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Hypertrophic Cardiomyopathy (HCM)

- HCM is a primary disease of the left ventricular myocardium characterized by mild to severe concentric hypertrophy
- HCM is the most common cardiac disease of the cat
- Humans: found in 1 in 500 people
 - 60% of cases are familial
 - Mutations found in several genes: β -myosin heavy-chain, α -tropomyosin, cardiac troponin T and I, myosin-binding protein C
 - 35-40% of familial HCM due to β -myosin heavy-chain gene mutations (over 50 point mutations identified); 15% due to mutations in troponin; 5% due to mutations in tropomyosin
 - Some mutations produce malignant disease with short survival time; others produce more benign disease with little effect on survival
- Familial HCM in Maine Coon cats identified 35 years after first identification of a human family with HCM
- Maine Coons: best studied, autosomal dominant inheritance
 - Mutation identified in the myosin binding protein C gene
 - Single base pair change from G to C in one codon
 - Mutation causes change in the structure of myosin binding protein C, this alters the ability of the protein to be integrated into the functional unit of heart muscle, the sarcomere
 - Cats homozygous for the mutation may have more severe disease earlier in life and may be at risk of sudden death
 - New mutation, never reported in any species
- Other breeds with autosomal dominant HCM:
 - Persians: often have asymmetrical septal hypertrophy
 - British Shorthairs
 - American Shorthairs: primary systolic anterior mitral valve motion, relatively benign form of HCM
- Breeds with familial HCM, inheritance unknown:
 - Ragdoll cats: often have severe disease, early onset; do not have the same mutation identified in Maine Coons
 - Sphynx, Devon Rex, Cornish Rex, Norwegian Forest Cat, Scottish Fold
 - List grows yearly
- Some breeds are at low risk for HCM, i.e. Abyssinian, Siamese
- General characteristics of HCM in cats:
 - Male cats more often clinically affected than females
 - Most common in middle-aged cats (average 6.5 years)
 - Many cats have no signs of illness at time of diagnosis
- Diagnosis:
 - Echocardiography: Most reliable method

- LV posterior wall over 6 mm in diastole
- Thickened papillary muscles
- Normal or decreased LV lumen
- Normal to increased fractional shortening
- Left atrial enlargement; may see smoke or thrombus
- Systolic anterior motion of the mitral valve
- Distinguishing mild HCM from normal heart may be difficult
- Radiography: document signs of heart failure (pulmonary edema, pleural effusion), cardiomegaly with prominent left ventricle and left atrium,
 - Ventrodorsal view: "valentine" shape due to ventricular hypertrophy and enlarged left auricle, apex shifted to right
 - Lateral view: increased sternal contact, left atrial prominence, prominent caudal cardiac waist
- Electrocardiography: abnormal in 35-70% of cases, useful to document arrhythmias and conduction disturbances, but changes are non-specific
- Rule out secondary causes of concentric hypertrophy, such as hyperthyroidism, hypertension, lymphoma, hypovolemia, acromegaly
- Necropsy: heart contracts after death, may mimic HCM
 - Heart weight: normal cats (4-6 kg) have heart under 20 g, mild-moderate HCM hearts weigh over 20 g, severe HCM hearts may weigh over 25 g
 - Histopathology: changes such as fibrosis, intramural coronary arteriosclerosis, myocardial fibre disarray may be identified

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For more information on how to help fund hypertrophic cardiomyopathy research, visit the Winn Feline Foundation's Ricky Fund at:

<http://www.winnfelinehealth.org/ricky-fund.html>