Endocrine Hypertension in Small Animals

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KEYWORDS

• Hypertension • Hyperaldosteronism • Hypercortisolism
• Pheochromocytoma • Hyperthyroidism • Diabetes mellitus

In human medicine, systemic hypertension has long been recognized as a major medical and public health issue, especially with regard to cardiovascular disease. In the most recent report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, hypertension was defined as systolic/diastolic blood pressure greater than or equal to 140/90 mm Hg. Systolic/diastolic pressures less than 120/80 mm Hg are considered normal, and blood pressures between the two values have been allocated to the newly introduced category of prehypertension.[1] For decades, physicians have considered diastolic pressure more important than systolic pressure. It has recently become clear, however, that hypertension-associated risks are more accurately attributed to systolic pressure, which is now the primary focus of treatment regimens.[2]

In dogs and cats, the importance of hypertension was first recognized approximately 15 to 20 years ago. Guidelines similar to those established for humans have recently been developed and published as the Consensus Statement of the American College of Veterinary Internal Medicine (ACVIM).[3] There is some controversy with regard to the threshold value at which individual animals are considered hypertensive. This primarily reflects differences between the various studies on blood pressure measurements in healthy dogs and cats and recognition of substantial interbreed differences in dogs.[3,4] Although studies have not determined if a change in systolic or diastolic pressure is more damaging, there has been an emphasis on addressing systolic hypertension in dogs and cats. Currently, blood pressure in pets is classified into four categories according to risk of tissue injury (**Table 1**). As blood pressure rises, there is progressive risk of damage to the so-called end organs or target organs, such as brain, heart, kidney, and eye. The most common adverse effects, which include

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Table 1
Classification of blood pressure in dogs and cats based on risk for future target-organ damage, according to the American College of Veterinary Internal Medicine Consensus Statement

Risk Category	Systolic Blood Pressure (mm Hg)	Diastolic Blood Pressure (mm Hg)	Risk of End-Organ Damage
I	<150	<95	Minimal
II	150–159	95–99	Mild
III	160–179	100–119	Moderate
IV	≥180	>120	Severe

Data from Brown S, Atkins C, Bagley R, et al. Guidelines for the identification, evaluation, and management of systemic hypertension in dogs and cats. J Vet Intern Med 2007;21:542–58.

hypertensive retinopathy, intraocular hemorrhage, and hypertensive encephalopathy, are seen when the systolic blood pressure exceeds 180 mm Hg, particularly when the increase is acute. Organ damage, especially damage involving the kidneys, has also been reported with systolic blood pressures less than 180 mm Hg. The threshold for tissue injury is not known, however, and is assumed to be approximately 160 mm Hg in cats and most breeds of dogs (**Table 2**).[5]

Table 2
Target-organ damage due to hypertension, adapted from the American College of Veterinary Internal Medicine Consensus Statement

Tissue	Hypertensive Injury	Clinical Findings Indicative of Target-Organ Damage
Kidney	Progression of chronic kidney disease	Serial increases in creatinine, or decrease in glomerular filtration rate, proteinuria, microalbuminuria
Eye	Retinopathy/choroidopathy	Acute onset blindness Exudative retinal detachment Retinal hemorrhage/edema Retinal vessel tortuosity or perivascular edema Papilledema Vitreal hemorrhage Hyphema Secondary glaucoma Retinal degeneration
Brain	Encephalopathy Stroke	Centrally localizing neurologic signs (eg, lethargy, seizures, acute onset of altered mention, altered behavior, disorientation, balance disturbances)
Heart and vessels	Left ventricular hypertrophy Cardiac failure	Left ventricular hypertrophy Gallop rhythm Arrhythmias Systolic murmur Evidence of cardiac failure Hemorrhage (eg, epistaxis, stroke)

Data from Brown S, Atkins C, Bagley R, et al. Guidelines for the identification, evaluation, and management of systemic hypertension in dogs and cats. J Vet Intern Med 2007;21:542–58.