Your clients’ pets are unique, and their genetic signature may hold the key to hidden healthcare indicators. Information gained from genetic testing can have a big impact on their life. It’s unfortunate that many canine and feline breeds are prone to certain diseases due to their genetic makeup. With an underlying genetic disease, an animal’s health span can begin deteriorating long before it would otherwise. For many pets, this can mean having to cease doing the things that they love to do.

Veterinarians can extend the health span of the animals entrusted to their care by testing for genetic disorders that occur later in life. By knowing what to look for, you and your client can begin treatment immediately. By participating in genetic testing, owners and their pets can benefit from the newest and most advanced technologies while also contributing to the advancement of new scientific discoveries every day.

As certain breeds are prone to genetic diseases and numerous other inherited health ailments, knowing these potential risks from the beginning and working with your clients to keep a watchful eye out for them, can not only save an animal’s life, but ensure their quality of life as well. Moreover, knowing the genetic status of an inherited condition will help breeders make prudent decisions in gradually reducing the incidence of this condition in a breed.

When to Consider Genetic Testing

**Carrier testing:** Many of these inherited disorders are recessive, meaning that a dog can be a carrier of a potentially devastating disease and not show any signs. DNA testing helps breeders improve the health of a litter by screening for genetic disorders.

**Drug toxicity testing:** This genetic testing will help determine whether the animal is susceptible to particular drug toxicity (multidrug sensitivity testing).

**Diagnostic testing:** If the animal has symptoms of a disease that may be caused by genetic alterations, genetic testing can reveal if he or she has the suspected disorder. An example of a disorder for which genetic testing may be used to confirm a diagnosis is polycystic kidney disease.

**Pre-symptomatic and predictive testing:** If the animal has a history of a familial genetic condition, undergoing genetic testing before having symptoms may show if the animal is at risk of developing that condition (such as degenerative myelopathy and hypertrophic cardiomyopathy).

**What We Offer**
The Diagnostic Center for Population and Animal Health now offers a series of diagnostic genetic tests for the purpose of identifying an animal’s risk of developing inherited conditions. We provide fast, affordable, high quality genetic testing and interpretive services. More information about our available genetic testing, including currently available tests, can be found in our online test catalog at [animalhealth.msu.edu](http://animalhealth.msu.edu). Additional tests, including tests for felines, will be added in the coming months.

**Degenerative myelopathy**
Degenerative myelopathy (DM) is a progressive neurodegenerative disease. It is inherited as a recessive disease. Affected dogs that have inherited two defective copies will develop spinal and hind limb problems later in life. Two mutations associated with this condition have been identified in the SOD-1 gene. Mutation in exon 2 (test code 80321) has been reported in multiple dog breeds, whereas the mutation located in exon 1 (test code 80320) has been reported mainly in Bernese Mountain Dogs.
Multidrug sensitivity
The mutation in MDR-1 gene (test code 80318) causes a defect in removal of certain drugs from the brain, leading to accumulation and toxicity. Dogs with one copy of the MDR-1 mutation can have some drug sensitivity at higher doses. Dogs with two copies of this mutation can experience more serious neurologic symptoms like excess salivation, tremors, anorexia, blindness and possibly death.

There are many different types of drugs that have been reported to cause problems. The following is a list of some of the drugs: Ivermectin (found in heartworm medications); Loperamide (Imodium over the counter antidiarrheal agent); Doxorubicin, Vincristine, Vinblastine (anticancer agents); Cyclosporin (immunosuppressive agent); Digoxin (heart drug); Acepromazine (tranquilizer); and Butorphanol (“Bute” pain control). The following drugs may also cause problems: Ondansetron, Domperidone, Paclitaxel, Mitoxantrone, Etoposide, Rifampicin, Quinidine, and Morphine. This mutation has been reported in many dog breeds, including the Australian Shepherd, Border Collie, Collie, English Shepherd, German Shepherd, Herding Breed Cross, Long-haired Whippet, McNab, Mixed Breed, Old English Sheepdog, Shetland Sheepdog, and Silken Windhound.

Von Willebrand disease type 1
The mutation reduces the normal production of von Willebrand’s factor (vWF) in affected dogs, resulting in excessive bleeding. Two mutations associated with this condition have been identified in the VWF-1 gene. The mutation located in exon 42 (test code 80314) has been detected in the following breeds: Australian Labradoodle, Bernese Mountain Dog, Cardigan Welsh Corgi, Coton de Tulear, Doberman Pinscher, Drentsche Patrijshond, Dutch Partridge Dog, German Pinscher, Goldendoodle, Irish Red and White Setter, Irish Setter, Kerry Blue Terrier, Labrador, Manchester Terrier, Miniature Poodle, Papillon, Pembroke Welsh Corgi, Poodle, Stabyhoun, Standard Poodle, Toy Poodle, and West Highland White Terrier. Another mutation is located in exon 43 (test code 80315) and has been detected in the following breeds: Australian Labradoodle, Bernese Mountain Dog, Cardigan Welsh Corgi, Coton de Tulear, Doberman Pinscher, Drentsche Patrijshond, Dutch Partridge Dog, German Pinscher, Goldendoodle, Irish Red and White Setter, Irish Setter, Kerry Blue Terrier, Labrador, Manchester Terrier, Miniature Poodle, Papillon, Pembroke Welsh Corgi, Poodle, Stabyhoun, Standard Poodle, Toy Poodle, West Highland White Terrier, and Shelties.

Von Willebrand disease type 2
The mutation (test code 80319) causes structurally abnormal vWF, which impedes function and results in severe bleeding in affected animals. The most commonly affected breeds include Chinese Crested, Collie, Deutsch Drahthaar, German Longhaired Pointer, German Shorthaired Point, German Wirehaired Pointer, and Pointer.

Von Willebrand disease type 3
Type 3 von Willebrand disease is the most severe form of VWD, characterized by a bleeding disorder associated with a total or near-total absence of von Willebrand factor. Affected dogs are more likely to bleed abnormally and severely which can result in life threatening situations when the affected dog encounters injuries, spaying or neutering. Two mutations associated with this condition have been identified in the VWF-1 gene. One mutation (test code 80317) has been reported in Dutch Kooiker dogs, whereas another mutation (test code 80316) has been reported in Shetland Sheepdogs and Scottish Terriers.
Results
The test result can predict with a high level of confidence that an animal will fall into one of these three categories:

Clear: The animal does not have the mutation (having two normal copies of the gene) and is extremely unlikely to develop the genetic condition.

Carrier: The animal has both a normal and mutated copy of the gene and is therefore a carrier, but will not likely have an active disease. This mutation can, however, be passed to its offspring. As such, a thorough examination of the animal’s pedigree should be performed prior to breeding an animal with this result.

Affected: The animal has two mutated copies of the gene and is at risk for developing the disorder.

We are happy to provide this valuable diagnostic tool that can be used for all dogs and cats, both pure and mixed breeds, to provide important information and assist veterinarians in accommodating an animal’s specific needs. While the genetic testing does not cure the disease, this information can be used to create a custom health and wellness plan based on a pet’s genetic code. We also hold significant hope that breeders, armed with this new information, may create disease-controlled breeding plans that will ultimately lead to the reduction and possible elimination of these ailing traits from their respective populations. The main beneficiaries of this strategy are healthier animals for generations to come.

Submitting Samples
Only blood samples are acceptable for testing in order to avoid potential contamination and to ensure that sufficient quantities of cells are obtained for successful testing.

For more information regarding our list of available genetic testing, prices, collection protocol, sample requirements, shipping, and other information, please see our catalog of available tests on our website at animalhealth.msu.edu or call us at 517.353.1683.

References


A Message from the Director: CWD and EHD in White Tailed Deer, Leptospirosis, and Laboratory Funding

Greetings from DCPAH! Fall’s crisp air and leaves bursting with color have recently given way to frigid temperatures, snow, and ice. While the busiest parts of deer season are now behind us, DCPAH has been, and still is, testing hunter harvested deer, as well as deer collected by the Michigan Department of Natural Resources (MDNR), for chronic wasting disease (CWD). Since CWD was confirmed in a free-ranging white tailed deer in Michigan in late May 2015, DCPAH has performed over 11,000 tests for CWD, with only 9 positive samples to date, all found in MDNR’s CWD Core Area (17 townships in mid-Michigan). This testing has kept our Immunodiagnostics/Parasitology laboratory especially busy over the last several months, and we appreciate their hard work in handling large numbers of samples week after week.

The cooler weather and potential for frost seen earlier this fall were a benefit as the warm and rainy weather in late summer led to an increase in mosquitoes and other biting insects. The laboratory had two cases of epizootic hemorrhagic disease (EHD), one in captive deer. EHD, caused by a virus related to bluetongue virus, is transmitted by biting midges. EHD can infect many wild and domestic ruminants, but in the United States, white tailed deer are most susceptible and infections in cattle are rare.

The onset of cold weather was also welcome as the cool, wet fall here in Michigan provided good conditions for Leptospira in the environment. The Michigan Department of Agriculture and Rural Development (MDARD) recently announced a record number of reported leptospirosis cases for 2016. DCPAH performs more than 80,000 assays for leptospirosis annually. We have two resources related to leptospirosis available in our library of client education resources on our website: a half-page information card for practitioners and a one-page guide, “Leptospirosis: What Every Dog Owner Should Know.”

As the laboratory looks back at 2016, we would be remiss if we did not acknowledge our deep gratitude to the State of Michigan for recent funding that will allow DCPAH to upgrade our Laboratory Information Management System, a critical component to our testing services, and to purchase new laboratory instrumentation. As these instruments are brought on line in Bacteriology and Clinical Pathology, we will provide updates on the new capabilities in these areas in the coming months.

Warmest thoughts and best wishes for a wonderful holiday and a very happy new year,

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