AMYLOIDOSIS
(DISORDER CAUSED BY DEPOSITION OF PROTEINS [AMYLOID] IN VARIOUS ORGANS)

BASICS

OVERVIEW
• A group of conditions of differing cause in which insoluble proteins (amyloid) are deposited outside the cells in various tissues and organs, compromising the normal function of the tissues or organs

GENETICS
• No genetic involvement is established clearly; occurs in certain lines or families (known as "familial amyloidosis") in the following dog breeds: Chinese shar pei, English foxhound, and beagle, and in the following cat breeds: Abyssinian, Oriental shorthair, and Siamese

SIGNALMENT/DESCRIPTION of ANIMAL

Species
• Dogs and cats
• Uncommon disease in domestic animals; occurs most commonly in dogs; rare in cats, except Abyssinians

Breed Predilections
• Dogs—Chinese shar pei, beagle, collie, pointer, English foxhound, and walker hound; German shepherd dog and mixed-breed dogs are at lower risk
• Cats: Abyssinian, Oriental shorthair, and Siamese

Mean Age and Range
• Most affected dogs and cats are older than 5 years of age
• Dogs—mean age at diagnosis is 9 years; range, 1–15 years
• Cats—mean age at diagnosis is 7 years; range, 1–17 years
• Prevalence increases with age
• Abyssinian cats—range, less than 1 year of age and up to 17 years of age
• Chinese shar pei—usually less than 6 years of age when signs of kidney failure develop; range, 1.5 to 6 years of age
• Siamese cats with familial amyloidosis of the liver and thyroid gland usually develop signs of liver disease when 1 to 4 years of age

Predominant Sex
• Dogs and Abyssinian cats—females appear to be at a slightly higher risk than males to develop amyloidosis

SIGNS/OBSERVED CHANGES in the ANIMAL
• Depend on the organs affected, the amount of amyloid present in the tissues or organs, and the reaction of the affected tissues and organs to amyloid deposits
• Signs usually caused by kidney involvement; occasionally, liver involvement may cause signs in Chinese shar pei dogs and Oriental shorthair and Siamese cats
• Lack of appetite (anorexia), sluggishness (lethargy), excessive urination (polyuria) and excessive thirst (polydipsia), weight loss, vomiting, and occasionally diarrhea
• Fluid build-up in the abdomen (known as "ascites") and fluid build-up under the skin in the limbs and other parts of the body (known as "peripheral edema") may be seen in animals with nephrotic syndrome (a medical condition in which the animal has protein in its urine, low levels of albumin [a type of protein] and high levels of cholesterol in its blood, and fluid accumulation in the abdomen, chest, and/or under the skin)
• Chinese shar pei may have a history of previous episodic joint swelling and high fever that resolved spontaneously within a few days
• Young beagles with inflammation of many arteries (known as "juvenile polyarteritis") may have a history of fever and neck pain that persisted for 3–7 days
• Oriental shorthair and Siamese cats may present with spontaneous bleeding in the liver, leading to acute collapse and accumulation of blood in the abdomen (known as "hemoabdomen")
• Signs related to kidney failure—ulcers in the mouth, extreme weight loss (emaciation), vomiting, and dehydration; on physical examination, kidneys may be small, normal-sized, or slightly enlarged in affected dogs; they are usually small, firm, and irregular in affected cats
• Signs related to the primary inflammatory disease or cancer that caused the build-up of the amyloid protein in the tissues
• Up to 40% of affected dogs may develop blockage of blood vessels due to the presence of blood clots (thromboembolic phenomena); signs vary with the location of the blood clot (thrombus); patients may develop difficulty breathing (dyspnea) if the clot forms in or moves into the lungs (known as "pulmonary thromboembolism") or may develop weakness or paralysis of one or both hind limbs if the clot is located in the arteries going to the hind limbs (known as "iliac or femoral artery thromboembolism")

• Chinese shar pei dogs and Oriental shorthair and Siamese cats may have signs of liver disease (such as yellowish discoloration to the tissues [jaundice or icterus], wasting with extreme weight loss [cachexia], and spontaneous liver rupture and internal bleeding)

CAUSES

• Chronic inflammation—systemic fungal infections (known as "mycoses," such as blastomycosis, coccidioidomycosis); chronic bacterial infections (such as infections of the bone [osteomyelitis], of the bronchi and lungs [bronchopneumonia], inflammation of the lining of the chest [pleuritis], inflammation of the fat [steatitis], inflammation/infection of the uterus [pyometra], inflammation/infection of the kidney [pyelonephritis], chronic skin inflammation with pus present [suppurative dermatitis], chronic joint inflammation with pus present [suppurative arthritis], chronic inflammation of the lining of the abdomen [peritonitis], chronic inflammation of the mouth [stomatitis]); parasitic infections (such as heartworm disease [dirofilariasis], leishmaniasis, hepatozoonosis); and immune-mediated diseases (such as systemic lupus erythematosus)
• Cancer (examples include lymphoma, plasmacytoma, multiple myeloma, mammary tumors, testicular tumors)
• Familial (seen in Chinese shar pei, English foxhound and beagle dogs; Abyssinian, Siamese, and Oriental shorthair cats)
• Others—inherited disease in gray collies in which the dog has repeated episodes of low white-blood cell counts and fever (known as "cyclic hematopoiesis"); disease in young beagles with inflammation of many arteries (juvenile polyarteritis)

RISK FACTORS

• Chronic inflammation or cancer
• Family history in certain breeds

TREATMENT

HEALTH CARE

• Hospitalize patients with chronic kidney failure and dehydration for initial medical management
• Can manage stable patients and those that have protein in the urine, but no clinical signs (known as "asymptomatic proteinuria") as outpatients
• Correct dehydration with 0.9% NaCl (sodium chloride) solution or lactated Ringer's solution; patients with severe metabolic acidosis (a condition in which levels of acid are increased in the blood) may benefit from bicarbonate supplementation
• Identify underlying inflammatory conditions or cancer and treat, if possible
• Manage kidney failure

ACTIVITY

• Normal

DIET

• Patients with chronic kidney failure—restrict phosphorus and moderately restrict protein
• Patients with high blood pressure (hypertension)—restrict sodium

MEDICATIONS

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive.

• Medication to control blood pressure in patients with high blood pressure (hypertension)
• Patients with blood clots (thromboembolic syndrome) and nephrotic syndrome (a medical condition in which the animal has protein in its urine, low levels of albumin [a type of protein] and high levels of cholesterol in its blood, and fluid accumulation in the abdomen, chest, and/or under the skin) caused by accumulation of amyloid protein in the glomerulus of the kidney (known as "glomerular amyloidosis") usually have a low plasma concentration of antithrombin III (a compound involved in clotting of the blood); low-dose aspirin has been suggested for dogs with glomerular disease to prevent platelet aggregation (treatment with aspirin should only be under the supervision of your pet's veterinarian)
• DMSO—may be helpful
• Methylsulfonylmethane (MSM) has been used in dogs with amyloidosis, but no evidence indicates that it benefits dogs with kidney amyloidosis
• Colchicine—prevents development of amyloidosis in humans with familial Mediterranean fever (a familial amyloidosis) and stabilizes kidney function in patients with nephrotic syndrome, but without signs of kidney failure; no evidence of benefit once the patient develops kidney failure; may cause vomiting, diarrhea, and low white blood cell counts (neutropenia) in dogs; colchicine is used particularly in the Chinese shar pei with episodic fever or multi-joint arthritis (polyarthritis) before development of kidney failure

FOLLOW-UP CARE

PATIENT MONITORING

- Monitor appetite and activity level daily; check body weight weekly
- Serum blood tests, especially albumin, creatinine, and blood urea nitrogen (BUN) concentrations, every 2–6 months in stable patients
- Can assess degree of protein being lost in the urine (proteinuria) by repeated urine protein: creatinine (UP/C) ratios

PREVENTIONS AND AVOIDANCE

- Do not breed affected animals

POSSIBLE COMPLICATIONS

- Kidney failure
- Nephrotic syndrome (a medical condition in which the animal has protein in its urine, low levels of albumin [a type of protein] and high levels of cholesterol in its blood, and fluid accumulation in the abdomen, chest, and/or under the skin)
- Systemic high blood pressure (hypertension)
- Liver rupture, causing bleeding into the abdomen
- Blood clots (thromboembolic disease)

EXPECTED COURSE AND PROGNOSIS

- Progressive disease that is usually advanced at the time of diagnosis; prognosis improves if an underlying immune-mediated disease, inflammatory disease or cancer is detected and treated successfully
- Survival for dogs with glomerular amyloidosis varied from 3 to 20 months in one study; some dogs occasionally may live longer
- Cats with kidney failure because of amyloidosis usually survive less than 1 year
- Mildly affected cats may not develop kidney failure and have an almost a normal life expectancy

KEY POINTS

- Progressive disease that is usually advanced at the time of diagnosis; prognosis improves if an underlying immune-mediated disease, inflammatory disease or cancer is detected and treated successfully
- Signs usually caused by kidney involvement; occasionally, liver involvement may cause signs in Chinese shar pei dogs and Oriental shorthair and Siamese cats
- Familial predisposition in susceptible breeds; familial amyloidosis occurs in the following dog breeds: Chinese shar pei, English foxhound, and beagle, and in the following cat breeds: Abyssinian, Oriental shorthair, and Siamese
- Potential for complications (such as high blood pressure and blood clots)