

The study of the genetics of osteochondrosis dessicans in the Great Dane

What is osteochondrosis (OC)/ osteochondrosis dessicans (OCD)?

Osteochondrosis is a developmental orthopedic disease characterized by failure of endochondral ossification (the primary way in which new bone develops). This defect in development results in abnormal joint cartilage and underlying (subchondral) bone. The abnormally thickened articular cartilage is prone to damage which can result in lameness, joint swelling/effusion, and osteoarthritis if fractured (a flap is formed, known as osteochondrosis dessicans, OCD).

What causes OC to develop?

Many different theories exist to explain the causes of OC in the dog. Most likely it is a multifactorial genetic disease and its expression can be affected by rapid growth, over nutrition, trauma, hormones, and excessive calcium intake. Limited genetic studies on OC have been performed to date in the dog and they involve the overall trait elbow dysplasia (of which OC is a component). Several studies indicate that each component of elbow dysplasia should be treated as independent heritable traits.

Which dogs get OC?

Osteochondrosis most commonly affects rapidly growing, large and giant breed dogs, males more commonly than females. Animals are typically affected during the periods of rapid growth and the majority of animals, depending on which joint is involved, will exhibit clinical signs by the time they are 10 months of age. Less than 17% of cases will exhibit clinical signs associated with shoulder OC after they are 12 months of age. In addition, the Great Dane is considered a high risk breed for development of OC. This information, combined with the fact the specific breeds are considered at increased risk for OC while other breeds are considered protected from OCD (i.e. greyhound) suggests an underlying genetic basis to OC in the Great Dane dog. In addition, OC occurs more commonly in young male humans, and information that is gained from studying OC in the dog could be used to develop new therapeutic strategies for treating OC in humans.

How is OC diagnosed?

Most commonly, OC is diagnosed by a combination of signalment (i.e. young, rapidly growing, large breed dog), physical exam (joint pain and or swelling), and medical imaging (most commonly x-ray, but sometimes advanced imaging such as CT/MRI in difficult cases).

How is OC typically treated?

Surgical treatment of OC is recommended to remove the affected/irregular cartilage and subchondral bone and encourage the formation of new cartilage (fibrocartilage). Depending on the joint affected and the size of the patient, this can often be accomplished by a minimally invasive arthroscopic approach. Medical management includes a multi-modal approach aimed at the prevention/treatment of osteoarthritis <http://www.cvm.umn.edu/vcs/surgery/SRL/topics/arthritis.html>.

Goals of the study?

The **specific aim** of this project is to develop a genetic archive of Great Danes affected and unaffected with osteochondrosis. Our **hypothesis** is that osteochondrosis in the Great Dane is a heritable condition and predisposition to OC is associated with individual gene defect(s).

How is this to be accomplished?

Approximately 200 client owned animals are to be enrolled in the study. Animals must fall into one of two groups: animals affected with OC (as confirmed by lameness, radiographs and/or surgical confirmation) or animals over 2 years of age and unaffected with OC. All animals included in the study must also be accompanied by a pedigree documenting at least 3 generations. Finally a 20 mL blood sample will be taken from all enrolled animals from which their DNA will be extracted.

Is there compensation for enrollment of an animal?

YES! Upon receipt of the pedigree and the blood sample, you will be reimbursed \$50 for your help!

Why is this research important?

A marker for OC will have a tremendous impact on the dog breeds both financially and genetically. Not only will it allow elimination of the disease from the breeding population, as is currently being done with cystinuria in the Newfoundland breed, but it could also be linked to other orthopedic diseases, such as hip or elbow dysplasia.

How can I enroll my Great Dane in the study?

If your pet meets the above criteria (i.e. has a pedigree of at least 3 generation and is affected with OC or above 2 years of age and unaffected with OC) and you would like to help us help the breed, please send an e-mail to Wilke175@umn.edu Dr. Vicki Wilke, DVM, PhD, DACVS with your contact information. <http://www.cvm.umn.edu/vcs/surgery/SRL/personnel.html>