dietary management of cats with chronic renal failure is discussed in the section 'Nutritional considerations'.

Hypertension

Systemic hypertension in cats is usually secondary to chronic renal disease or hyperthyroidism. Approximately 65% of cats with chronic kidney disease have elevated systemic blood pressure; hypertension associated with this disease requires long-term anti-hypertensive therapy. Hypertension associated with hyperthyroidism does not require long-term anti-hypertensive treatment if the hyperthyroidism is corrected. Less likely causes of hypertension include anemia, hyperadrenocorticism, and primary hypertension.

Indirect systolic blood pressure measurements are reliable, non-invasive, and can be done in the clinic via the Doppler method.[†] Multiple measurements (at least five readings) are recommended. Most veterinarians believe treatment should be instituted if systolic blood pressure is greater than 170–190 mmHg. Blood pressure should be taken prior to venipuncture, with the patient as free of stress as possible. Using a head set and inflating the cuff slowly can minimize fear in the patient. Accurate placement of the cuff and selection of the correct cuff size are important in achieving valid measurements.[‡] The limb and

[†] Doppler Flowmeter Model 811, Ultrasonic Doppler Flow Detector, Parks Medical Electronics, Aloha, OR.

[‡] Critikon Disposa-cuffs from Johnson & Johnson, 1-800-642-6748, 2 pronged cuffs, sizes: neonatal 2 and 3.

cuff size used should be noted in the medical record.

The clinical signs of hypertension are usually due to damage to target organs with a rich arteriolar supply. These include ophthalmic, renal, cardiovascular, and cerebrovascular tissues. Ocular signs include retinal hemorrhage or hyphema, retinal detachment and blindness. Hypertension may worsen existing kidney disease by causing a continued increase in glomerular filtration pressure. An acquired cardiac murmur can be secondary to hypertension, and compensatory cardiac hypertrophy can occur. Cerebral vascular hemorrhage can occur due to severe hypertension, causing seizures, ataxia, or sudden collapse.

Therapeutic agents include β blockers, ACE inhibitors, and calcium channel blockers. Amlodipine has been used with wide success and minimal side effects in the treatment of feline hypertension.

Cancer

Due to the popularity of cats and the increasing age of the feline population, the care of feline cancer patients is becoming a major component of many veterinary practices. Recent advances in feline oncology have improved treatment response rates, prolonged disease-free intervals, and increased survival times. However, many cat owners and veterinarians remain unaware that a large percentage of cats with cancer can either be cured or rendered free of their disease for significant periods of time. In addition, advances in palliative therapy and support often allow maintenance of a good quality of life for cancer patients. It should be recognized that most owners believe their cat's quality of life is more important than the length of life.

Treatment of cancer can be approached with either curative or palliative intent. Curative intent often involves the use of treatment modalities such as chemotherapy, radiation therapy, surgery, and in some cases, immunosuppressive therapy. Palliative therapy is designed to improve the quality of life without necessarily increasing the survival time. While tumor control is very important, support of the patient is imperative, and because most feline oncology patients are also geriatric patients, attention must be paid to underlying conditions such as renal failure, dental disease, and cardiac disease. In addition, treatment for gastrointestinal disorders, dehydration, uremia, anemia, leukopenia, sepsis, and other conditions that

may be associated with the cancer treatment itself must be provided. Adequate pain management is another essential component of cancer patient care. Tumor invasion with subsequent tissue damage is the most common cause of pain. However, the treatment itself (such as surgery or radiation therapy) can also cause pain. Maintenance of appetite by the use of appetite stimulants and provision of instructions regarding care, hygiene, and feeding is also important.

Staging is the process of determining the extent of the primary tumor and the presence of metastatic disease or paraneoplastic disorders such as hypoglycemia, hypergammaglobulinemia, and hypercalcemia. Accurate staging is necessary to determine the extent of the disease, direct the course of therapy, and provide information about the patient's prognosis and the amount of time and money the caregiver will be required to expend.

In veterinary medicine, compassionate care is the watchword of oncology. Optimum care requires the dedication of a compassionate, informed, and cohesive health care team which includes not only veterinarians, but receptionists, animal health technicians, veterinary nurses, and all animal care personnel. Feline cancer patients usually have a dynamic course to their disease, so regular and frequent communication with caregivers is an essential component of compassionate care.

Diabetes mellitus

Serial blood glucose determination is the most accurate method for assessing the appropriateness of insulin type, dosage, and frequency of administration. Urine glucose and random blood glucose determinations can be misleading, and should only be used in conjunction with serial blood glucose curves and information from the client. Subsequent single blood glucose determinations should coincide with peak insulin activity, as determined by previous blood glucose curves. At this point in time, further studies are needed to validate the clinical application of fructosamine and glycosylated hemoglobin in the management of the diabetic cat. The client should be instructed to monitor appetite, activity, attitude, water consumption, and urine output. Some clients can be taught to measure blood glucose at home, thus helping reduce stress-associated hyperglycemia.

There are several causes of insulin resistance in cats with diabetes mellitus. They include the following: poor absorption of subcutaneous

insulin; anti-insulin antibodies; infection, such as in the urinary tract or oral cavity; concurrent illness, such as pancreatitis or chronic renal disease; obesity; ketoacidosis; acromegaly; hyperadrenocorticism; hyperthyroidism; glucocorticoid therapy; and progesterone therapy.

Inflammatory bowel disease

Anorexia or weight loss may be the only clinical signs associated with inflammatory bowel disease (IBD). IBD should be considered after other causes of gastrointestinal disease have been excluded. The following criteria support the diagnosis: clinical signs consistent with chronic gastrointestinal disease; a thorough diagnostic evaluation (including feline TLI, cobalamin, and folate) that excludes metabolic disease and other primary gastrointestinal diseases; and presence of significant inflammatory cellular infiltrates on histopathology with failure to demonstrate other causes of gastroenteritis.

Definitive diagnosis requires evaluation of gastrointestinal biopsy specimens obtained by endoscopy or laparotomy. The typical histopathological finding in IBD is increased infiltration of the lamina propria by lymphocytes and plasma cells. Inflammatory bowel disease may be present in conjunction with cholangiohepatitis and/or pancreatitis.

Behavior problems in senior cats

Although primary behavior problems may develop in older cats, the possibility of an underlying medical condition should first be considered. Therefore, it is imperative that the history be complete and comprehensive, so that all emerging behavior and health problems are identified. Disease, dysfunction, or neoplasia of virtually any organ system, sensory or cognitive decline, endocrine dysfunction, and conditions leading to increased pain or decreased mobility can all contribute to changes in behavior. Behavior problems may not be exhibited until numerous stimuli combine to 'push' the pet beyond a certain threshold—or medical conditions may lower the threshold. For example, a fearful cat may not exhibit aggression until it is in pain (eg, from dental disease), or less mobile (eg, from musculoskeletal disorders). Cats with sensory decline may be less reactive to stimuli but may startle more easily when the stimuli are finally detected. Soiled litter pans secondary to polyuria may cause litter box aversion, which may lead to inappropriate elimination. Patients

with pain secondary to arthritis may have difficulty getting to, or into litter pans. Many cats do not mark territory even if exposed to intruding cats, but may begin to do so when a condition such as hyperthyroidism develops. Older cats may become more sensitive to environmental change as their capacity to adapt diminishes.

It is generally believed that, as in people and dogs, the cognitive abilities of cats tend to decline with age. Alzheimer-type pathology, including diffuse β amyloid plaques within the brain and its vessels, have been identified in senior humans, dogs, and cats. Although atherosclerosis is rare in cats, the brain of the elderly cat may become chronically hypoxic due to decreased cardiac output, anemia, conditions that lead to hypertension (eg, hyperthyroidism and renal disease), and arteriosclerosis of the non-lipid variety. With age comes cerebral atrophy, ventricular dilation, a decrease in the number of neurons, and an increase in glial cells. In fact, it may be extremely difficult to differentiate physiological from pathological changes, and normal function from cognitive dysfunction.

There are multiple neurochemical changes associated with aging in a number of species, including a fall in serotonin levels, an increase in monoamine oxidase B leading to a decline in dopamine, a decrease in cholinergic activity, a decrease in catecholamine activity, and a possible adrenergic increase, leading to a further reduction in cerebral perfusion. There is also increased production and decreased clearance of free radicals.

A diagnosis of cognitive dysfunction generally requires the presence of one or more of the following behavioral changes in the absence of any physical causes: decreased reaction to stimuli, confusion, disorientation, decreased interaction with the owner, increased irritability, slowness in obeying commands, alterations in sleep cycles, decreased responsiveness to sensory input, increased vocalization, and problems performing previously learned behaviors. Although there are no drugs presently licensed in North America for the treatment of cognitive dysfunction in cats, drugs that help to normalize neurotransmitters that may have become depleted (such as dopamine or serotonin), and those that improve cerebral blood flow, hold some promise. The use of other mood altering drugs, behavior modification techniques, and modifications to the pet's environment may also be required to control or resolve behavior

problems in the older cat. For example, the cat that can no longer gain access to its litter box may need the litter box relocated or adjusted so that the cat can climb in and out and assume an appropriate elimination position. Similarly the cat that eliminates more frequently may require more frequent litter cleaning or additional litter boxes.

Pain management

Recognizing pain in cats may be difficult, but it should be assumed that they experience pain under the same circumstances as humans. Acute pain may arise from disease processes such as pancreatitis, gastrointestinal disease, feline lower urinary tract disease, and neoplasia, trauma, or surgery. Chronic pain is often associated with musculoskeletal disease, neoplasia, or chronic dental disease. Pain produces undesirable physiologic responses that impair wound healing and recovery, and is associated with an increased rate of morbidity and mortality. Careful consideration of the patient's physical condition (including renal, hepatic, and cardiopulmonary function) will aid in the selection of a proper pain control modality and help avoid adverse consequences.

Control of acute pain

Prevention of acute pain is important in re-establishing metabolic homeostasis. Unless contraindicated by the patient's condition, pain control should be initiated as soon as possible after the initial patient evaluation.

Opioid analgesics, the mainstay of short term pain management in cats, are easily administered, have predictable actions, can be chemically reversed, and result in comparatively few side effects. However, any patient receiving an opioid should be monitored, and attention given to cardiac and respiratory functions.

Butorphanol is an opioid agonist/antagonist which is agonistic at the kappa and sigma sites and antagonistic at the mu receptors.

Butorphanol will antagonize mu agonists such as oxymorphone and fentanyl. Its analgesic potency is approximately four to seven times that of morphine. Butorphanol has a ceiling above which increasing dosage offers no additional analgesia. Butorphanol can provide visceral analgesia for approximately five hours and somatic analgesia for one to one-and-a-half hours. Administration of butorphanol prior to surgery has been recommended. Buprenorphine is a mu agonist with a potency approximately 30

times that of morphine, and is a popular analgesic drug in Europe. Longer duration of activity makes buprenorphine useful for post-surgical analgesia.

Oxymorphone is a narcotic agonist with potency approximately 10 times that of morphine. Senior patients and those with liver disease require lower doses. Higher doses may produce behavioral changes. Oxymorphone may produce respiratory or CNS depression.

Fentanyl, as delivered by the Duragesic® transdermal patch, has been widely used in feline medicine. Fentanyl is absorbed from the topically applied patch and reaches peak levels within 3–6 h. Fentanyl is delivered over approximately 3 to 5 days, but its analgesic effect may persist for some time after removal of the patch. Fentanyl absorption is temperature dependent, thus placement of the patient on a warm water circulating blanket or other heat source should be done so as to avoid heating the patch directly. Patches can be subsequently applied for continued analgesia. To prevent substance abuse in humans, it is recommended that the patient return to the hospital for removal and disposal of the patch.

Other than aspirin, non-steroidal anti-inflammatory drugs (NSAIDs) have not been widely used in feline medicine in the United States. Recently two NSAIDs—carprofen and ketoprofen—have been used in Europe and Canada for short-term management of pain. Adverse reactions, including renal failure and bleeding, have been reported. As with most of the other analgesics discussed, neither of these drugs is currently approved for use in cats in the United States.

Control of chronic pain

In many cases, recognition of chronic pain may be difficult in the senior cat due to the insidious nature of its onset. Cats may be reluctant to move and jump, or be increasingly irritable, reclusive, or aggressive toward owners and other animals. Changes in eating or elimination habits, including inappropriate eliminations, may be a result of chronic pain. Owners often attribute these behaviors to 'just getting old', so careful questioning is often necessary to avoid misinterpretation.

Management of chronic pain due to osteoarthritis is difficult. Corticosteroids have been the mainstay of osteoarthritis management, but their long-term use produces side effects, especially in cats with pre-existing renal, hepatic, or other systemic disease. In addition, corticosteroids can

cause additional musculoskeletal problems. However, cats are more resistant to these complications than other species.

Non-steroidal anti-inflammatory drugs have been used with some success in the alleviation of arthritic pain. Aspirin is occasionally used, but the depth of its analgesic effect is believed to be insufficient for effective pain management. Newer NSAIDs, such as carprofen and ketoprofen, are used in Europe and Canada for analgesic purposes in cats, but since their side effects can be severe, use of these drugs is controversial. They are generally reserved for acute exacerbations of pain.

Chondroprotective agents, such as glycosaminoglycans and chondroitin sulfate, purportedly resolve some osteoarthritic changes by allowing for repair of articular cartilage. These agents are available in injectable and oral preparations, and produce seemingly few side effects. Combinations of therapies are often used. For instance, osteoarthritic cats may be treated long-term with chondroprotective agents, with the addition of other medications such as NSAIDs when acute pain is recognized.

Environmental modifications may help make the arthritic cat more comfortable. Carpeted ramps to favorite perching areas, heated bedding, and owner assisted grooming may be helpful. Older cats may be reluctant to climb stairs, so relocating litter pans in more accessible areas and reducing the height of litter pan rims may prevent inappropriate elimination. Weight loss reduces the stress on compromised joints in overweight cats. Alternative therapies should be explored for their potential role in the treatment of chronic pain. Acupuncture, for example, has been shown to increase brain endorphin levels and alleviate pain in humans, dogs, and horses. It is evident that much more research needs to be done on the management of chronic pain in cats. Sadly, research in the area of feline pain management is minimal, and agents with proven safety for long-term use do not exist. The development of analgesic agents and further studies in the management of pain in cats are needed.

Anesthesia in senior cats

Veterinarians are often reluctant to anesthetize a senior patient, risking incomplete diagnosis or inadequate therapeutic care. Age in and of itself is not a reason to avoid anesthesia. Studies in humans relate a higher incidence of mortality in anesthetized senior patients, but the higher rates

are associated with ongoing disease processes rather than with the anesthesia itself.

Thorough patient evaluation is necessary to minimize risks associated with anesthetic induction, maintenance, and recovery. Appropriate selection of pre-anesthetic and anesthetic regimens, and adjunctive procedures is of primary importance. Complete physical examination and minimum diagnostic testing (see 'Diagnostic testing of senior cats with clinical signs of disease' and 'Diagnostic testing of senior cats with no clinical signs of disease') are essential, but electrocardiography, echocardiography, radiography, and blood pressure determination, as well as additional laboratory testing may be necessary depending on physical examination findings and/or initial laboratory results. Correction of underlying abnormalities should begin pre-operatively whenever possible. Selecting a regimen with which the veterinarian is knowledgeable and comfortable may be one of the most important considerations.

To avoid catecholamine-induced cardiac arrhythmias, gentle handling is extremely important. Pre-operative medications generally include combinations of tranquilizers, opioids, dissociatives, and benzodiazepines. Combinations permit lower dosages of any single drug, thereby limiting side effects, as well as allowing smoother induction by whatever method is chosen. However, the choice of pre-operative medications should be determined by the patient's condition. The most commonly used combinations include diazepam with ketamine, acepromazine with ketamine, acepromazine with ketamine and butorphanol, and tiletamine with zolazepam. Tiletamine with zolazepam generally produces longer anesthetic duration and more pronounced cardiovascular effects than ketamine combinations. Anti-cholinergic drugs should be used with caution, especially in cats with heart rates exceeding 180 beats per minute. Cardiovascular and respiratory parameters, including blood pressure, warrant careful monitoring when using any of these drugs. For all but the shortest procedures, isoflurane is the maintenance agent of choice, having the least effect on cardiovascular parameters.

Some anesthetic drugs must be used with extreme caution in the older cat due to negative effects on homeostasis. For example, propofol, an injectable anesthetic used for short term procedures, must be given slowly or it will induce apnea. In addition, propofol can cause arterial hypotension and bradycardia. Since propofol is

a phenolic compound, it can cause Heinz body anemia with repeated use. Degradation relies on the cytochrome p-450 system, so effects may be prolonged due to low levels of this enzyme system.

All anesthetized senior cats should have a cuffed endotracheal tube in place to prevent aspiration, and to insure an open airway should assisted ventilation become necessary. When cats are maintained on inhalant agents such as isoflurane, depth of anesthesia can be quickly adjusted based on the procedure and the patient's reactions. An indwelling intravenous catheter insures vascular access and facilitates fluid administration necessary to maintaining adequate perfusion. Inadequate perfusion can result in impairment of renal function, delayed metabolism of drugs, or more serious complications. However, excessive fluid administration may cause pulmonary hypertension, especially in patients with cardiac or renal impairment. Estimates of blood pressure obtained by an indirect Doppler technique provide an indication of whether perfusion pressure to vital organ systems is adequate.

Additional techniques that may be employed include continuous electrocardiography, respiratory monitoring, and pulse oximetry. Periodic determination of rectal temperature is recommended, as maintaining body temperature, important in all surgical patients, is critical in aged cats with decreased body fat. Placing anesthetized patients on heated tables, warmed blankets, or circulating hot water pads can minimize heat loss during the anesthetic and post-anesthetic period. Infant incubators offer a convenient means of providing heat during the post-anesthetic period. Since cats lose heat from their extremities, placing infant socks on their feet can also help reduce heat loss, as can wrapping the patient in bubble pack or running the IV line through a heating source. Patient monitoring should continue until the patient is able to maintain homeostasis without assistance.

Nutritional considerations

Nutritional needs change during aging, but few studies have investigated the nutrient needs of cats during the last quarter to one third of their life span. Pending more information, only tentative recommendations can be offered beyond sound general advice based on diet history, physical examination, and appropriate diagnostic testing. The diet history should be obtained

from the person who feeds the cat, and should include the following: what the cat eats, in sufficient detail that it could be purchased accurately (brand, form, flavor); how much is consumed in standard units (a cup may mean an eight-ounce measuring cup to the clinician, but a 12-ounce drinking cup to the client); the feeding schedule (ad libitum, meals, or some combination of the two); treats, supplements, or any additional food provided; the quality of the cat's appetite (ravenous, excellent, good, fair, or poor); and recent changes in any of the above and the explanation if known. The physical examination should include body weight and condition score, feces, and coat quality, in addition to the usual parameters.

Healthy older cats

Healthy older cats should consume diets with which the veterinarian has had positive experience, which are produced by reputable manufacturers, and which have passed feeding trials approved by the Association of American Feed Control Officials (AAFCO). Diet-related problems may increase if unknown, untested, or homemade diets are fed. Adequate water intake should be encouraged, and if the cat seems predisposed to dehydration, intake may be enhanced by providing bottled water or running water from a tap or fountain. Some cats prefer their water 'flavored' by adding small ice cubes made from chicken or fish broth in their water bowls. Providing fresh water in filled, wide-mouthed bowls may facilitate drinking. It is also helpful to place several bowls throughout the house in areas easily accessible to the cat.

There is no evidence that special 'senior' diets are necessary if the cat is healthy and consumes a nutritionally balanced and complete adult maintenance diet. However, most commercial diets currently are restricted in magnesium content and are formulated to produce an acidic urine pH in order to reduce the risk of struvite urolithiasis. Although the risk of struvite urolithiasis decreases in older cats, the incidence of oxalate urolithiasis increases, particularly in cats over 10 years old. Since cat foods formulated for the prevention of struvite crystals are believed by some to contribute to calcium oxalate formation, diets that are not magnesium restricted and maintain a more neutral urine pH may be more appropriate for older cats.

If a diet change is needed, making it gradually over the course of a week or more may accommodate the sluggish physiological adaptive

responses that often attend aging. Some cats accustomed to continuous access to food may resist diet changes. For such cats, feeding may be restricted to two meals per day. When the cat has adapted to the modified feeding schedule, intake of the usual diet can be reduced and the new diet offered or mixed with the usual diet. However, it is important to make sure that the patient is consuming sufficient calories.

Activity generally decreases as cats age, so fewer calories may be required to maintain moderate body condition, and fewer may be consumed. One report found that the digestibility of a standard canned diet declined from approximately 84% in 14-month-old cats to 75% in 14-year-old cats. The older cats adapted to the decreased digestibility by increasing intake to maintain energy balance.

The protein needs of older cats as compared to younger cats are not known, but compared to other species, cats of all ages appear to have relatively high protein needs. The vitamin and mineral requirements of healthy older cats do not appear to differ from those of younger cats, so dietary supplementation is not necessary if a satisfactory diet is being fed. If a satisfactory diet is not being fed, it is more effective to change to one that is, than to rectify the deficiencies of the unsatisfactory one. Dietary antioxidants also might retard the progression of normal aging processes, but no benefits of supplementation have been documented. Moreover, antioxidant preservatives are already present in most cat foods.

To insure adequate nutrition, food consumption of senior cats should be monitored. Some cats may benefit from being fed a more nutrient-dense diet to ensure adequate intake of essential nutrients. For example, cats require at least 2 g of protein per pound of body weight per day. A cat eating 28 kcal/lb/day would meet its needs consuming a 25% protein diet, whereas a 30% protein diet would be necessary if only 21 kcal/lb/day were being consumed. Thus, the intake of senior patients should be assessed individually to determine the nutrient densities needed in the diet. Client monitoring of food intake also provides an early warning system for health problems, since change in food intake is a common early sign of disease.

The incidence of obesity peaks between 6 and 8 years of age, decreases slightly by 10 years of age, and declines sharply after that. Body condition score, or BCS (see [Table 2](#)) can be used to provide a more accurate reflection of lean body mass than can weight alone. Cats with

a BCS of 5 are at increased risk for musculoskeletal disease, diabetes mellitus, hepatic lipidosis, and early mortality. They may also have increased anesthetic and surgical risk, decreased immune competence, and increased cardiovascular disease. To effect weight reduction, the current energy intake of the patient should be determined and then reduced sufficiently to induce loss of 1–2% of body weight per week until a healthy weight is restored. Although many veterinary nutritionists believe that any nutritionally balanced and complete adult maintenance diet can be safely used to achieve weight reduction, specially-formulated reduced-calorie commercial or therapeutic diets typically adjust nutrient levels so that patients can consume normal levels of other nutrients while reducing their calorie intake.

Sick older cats

The most common health problems of older cats include oral disease, chronic renal failure, cardiovascular disease, hyperthyroidism, neoplasia, and diabetes mellitus. Tentative diet and feeding recommendations for some common problems are provided here, but many of these recommendations are based on little more than clinical experience, and should be regarded with caution.

Oral disease Dental problems can inhibit food intake, depress appetite, and result in weight loss. Careful oral examinations should be a routine part of geriatric physical examinations, and abnormalities should be appropriately treated. Changing to canned food may be necessary if the cat experiences discomfort while chewing dry food.

Chronic renal failure Nutrients currently thought to be of concern to cats with chronic renal failure include phosphorus, protein, and potassium. Phosphorus restriction appears to be more important than protein restriction in retarding the progression of chronic renal disease and its effects in dogs and rats. Dietary phosphate restriction may be helpful to cats with chronic renal failure, but clear benefits have not yet been documented. Unfortunately, the aversion of many cats to phosphate binders limits enthusiasm for their use. Because protein-containing ingredients are the primary source of dietary phosphate, a possible benefit of protein restriction is dietary phosphorus reduction. Dietary protein intake should be sufficient to maintain a lean body condition score of 3, a goal generally

achieved by consuming at least 2 g/lb/day of high biological value protein.

Recommending restriction of non-essential dietary protein for patients with uremia is based on the premise that this will decrease production of nitrogenous wastes, thereby ameliorating associated clinical signs such as anorexia, vomiting, uremic ulcers, lethargy, and weight loss. However, there is no proof that such an effect occurs in cats, or that consuming a restricted-protein diet slows the progression of renal disease. As a result, there is currently no reason to restrict protein intake in cats with no clinical evidence of renal disease, or in those with only mild azotemia. In fact, inadequate protein intake can cause protein depletion and its consequences, even in healthy cats. Potassium depletion is common in senior cats, especially those with renal insufficiency. Potassium replete, non-acidifying diets should be fed to help control hypokalemia. Although oral potassium supplementation of all cats with chronic renal failure has been advocated by some, there is presently not enough evidence to support such a recommendation. However, oral potassium supplementation is recommended when serum potassium levels fall below 4 mEq/l. Either potassium gluconate or potassium citrate can be used to correct hypokalemia, and may correct or prevent such associated effects as hypokalemic myopathy, reduced renal function, and anorexia. Potassium supplements also provide an alkalinizing effect and may limit progressive renal injury.

Metabolic acidosis is common in cats with chronic renal failure and has been shown to contribute to the progression of this disease. Thus, feeding urine-acidifying diets to patients with renal failure should be avoided. Most diets designed for renal failure patients are non-acidifying, and are beneficial in this respect. These diets are often restricted in phosphorus as well, which might help limit progression of renal disease and renal secondary hyperparathyroidism, with its resultant soft tissue mineralization and renal osteodystrophy.

Cardiovascular disease Patients with congestive heart failure may be obese or cachectic, so energy requirements vary. Potassium depletion is a potential problem associated with the use of loop diuretics, such as furosemide, in patients with congestive heart failure. Magnesium deficiency may be more common in cats with congestive heart failure than is generally recognized due to the feeding of magnesium-restricted diets and magnesium wasting induced by diuretics,

digitalis, and aldosterone. The feeding of urine-acidifying, magnesium-restricted diets to patients receiving diuretics or digitalis, or to patients with hypertension or hypokalemia should be avoided. Hypertensive cats may benefit from sodium restriction, but dietary change alone is frequently insufficient to lower blood pressure.

Hyperthyroidism Current nutritional recommendations are limited to assuring adequate caloric intake.

Neoplasia The food intake of cancer patients should be monitored closely, and support should be provided before weight loss occurs. Easily digested, highly palatable diets containing nutrients with high bioavailability may help the patient maintain nutrient reserves. If invasive support is necessary, the enteral route is the preferred approach. Due to the slower healing response of most cancer patients, gastrostomy or jejunostomy tubes should not be removed earlier than 2 weeks after placement, even if the patient's ability to eat returns before that time. Provision of enhanced quantities of arginine, carotene, cystine, fiber, glutamine, omega-3 fatty acids, and/or taurine has been recommended for feline cancer patients, but no validated dosages or supporting data are currently available for these nutrients.

Diabetes mellitus The primary goals of nutritional management of older diabetic cats are similar to those for younger cats: to attain and maintain optimal body condition (a BCS of 3), to minimize post-prandial fluctuations in blood glucose by feeding diets low in simple sugars, and to match the diet type, quantity fed, and times of feeding with the effects of exogenously-administered insulin or other therapy. Food intake should be monitored carefully in senior cats. The role of dietary fiber in the management of diabetes mellitus remains controversial.

Other diseases Older cats suffer from many diseases that also afflict younger cats. In such cases, diet and feeding recommendations for senior patients differ mainly by the greater concern for adequate nutrient intake in the face of decreased activity and appetite. Even though the relationship of diet to the formation and composition of uroliths is complex and incompletely understood, regardless of stone type, cats of all ages with a history of urolithiasis should be fed a high-moisture (canned food) diet and

encouraged to consume water. Since dietary allergens are believed by some to play a role in the pathogenesis of some cases of inflammatory bowel disease, dietary therapy may be helpful. Trial therapy with an easily digested diet containing a novel protein and carbohydrate source is frequently recommended. Incorporation of omega-3 fatty acids into the diet has been shown to have anti-inflammatory effects on the gastrointestinal mucosa, and may be of benefit to patients with inflammatory bowel disease. As in the management of diabetes mellitus, the role of dietary fiber in the management of IBD is unclear.

Feeding considerations

Owners should monitor the daily food intake of senior cats. A decrease in appetite is often an early sign of the worsening of a problem or the development of complications. Owners of sick elderly cats may encourage eating by offering favorite foods, feeding from wide, shallow bowls, warming or moistening the food, offering fresh food frequently and in a quiet environment, and petting the cat during feeding. Learned aversion (avoidance of a food because its presence has been associated with an unpleasant experience) can be induced in cats by offering novel foods, such as veterinary prescription diets, to sick, hospitalized cats. The risk of developing a learned aversion can be minimized by delaying introduction of a new diet until a sick cat's condition has improved. Patient health should not be compromised by offering only a therapeutic or prescription food specifically formulated to accommodate the patient's condition. It is better for an ill cat to eat something than to eat nothing at all.

For patients taking medication, drug/nutrient interactions may influence dietary intake or nutritional requirements. A list of common interactions can be found on the Internet at http://www.cahe.nmsu.edu/pubs/_e/e-507.html.

Like all recommendations made to clients concerning their cats, nutritional recommendations require consideration of the individual patient. Further, caution is advised when attempting to extrapolate the results of studies done on other species. It remains to be proven how similar old rats, dogs, and people are to old cats. Keeping normal older cats in moderate body condition, feeding them satisfactory diets, and encouraging physical activity will go a long way toward helping them reach their genetic life expectancy.

Oral cavity disease in senior cats

Oral cavity disease is an often overlooked cause of significant morbidity in the older cat, and can contribute to a general decline in attitude and overall health. Appropriate treatment often leads to a marked improvement in quality of life and activity. However, the clinical signs of periodontitis, gingivitis, stomatitis, dental disease, oral ulcers or oral cavity tumors may go unnoticed by some owners. Inappetence, weight loss, halitosis, chattering teeth, abnormal chewing and/or swallowing behavior, decreased grooming, or nasal discharge (usually unilateral) are common signs, but may be unobserved or attributed to other causes. Infection often accompanies oral cavity disease and may result in intermittent bacteremia or septicemia. This may in turn lead to disorders in other body systems including hyperglobulinemia due to immune stimulation, immune-complex renal disease, chronic interstitial nephritis, hepatitis, and possibly cardiovascular disease. In addition to secondary diseases, oral disease can cause changes in diagnostic test results due to hyperglobulinemia (increased total protein and globulins), reactive hepatopathy (increased ALT), and septicemia (neutrophilia, doehle bodies, and toxic changes). These changes should not delay anesthesia and treatment of dental disease.

Although some gross lesions will be visible during routine inspection, a thorough oral cavity examination cannot be performed in most cats without sedation or anesthesia (see 'Geriatric Anesthesia'), especially if the mouth is painful. The examination should include careful inspection of the lips, gingiva (including measurement of the depth of periodontal pockets), teeth (including evaluation for resorptive lesions), all surfaces of the tongue, the oropharynx, the nasopharynx, and the larynx. Oral cavity radiographs are recommended if significant periodontal disease is identified, or if retained dental roots, resorptive lesions, bone lesions, or apical abscesses are suspected. In fact, radiographic evaluation is suggested if any oral lesions are detected (for example, neoplasia may be misdiagnosed as gingivitis). The best detail is obtained with dental radiographic film but standard high detail radiographic film can be used. Standard X-ray machines can provide good results with either film type if appropriate exposures and techniques are used. However, dental X-ray units are more versatile, easier to use and require minimal manipulation of the patient in the production of high-quality dental

radiographs. It should be noted that changes induced by the aging process are sometimes difficult to differentiate radiographically from early or mild periodontal disease. With normal aging, the density of supportive bone increases and the lamina dura is less discernible. The indistinct lamina propria could be misinterpreted as periodontal disease. The increased bone density could be misconstrued as sclerosis, or a response to chronic bone inflammation.

Following inspection and radiographic examination, biopsies should be obtained for cytologic and histopathologic examination from areas of abnormality, particularly if there is concern about the character of the lesion and neoplasia is suspected. Treatment of existing dental disease, periodontitis, and gingivitis should then proceed as necessary and appropriate. Routine use of antimicrobials is controversial. Additional medications may be prescribed depending on the physical findings and results of biopsies or procedures. If an invasive, neoplastic lesion is identified, further evaluation and treatment should be pursued. A complete description of the results of the oral cavity inspection, procedures performed, results of biopsies, and therapeutic recommendations should be recorded in the patient record. This should include a chart of the dentition; areas of disease, depth of periodontal sulci and tooth loss should be clearly identified. Because care of the oral cavity should be an ongoing process, maintaining good records is essential to monitor changes and document improvement or disease progression.

Owner participation in the oral health care program will improve results and slow the progression of disease in many cats. The client should be given a clear description of the plan for future dental care, including options for home care. These options include tooth brushing, cleaning the teeth with gauze, enzymatic dentifrice placed in the mouth, CET[®] chews, and Prescription Diet[®] Feline t/d[®] brand pet food (if not contraindicated because of specific nutritional requirements). The home care program should fit the owner's expectations, abilities, and lifestyle. Re-evaluation schedules, diets, and routine dental prophylaxis visits for a particular patient will vary depending on these factors as well as any coexisting health problems.

Pet loss, euthanasia and grief management

As veterinarians, one of our most important roles is to understand and respect the human–animal

bond, and the impact that pet loss can have upon our clients. Helping owners prepare for the loss of an aged pet and the grief that can occur is a valuable and memorable service that we can offer. It can affect the pet owners' ability to cope with the loss of a beloved pet and can make the difference as to whether they will have a pet again.

During euthanasia, there are several steps that can facilitate the process for clients. Clients should understand that euthanasia is the act of causing death without pain. It is a humane option for terminally ill cats, or for those with a poor quality of life unresolvable by medical intervention. The veterinarian's role is to provide information and help the owner reach a decision; care should be taken to not judge or condemn. The decision ideally should involve the participation of the entire family. Advanced planning may help the family prepare for the eventual loss of a beloved pet.

Client presence during euthanasia should be permitted, as it is often beneficial to the grieving process. Clients should be treated with compassion and the process carried out with respect and reverence, ideally in a private room. Euthanasia at home can be comforting to both client and pet and should be considered in select situations. It is important to discuss beforehand the options for care of the remains, and to describe what may occur during the euthanasia process (eg, failure of the eyes to close, protrusion of the tongue, muscle spasms, agonal respirations, or elimination). The client should sign a euthanasia consent form if at all possible. In certain situations, such as during a medical emergency or surgery, an immediate decision may be warranted in the absence of the client. In these instances, it is appropriate to obtain telephone permission with a third party witness, and to document the information in the medical record.

Pre-placement of an intravenous catheter and tranquilization prior to euthanasia usually help minimize complications. Auscultating the thorax after giving the euthanasia injection and pronouncing the cat dead helps clients with closure. After the euthanasia, the client should be given time alone with the cat if desired. The body can be covered, or partially covered, showing only the head. Some clients like to brush the cat, clip fur to save, or position the body, often with a favorite toy or blanket.

Clients and members of the veterinary team should not be afraid to express their own feelings of grief. Discussions about the grieving process may be important, since many owners are not aware that their grief may equal that associated

with the loss of a human loved one. However, emotional support from co-workers and friends may be non-existent. Pet owners should be made aware of written materials that discuss pet loss, pet loss support groups and hot-lines, and other support options (see [Appendix A](#)). Within a few days of pet loss, contacting the client by phone, condolence card, or personal letter is encouraged. Clients may be comforted by making a contribution to a cat-related charity in their cat's memory.

Appendix A. Sources of client assistance

Pet loss support hot-lines

University of California-Davis: 916-752-4200
 University of Florida: 352-392-4700; then dial 1 and 4080
 Michigan State University: 517-432-2696
 Chicago Veterinary Medical Association: 630-603-3994
 Virginia–Maryland Regional College of Veterinary Medicine: 540-231-8038
 The Ohio State University: 614-292-1823; petloss@osu.edu
 Tufts University: 508-839-7966
 Cornell University: 607-253-3932
 Iowa State University: 888-478-7574

Client information brochures

Pet Loss, available from the AVMA
When Your Animal Dies, available from the AVMA
Special Needs of the Older Cat, available from the Cornell Feline Health Center
Aging Pets, available from AAHA
Diabetes in Cats, available from the Cornell Feline Health Center
Inflammatory Bowel Disease, available from the Cornell Feline Health Center
Owner's Guides to Pet Care (kidney disease, heart disease, diabetes mellitus, oral care, weight management), available from Hill's Pet Nutrition, 1-800-892-4621
Pet Wellness, available from IDEXX Laboratories, Inc. at 1-800-248-2483
Facts about Blood Testing, available from IDEXX Laboratories, Inc. at 1-800-248-2483

Books for Owners

Your Aging Cat, Kim Cambell Thorton and John Hamil, DVM

The Cornell Book of Cats, Mordecai Siegal, ed.
The Well Cat Book, Terry McGinnis, DVM
When Your Pet Dies: How to Cope with Your Feelings, Jamie Quackenbush, MSW and Denise Graveline
A Final Act of Caring: Ending the Life of an Animal Friend, Mary and Herb Montgomery

Books For Children

Because of Flowers and Dancers, Sandra Breckenridge
The Tenth Good Thing About Barney, Judith Viorst
Goodbye My Friend, Mary and Herb Montgomery

Web sites

AVMA Pet Loss Page: www.avma.org/care4pets/avmaloss.htm
 Iowa State University Pet Loss Support Hotline: www.vetmed.iastate.edu/support
 Delta Society Pet Loss and Bereavement: www.petsforum.com/deltasociety/dsn000.htm
 Cornell Feline Health Center: web.vet.cornell.edu/public/fhc/FelineHealth.html
 American Animal Hospital Association: www.healthypet.com
 Hill's Pet Nutrition: www.hillspet.com
 Morris Animal Foundation: www.MorrisAnimalFoundation.org
 Cat Fancy On-Line Feline Library: www.animalnetwork.com/cats/library
 Winn Feline Foundation: www.cfainc.org/winn/winn.html
 Feline CRF Information Center: www.best.com/~lynxpt

Appendix B. Associations

American Veterinary Medical Association: 1-800-248-AVMA; www.avma.org
 American Association of Feline Practitioners: 1-800-204-3514; www.avma.org/aafp
 Cornell Feline Health Center: 607-253-3414; web.vet.cornell.edu/public/fhc/FelineHealth.html
 American Animal Hospital Association: 1-800-883-6301; www.healthypet.com
 The Delta Society: 1-800-869-6898; www.petsforum.com/deltasociety

C. Pre-Examination History Checklist

Owner's Name: _____

Date: _____

Pet's Name: _____

Age: _____

	No	Mild	Moderate	Severe	When did problem begin?
1) Weight gain ____ Weight loss ____					
2) Appetite: Increase ____ Decrease ____					
3) Vomiting ____ Diarrhea ____					
4) Constipation/difficult defecation					
5) Increased drinking ____ Increased Urine ____					
6) Lumps/tumors ____ Skin Problems ____ Describe: _____					
7) Bad breath / Sore gums / Difficult chewing					
8) Decreased awareness – gets confused/lost					
9) Housesoiling ____ Spraying ____ Describe: _____					
10) Decreased recognition of people, animals or previously learned commands Describe: _____					
11) Decreased affection / interaction with owners					
12) Chewing, licking, eating non-food items Describe: _____					
13) Increased irritability / aggression					
14) Increased fear / anxiety					
15) Decreased tolerance of handling					
16) Decreased hearing or "selective hearing"					
17) Repetitive behaviors e.g. pacing, overgrooming Describe: _____					
18) Decreased grooming or self care					
19) Muscle tremors / shaking					
20) Weakness / incoordination					
21) Difficulty climbing stairs / increased stiffness					
22) Decreased activity – sleeps more					
23) Excessive vocalization: Day ____ Night ____					
24) Waking owners at night					
Other problems / concerns: _____					
Medications: _____					
Existing Medical problems: _____					

D. Monthly Checklist for a Happy, Healthy Kitty!

If any answer is "No", please call us... It's important to your cat's health!

1-888-555-CATS

	Month 1	Month 2	Month 3	Month 4
My cat:	Yes/No	Yes/No	Yes/No	Yes/No
1) is acting normal - active and in good spirits				
2) does not tire easily with moderate exercise				
3) does not have seizures or fainting episodes				
4) has a normal appetite, with no significant weight change				
5) has a normal thirst and drinks the usual amount (approx. 1 oz. per pound per day or less)				
6) does not vomit or regurgitate undigested food				
7) has normal appearing bowel movements (firm/formed with no blood or mucus)				
8) urinates in usual amounts and frequently, color is normal				
9) always uses the litter box and there is no offensive household pet odor				
10) has no offensive habits (biting, digging, chewing, scratching, spraying)				
11) has gums that are pink with no redness, swelling, or bleeding				
12) has clean, white teeth, free from plaque, tartar or bad breath				
13) has a moist nose, free from discharge or sneezing				
14) has eyes that are bright, clear and free of discharge				
15) doesn't drag its bottom or chew itself excessively				
16) has a full, glossy coat with no missing hair, no mats or excessive shedding				
17) doesn't scratch, lick, or chew itself excessively				
18) has skin that is free from dry flakes, thinning haircoat, is not greasy, and has no bad odor				
19) is free from fleas, ticks, lice or mites				
20) has a body that is free from lumps/bumps				
21) has ears that are clean and odor free				
22) doesn't shake its head or scratch its ears				
23) has normal hearing and reacts as usual to its environment				
24) walks without stiffness, pain or difficulty				
25) has healthy looking feet and short nails				
26) breathes normally, without straining or coughing				

E. Examination Form



ABC Cat Clinic • Main Street • Anytown, USA • Tel. 555-555-CATS Fax 555-555-0000

Client _____ Cat _____ Date _____

Examined by: _____ Technician/Assistant _____

1. ATTITUDE

☐ Normal/Alert ☐ Other _____

2. HYDRATION

☐ Normal ☐ Other _____

3. COAT & SKIN

☐ Normal ☐ Flea comb negative

☐ Other _____

4. EYES

☐ Normal ☐ Other _____

5. EARS

☐ Normal ☐ Other _____

6. NOSE & THROAT

☐ Normal ☐ Other _____

7. MOUTH, TEETH AND GUMS

☐ Normal

☐ Tartar ☐ Mild ☐ Mod ☐ Severe

☐ Gingivitis ☐ Mild ☐ Mod ☐ Severe

☐ Mucus membrane color ☐ Pink ☐ Pigmented

☐ Other _____

8. LEGS AND PAWS

☐ Normal ☐ Other _____

9. WEIGHT

☐ Normal ☐ Other _____

☐ Overweight by _____ ☐ Underweight by _____

10. HEART

☐ Normal ☐ Slow ☐ Fast (HR = _____)

☐ Murmur Grade (_____ / VI)

☐ Other _____

11. LUNGS

☐ Normal ☐ Other _____

12. ABDOMEN

☐ Normal ☐ Other _____

13. GASTROINTESTINAL SYSTEM

☐ Normal ☐ Other _____

14. UROGENITAL SYSTEM

☐ Normal ☐ Other _____

15. LYMPH NODES, TONSILS, & THYROID GLANDS

☐ Normal ☐ Other _____

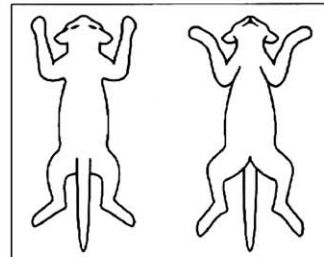
16. CENTRAL NERVOUS SYSTEM

☐ Normal ☐ Other _____

Weight _____ Temp _____ (Normal < 101-102.5°F)

Age _____ F FS M MN

Diet _____



LAB WORK

☐ Feline leukemia virus _____

☐ Feline immunodeficiency virus _____

☐ Fecal flotation _____

☐ Baseline testing _____

☐ Geriatric profile _____

☐ Heartworm test _____

☐ Urinalysis _____

☐ Other _____

RECOMMENDED HANDOUTS

☐ Vaccine risk vs. benefits

☐ Dental protocol

☐ Rec. for cats that go outdoors

☐ Flea treatment protocol

☐ Explanations of diagnostic testing

☐ Introducing your new cat

☐ Heartworm information

DESCRIPTION (Numbers below correspond to numbers above)

Vaccines given today ☐ FVRCP / SN: ☐ Rabies # - (yr)

☐ Feline leukemia / ☐ Other _____

Future vaccines ☐ FVRCP ☐ in 3-4 weeks ☐ Other _____

☐ Rabies ☐ in 3-4 weeks ☐ Other _____

☐ Feline leukemia ☐ in 3-4 weeks ☐ Qther _____

☐ Other _____

Assessment

Recommendations

Next Visit

[illegible]

G. Diagnostic Tests for Common Geriatric Diseases

	Chronic Renal Failure	Hyperthyroidism	Diabetes mellitus	Inflammatory Bowel Disease	Cancer
CBC*	+	+	+	+	+
Chemistry Profile**	+	+	+	+	+
T₄	+	+	+	+	+
Urine Analysis	+	+	+	+	+
FeLV/FIV***	+	+	+	+	+
Blood Pressure	+	+	+	+/-	+/-
Abdominal Radiographs	+	-	+	+	+
Thoracic Radiographs	-	+	-	-	+
Urine Culture and Sensitivity	+	-	+	-	-
Endoscopy	-	-	-	+	+/-
Biopsy	+/-	-	-	+	+
Echocardiography	+/-	+/-	+/-	-	-

* Includes hematocrit, red blood cell count and parameters, white blood cell count, differential white cell count evaluated by cytology, total protein, and platelet count

** Includes albumin, BUN, Cr, glucose, ALT, ALP, GGT, bilirubin, Na, K, Cl, Ca, P, TCO₂, and anion gap

*** for cats not previously tested or at risk of exposure



These Recommendations are based on sound principles, research, experience and technical judgements as of the time of preparation. While the information is intended to be accurate, thorough and comprehensive, it is subject to change in light of developments in research, technology and experience.

The Recommendations are not exclusive, and other techniques and procedures may also be available.

AAFP and AFM expressly disclaim any warranties or guarantees, express or implied, and shall not be liable for damages of any kind in connection with the material, information, techniques, or procedures set forth in the Recommendations.

For more information regarding the AAFP and the Academy of Feline Medicine please contact:

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IDEXX



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