SUPPLEMENT THE ORTHOPEDIC CARE IN YOUR PRACTICE
Donna M. Raditic DVM, DACVN

It should be acknowledged that owners use diets, supplements, herbs, massage, and acupuncture in their own health care and the expectation is for today’s veterinarian is to have a basic knowledge of these complementary modalities for pets. The NIH has renamed the National Center for Complementary and Alternative Medicine (NCCAM) in 2014 to the National Center for Complementary and Integrative Medicine (NCCIM) recognizing that Americans no longer consider “complementary” approaches as “alternatives” to conventional medical care. The NCCIM has reported that more than half of Americans report using a dietary supplement and that the scientific foundations for complementary approaches are needed.

In a recent report, pet supplements sales were reported to be $541 billion in 2014 with a forecasted increase of 29% in 2019. Forty five percent of these sales were from pet stores, 35% from veterinarians, and the reminding 20% from on-line or major stores such as Target and Walmart. Consumers reported wanting to use supplements for joints, cardiac, skin, and digestive issues in their pets.

Supplements are defined by the AVMA as a macronutrient or micronutrient often used as a therapeutic agent. Veterinarians should understand how to use supplements safely and effectively as part of treatment plans. We consider supplements medical therapy that is integrated into conventional medical plans for our patients; therefore we prescribe supplements. Using supplements as part of treatment plans thoughtfully and effectively can improve patient outcomes and client satisfaction.

In human medicine, integrative medicine is defined as combining complementary approaches into conventional treatment plans as an integrative health care approach. The growth of integrative health care is being seen in hospitals, hospice centers, and military health facilities. The goal of integrative health care is to enhance overall health, prevent disease and alleviate debilitating symptoms in patients with complex and chronic diseases. These are the same goals we have for veterinary patients with chronic diseases. Understanding complementary therapies and integrating them into conventional veterinary treatment plans while improving patient care can increase services and revenues in private practices.

Osteoarthritis (OA) is the most common form of arthritis ranking as the 6th leading cause of disability globally in the human population. In veterinary medicine OA is the most common orthopedic disease in dogs and the prevalence of musculoskeletal disorders in all dogs has been report as one in four at multicenter referral practices. Osteoarthritis occurs commonly in cats; however, there is a paucity of research in the role of nutrition or nutritional compounds in management. Strategies to modify the inflammatory environment present within joints can include the use of supplements.

Traditionally OA has been regarded primarily as a degenerative process and most often a consequence of aging. Treatments focused solely on symptomatic management rather than halting disease progression will fail as research revisits the role of inflammation in OA. The same inflammatory cytokines that drive rheumatoid arthritis have been shown in canine and feline OA including IL-1, IL6, and TNFα. Studies suggest IL-1β and TNFα occupy a key role in the development of OA, with elevated levels of these cytokines and/or their gene expression reported in synovial tissues, synovial fluid and/or plasma. Investigating the role of individual supplements in
maintaining the normal anabolic and catabolic processes in the OA niche and attendant inflammatory milieu can be used as preventative, regenerative and maintenance strategies for bone or cartilage in OA.

Understanding the pathophysiology of osteoarthritis, allows the practitioner to understand how complementary supplements can be integrated into patient management plans. Specific OA supplements have been evaluated in dogs or in vitro using canine cells. Supplements that are evaluated include chondromodulating agents (glucosamine and/or glucosamine chondroitin sulfate), which can be prescribed parentally and orally. Other supplements that are evaluated include omega-3 (n-3) fatty acids, Boswellin or Indian frankincense, avocado/soybean unsaponifiables, and curcumin. There is evidence based research for these supplements as well as discussion of potential mode of action. Using supplements preemptively should be considered in patients at risk i.e. post orthopedic, performance/working dogs and geriatrics.

Clients are familiar with OA, perceive their pet is in pain and recognize it impacts quality of life. All too often we are euthanizing patients with poor mobility because of advanced OA. Today’s owners are requesting and want plans to proactively prevent, treat and manage OA in their pets. Case examples will assist the practitioner in selecting supplements, prescribing them, and evaluating their effect in managing the patient with OA.

References available upon request
SUPPLEMENT THE ORTHOPEDIC CARE IN YOUR PRACTICE II
Donna M. Raditic DVM, DACVN

Veterinarians should consider the proactive use of supplements especially in dog breeds prone to the genetic disease, developmental orthopedic disease (DOD). Both nutrition and genetics play a role in developmental orthopedic disease (DOD) in the large breed puppy. There is evidence based research that suggests using supplements preemptively may improve outcomes in osteoarthritis. These studies and clinical experience support the proactive use of supplements in DOD breeds and other patients that may be predisposed to developing OA.

We have found owners are appreciative and responsive to using safe and prescribed supplements to prevent the development of OA. We also recommend using therapeutic joint diets as is part of a program to prevent DOD. Currently one of the therapeutic joint diets, Purina JM is labelled both for growth of puppies and maintenance of the adult dog. Case examples will enable practitioners to understand how to combine nutrition and supplements to proactively manage DOD and OA at risk patients.

Glucosamine chondroitin and n-3 fatty acids are now incorporated into therapeutic joint diets. The n-3 fatty acids currently recognized are Eicosapentaenoic acid (EPA) and Docosahexaenoic acid (DHA). It should be noted there is a reported NRC upper safe limit for n-3 fatty acids, specifically EPA. The levels currently in therapeutic joint diets allow for additional supplementation of approximately 50 mg of EPA+ DHA/kg body weight per day, but careful selection of supplement and diet is indicated. Problems with over supplementation can create dietary imbalances as well as gastrointestinal issues.

The therapeutic joint diets and their content of total n-3 fatty acids in mg per 100 kcal as well as glucosamine and chondroitin (ChSO4) content in mg per 100 kcal of diet has been determined. Reported dosing for glucosamine supplementation is 25-50 mg/kg/day and chondroitin is 15-40mg/kg/day. Calculations demonstrate that the levels of these supplements in the therapeutic joint diets are low compared to these doses. Additional supplementation of glucosamine chondroitin can be given safely with therapeutic joint diets.

Evaluating supplements for the use in orthopedic diseases can be challenging. There are many products available on the market containing single active ingredients as well as combinations of ingredients. Selecting appropriate supplements for preventing OA in a DOD as well as the geriatric patient can be challenging. Understanding patient assessment, treatment goals, and what role nutrition and supplements play in OA will enable the astute practitioner to prescribe safe and effective joint diets and/or supplements.

It is important to note there is little regulation of supplements as compared to the pharmaceutical industry. Unlike the pharmaceutical industry and even the pet food industry, supplements are manufactured and sold with little regulation. We recommend the following as guidelines and sources of information for practitioners to consider when using supplements in the management of orthopedic patients and other diseases:

- National Animal Supplement Council (NASC) [http://www.nasc.cc/]
- Consumerlab.com
- Do you know the manufacturer?
- Does the manufacturer provide contact information that is immediately accessible?
- Are there studies on efficacy and safety?
- Products should have lot number and expiration date on the label
- Is there a guaranteed analysis?
- Can you readily identify the active ingredients? Is the recommended amount expressed in an exact measurement i.e. 1 tab is 5 grams, 1 teaspoon is 5 mls
- Can you readily identify inactive ingredients and fillers?
- Common sense, investigate, contact company
- Determine the cost by determining the cost/active ingredient i.e. $/mg of EPA + DHA

Recent reviews include the following:
- Vanderweerd, et al, JVIM 2012; 26:448

References available upon request
SUPPLEMENT THE INTERNAL MEDICINE CARE IN YOUR PRACTICE
Donna M. Raditic DVM, DACVN

Veterinarians should acknowledge that owners use diets, supplements, herbs, massage, and acupuncture in their own health care and the expectation is for today’s veterinarian is to have a basic knowledge of these complementary modalities for pets. The NIH arm for complementary medicine, the National Center for Complementary and Integrative Medicine (NCCIM) recognizes that Americans no longer consider complementary approaches as “alternatives” to conventional medical care. The NCCIM has reported that more than half of Americans report using a dietary supplement. Veterinarians should recognize clients will be requesting information on supplements for the healthcare and treatment of their pets.

In a large survey by MotiveQuest in 2014 veterinarians define preventative care as vaccines, neutering, and parasite control. In this survey pet owners when asked to define a preventative care program respond, “What about my pet’s diet, exercise, care, play and emotional wellbeing?” This presents a significant opportunity to build strong relationships with pet owners and promote the need for preventative health care at every life stage and in disease management.

In human medicine, integrative medicine is defined as combining complementary approaches into conventional treatment plans as an integrative health care approach. The growth of integrative health care is continuing and its goals are to enhance overall health, prevent disease and alleviate debilitating symptoms in patients with complex and chronic diseases. These are the same goals we have for our pet patients with chronic internal medicine diseases. Understanding complementary therapies and integrating them into conventional veterinary treatment plans can improve patient care while increasing service and revenues in practice. In our clinical experience we have also learned that thoughtful and safe integrative therapies can play a role in preventative health care programs.

The AVMA Guidelines for Complementary and Alternative Veterinary Medicine states: “claims for safety and effectiveness ultimately should be proven by scientific method. Circumstances commonly require that veterinarian’s extrapolate information when formulating a course of therapy. Veterinarians should exercise caution in such circumstances.” When using supplements, we are often extrapolating, but safe supplements are routinely prescribed by veterinary internists’ today especially in hepatic diseases. Other internal medicine cases could benefit from judicious supplements as part of long term management. We recognize in clinical practice that evidence based medicine may be a triad of the practitioner’s clinical expertise, patient’s values and expectations along with the best external evidence.

We have evaluated the evidence based research available to use safe supplements to complement conventional treatment plans for patients with urologic, gastrointestinal (GI), and dermatological diseases. These cases are seen on a daily basis by the general practitioner and can be challenging as some of these patients develop progressive symptoms and chronic disease states that require continual management. Common pathophysiology pathways are seen in these diseases to include inflammation, reactive oxidative species, barrier dysfunction and inappropriate immune responses. In our experience, using thoughtful supplements and specific nutrition concepts that are targeting these pathologic states can be integrated into conventional treatment for improved outcomes.
We will explore some of the options for using supplements and/or nutrition for improved management of internal medicine diseases. The astute practitioner will learn that the proactive use of supplements and nutrition may prevent chronic refractory disease states in their patients. Case examples will be provided to enable the practitioner to prescribe safe supplements and specific diets to improve patient outcomes.

References available upon request
SUPPLEMENT THE INTERNAL MEDICINE CARE IN YOUR PRACTICE II
Donna M. Raditic DVM, DACVN

Urology is literally the study of urine, but usually infers the study of normal processes and diseases of the lower urinary tract. In veterinary medicine, lower urinary tract disorders especially urinary tract infection (UTI) and urolithiasis occur commonly in the dog and cat. UTIs can be challenging to treat or to prevent because of their recurrent nature. Interestingly in human urology, urinary tract infections, prostatic and urolithiasis are the three most prominent lower urinary tract diseases. Strategies to prevent recurrence are similar in both human and veterinary medicine for these lower urinary tract diseases.

Urinary tract infections

It is critical for the practitioner to be able to develop rational diagnostic and therapeutic plans for the patient with a UTI. Urinary tract infection occurs when there is compromise of host defense mechanisms and a microbe adheres, multiplies and persists in the urinary tract. Normal host defenses include normal micturition, mucosal barrier, urine properties and systemic immunocompetence. Common bacterial UTI occur from ascending pathogens from the genital tract and urethra to the bladder, ureters and one or both of the kidneys. The bacterial reservoirs for a UTI are rectal, perineal, and genital bacteria, which overwhelm host defenses.

The question that is first considered is whether an infection is uncomplicated or complicated. Antibiotics are the cornerstone of treatment of bacterial UTI and ideally are selected based on culture and sensitivity. Simple infections resolve in approximately 2 weeks of therapy. Persistent or recurrent UTIs (RUTIs) that involve refractory bacterial isolates can be difficult to treat using conventional antimicrobial therapy alone. In both human and veterinary medicine, Escherichia coli is the most common cause of UTIs. In RUTIs, there is an increase in resistance of common urinary pathogens because of the overuse and misuse of antimicrobials.

Because of the growing concern for antimicrobial resistance, other complementary therapies are being evaluated extensively in the human literature. The evidence base use of relevant and practical complementary therapies for UTI in dogs and cats include cranberry supplements, D-mannose, oral probiotics, and herbs/herbal preparations. From evaluation of the research and clinical experience we have successfully used nutrition, D-mannose and/or probiotics in the treatment of RUTIs.

Urolithiasis

Urolithiasis occurs commonly in dogs and cats with most uroliths occurring in the lower urinary tract. It has been reported that 80 to 90% of lower urinary tract uroliths are struvite or calcium oxalate. Urolith formation is a complication of several disorders, some which are easily recognized and corrected such as infection induced struvite uroliths. Practitioners are also faced with uroliths where the underlying etiopathogenesis is unknown as seen in the formation of calcium oxalate uroliths.

Conventional therapies such as surgery and medical dissolution are the standard treatments for common urolithiasis in dogs and cats. Medical dissolution of infection induced struvite uroliths includes appropriate antibiotic therapy and feeding a struvite dissolution diet. Instead of the
conventional use of dissolution diets, the use of a urine acidifier D, L methionine 75-100mg/kg by mouth every 12 hours with appropriate antibiotic therapy has been reported for infection induced struvite dissolution.

Currently there is no known medical dissolution of calcium oxalate urolithiasis in the dog or cat; therefore, uroliths are removed surgically or by voiding urohydropropulsion. Calcium oxalate urolithiasis is recurrent and preventative strategies are warranted. The goals of dietary management recommended include reducing urine calcium and oxalate concentration, promoting high concentrations of urolith inhibitors, reducing urine acidity and promoting dilute urine.

The use of canned diets, flavoring water, adding water to dry foods, and high moisture homemade diet formulations have been used to promote dilute urine and successfully manage calcium oxalate urolithiasis. Diets higher in fiber or prebiotics may also be considered for calcium oxalate urolithiasis. Homemade diets can be used to provide a more customized approach to recurrent calcium oxalate urolithiasis and has been recommended in refractory cases. Potassium citrate is often contained in therapeutic diets designed for urolithiasis prevention, but it also can be added to a homemade diet to promote alkaline urine. A target urine pH of 6.6 to 7.5 is suggested in dogs and cats at risk of recurrence.

There has been an interest in the use of probiotics and calcium oxalate urolithiasis as mammals do not have the enzyme required to metabolize oxalate in the gut. There have been reports of reduced prevalence of Oxalobacter formigenes, an oxalate degrading bacterium in stone forming populations. Studies looking at the use of oxalate-degrading bacteria as probiotics have demonstrated the potential as a complementary therapy in the prevention of recurrent calcium oxalate urolithiasis.

**Adverse reactions to food: dermatology and gastroenterology**

An adverse reaction to food is defined as a clinically abnormal response attributed to an ingested food substance, and may be further categorized as immunologic or non-immunologic in nature. Food allergy is an immunologically mediated, reaction to ingested food. This is different than food intolerance, which is a non-immunologically mediated adverse reaction including toxic reactions, pharmacological reactions, metabolic reactions and idiosyncratic reactions.

The practitioner may easily manage a non-immunologic adverse food reaction i.e. a dog getting into the garbage, with a simple 24 hour fast and bland diet. Immunological mediated adverse food reactions such as food allergies may be more challenging. Food allergies may present alone or potentially with canine atopic disease, another difficult immune based disease.

Food allergies often include both dermatologic and gastrointestinal signs. Dermatologic signs often include pruritus, erythema, otitis and secondary pyoderma. Gastrointestinal signs may include vomiting and/or diarrhea, flatulence, perianal fistulae, frequent bowel movements and anorexia. Other potentially associated disorders which are less commonly noted include cholangiohepatitis/cholangitis, feline asthma and idiopathic epilepsy.

It should be noted that the etiopathogenesis of both food allergies and canine atopic dermatitis include the concept of disruption of the mucosal integrity and skin barrier, respectively to handle
antigenic proteins. Perhaps early recognition of a patient with recurrent dermatologic and/or gastrointestinal symptoms may alert the proactive veterinarian to intervene before the patient suffers from chronic, persistent immunologic adverse food reactions and/or atopic dermatitis. The proactive use of diet, probiotics and prebiotics as complementary therapies in at risk patients will be presented. Case examples will illustrate the use of proactive integrative therapies we have used to prevent overt and refractory disease states.

**Inflammatory bowel disease**

Inflammatory bowel disease (IBD) is an immune mediated disease which is **not due to food allergy and/or intolerance**. It is an idiopathic disorder that is associated with persistent or recurrent GI signs, characterized by histologic evidence of inflammation with no discernible cause. It is not due to infectious, neoplastic, or metabolic disease. We will include it in this discussion as an idiopathic immunological disease of the gut where a dysregulated immune response to components of the commensal (nonpathogenic) flora may play an important role in induction and perpetuation of chronic intestinal inflammation. There also is a genetic predisposition being identified especially in the German shepherd.

Understanding of role of mucosal barrier, antigens and the intestinal microbiome are critical to develop successful strategies to proactively manage at risk dogs and cats. Intervention with diet including therapeutic novel protein diets, hydrolyzed diets and homemade diets can be used to proactively treat the at risk patient. Probiotics and prebiotics (fiber) may also enable the astute practitioner to treat before severe disease develops and multiple immunosuppressive therapies are needed.

References available upon request
Cancer is an important disease in dogs and represents one of the major causes of death accounting for 27% of all deaths in purebred dogs in the UK. In the absence of reliable historical tumor registries, it is difficult to know whether the prevalence of cancer in dogs is increasing; however, a number of factors may contribute to an increase in the diagnosis of cancer in dogs. As a result of improvements in health and welfare animals are living longer and cancer is generally a disease of older age. Advances in veterinary medicine, particularly diagnostics and higher expectations of the pet owning public are likely to result in an increased rate of diagnosis.

Integrative medicine is the use of complementary therapies with conventional medicine systems. “Integrative medicine” and “integrative oncology” are appropriate terms describing the adjunctive role of complementary therapies as part of multidisciplinary mainstream cancer care. These complementary therapies can include herbs, supplements, acupuncture, massage, and other therapies which are rational and evidence based. They are known to alleviate physical and emotional symptoms, improve quality of life (QOL), and may improve adherence to oncology treatment regimens. The demand for an integrative medicine approach is growing and veterinarians are being challenged to understand and provide these types of therapies.

Herbs and dietary supplements (HDS) are the most accessible form of complementary and alternative therapy. In one report 68% human population in the United States used some form of a HDS. In 2010, US herbal supplement sales exceeded $5.2 billion. Between 67 and 87% of woman with breast cancer and those 9 years post diagnosis are reported to use supplements. These patients often do not report supplement use to their provider. In veterinary oncology, a study reported that 67% of clients used supplements with their pets. In this study, it was determined the use of complementary and alternative veterinary medicine (CAVM) was commonplace in this population.

Clients using complementary care for their own health care will want these options for their pets. The astute practitioner will embrace this and offer complementary care for cancer patients. The expectation is for today’s veterinarian is to have a basic knowledge of these alternative modalities for pets, especially with cancer, chronic illnesses and geriatrics. Because the veterinary oncology patient has a shorter lifespan and the economics of treatment(s) is different, the focus on quality of life (QOL) comes to the forefront of a treatment plan. An integrative approach to veterinary clinical oncology should target many physiological and biochemical tumor pathways while minimizing normal tissue toxicity and supporting overall well-being or QOL.

Assessment of the evidence base for the use of relevant HDS was evaluated by an extensive literature search in dog/cat or in vitro using dog/cat cells and then HDS in other species, including humans or in vitro cell lines. The relative strength of evidence has been considered, noting there are no meta-analysis and only a few randomized controlled clinical trials (RCCT) using HDS in veterinary oncology.

RCCT of herbs include the use of mushroom extracts. The use of Coriolus versicolor mushroom commonly referred to as cloud or turkey tail mushroom in 15 dogs with splenic hemangiosarcoma was done as a pilot study. The study enrolled 15 dogs with hemangiosarcoma
with splenectomy only and treated them with three dosing levels of the extract. The use of a known supplement containing S-adenosylmethionine (SAMe) and silybin, the latter being a flavolignan of milk thistle (Silybum marianum) was evaluated in an RCCT of dogs with lymphoma, mast cell tumor or histiocytic carcinoma. Dogs were prospectively randomized to receive either concurrent supplement during CCNU chemotherapy or to receive CCNU alone. The study evaluated the hepato-protective effects of the supplement when used with known hepatotoxic drugs.

There are some cancer studies in other species and many in vitro studies demonstrating the effects of HDS and their antitumor mechanisms. However, most of these treatments seldom progress to quality multi-institutional RCCT trials evaluating response rate and survival statistics. This is because of the nature of herbal medicine that precludes patenting; therefore funding for these types of studies is limited. Some extrapolation from these studies will be reviewed for their potential use in integrative veterinary oncology care.

References available upon request
Integrative medicine is the use of complementary therapies with conventional or traditional western medicine systems. “Integrative medicine” and “integrative oncology” are appropriate terms describing the adjunctive role of complementary therapies as part of multidisciplinary mainstream cancer care. These complementary therapies can include herbs, supplements, acupuncture, massage, and other therapies which are rational and evidence based. The demand for an integrative medicine approach is growing and veterinarians are being challenged to understand and provide these types of therapies.

Because the veterinary oncology patient has a shorter lifespan and the economics of treatment(s) is different, the focus on QOL comes to the forefront of a treatment plan. An integrative approach to veterinary clinical oncology using herbs, nutrition and dietary supplements can readily be used in the cancer patient to improve outcomes, overall well-being, and/or QOL.

It is well known that dietary (caloric) intake profoundly affects outcomes in cancer therapies as measured by both survival and quality of life. Practitioners can readily integrate into their oncology care the use of nutrition and supplements. All cancer patients should have a nutritional evaluation and changes made if the current diet is not optimal. We currently recommend the OA, dermatologic disease, and/or gastrointestinal therapeutic diets due to the higher digestibility of nutrients and specific nutrients (fiber, antioxidant) for oncology patients. We will also recommend and formulate complete and balanced homemade diets to be fed alone or with a specific therapeutic diet.

Specific dietary supplementations such as N-3 fatty acids, probiotics, Vitamin A, D, and E are used in cancer patients. In patients with non-regenerative anemia, we have explored the use of parental administration of B complex, B12, and iron dextrans noting improved QOL and an increase in hematocrit (HCT) and reticulocytes in oncology patients. Case examples utilizing integrative nutritional therapies and/or some complementary therapies will be presented.

The following organizations listed are an excellent source of information for veterinarians seeking more information about using an integrative approach for a cancer patient.

- American College of Veterinary Nutrition: [www.acvn.org](http://www.acvn.org)
- College of Veterinary Integrative Therapy: [www.civedu.org](http://www.civedu.org)
- Veterinary Information Network (message boards): [www.vin.com](http://www.vin.com)
- International Veterinary Acupuncture Society: [www.ivas.org](http://www.ivas.org)
- American Academy of Veterinary Acupuncture: [www.aava.org](http://www.aava.org)
- American Holistic Veterinary Medicine Association: [www.ahvma.org](http://www.ahvma.org)
- Veterinary Botanical Medical Association: [www.vbma.org](http://www.vbma.org)

References available upon request