Cord1-PRA Genetic Testing Recommended for Miniature Dachshunds

Almost as soon as Dawn DiBari brought “Sunshine” home, she knew something was wrong with the 4-year-old Miniature Long-haired Dachshund’s vision. The dog took a long time to focus his eyes, and he gravitated to the walls of rooms instead of the middle — sure signs he couldn’t see well.

“I was told he was shy, but I could tell by the way he looked at me there was a problem,” says DiBari of West Palm Beach, Fla. “If I went down to the floor instead of standing, it seemed he could see me and would respond.”

DiBari decided to have Sunshine tested for genetic eye disease. Less than a month after buying the Dachshund, DiBari learned that Sunshine has a gene mutation that puts him at risk for developing progressive retinal atrophy (PRA).

PRA is an inherited eye condition. Eight different forms of the disease have been discovered, but more are likely to exist. A progressive disease that usually leads to blindness, PRA affects both eyes simultaneously. Unfortunately, there is no treatment, no cure and no way to stop or reverse the damage.

The good news about PRA is that dogs adapt well, and the disease is painless. Since the disease generally progresses slowly, dogs are able to compensate for vision loss with their acute hearing and olfactory senses. Owners who keep furniture in fixed locations help their dogs stay mobile and independent.

Difficult to Distinguish

PRA has been diagnosed in Miniature and Standard Dachshunds of Smooth, Longhaired and Wirehaired varieties. The different sizes and coat varieties of the seventh most popular breed registered by the American Kennel Club complicate determining all forms and causes of PRA in Dachshunds.

Two forms of PRA are known to affect Dachshunds: cone-rod dystrophy 1-PRA (cord1-PRA) and cone-rod dystrophy PRA (crd-PRA). Gene mutations for both diseases have been discovered in recent years. A genetic test is available for cord1-PRA, and a test for crd-PRA, already available in Europe, is expected soon in the United States.

Mutations in different genes cause the different forms of PRA — all which have similar clinical signs. The disease affects individual dogs differently; thus, even in dogs of the same bloodline with the same form of PRA, the age of onset and rate of disease progression can vary widely.

“Some dogs show signs of PRA in their first year, while others may not develop signs until later in life,” says Gregory M. Acland, B.V.Sc., DACVO, professor of medical genetics at Cornell University’s Baker Institute for Animal Health. “Some dogs die before the disease becomes evident, which accounts for why some owners unknowingly breed dogs with PRA.

On the other hand, though the disease generally progresses slowly with loss of vision over years, some dogs go completely blind within months.”

Clinical signs of PRA include: dilated pupils, a glow from the back of the eyes, sticking close to an owner in dimly lit environments, slow movement, reluctance to go outside at night, and walking along the walls of a room rather than crossing through the center. Dogs also commonly stumble on steps and bump into objects.

There are no definitive statistics on the prevalence of PRA, but the disease is believed to affect several breeds of dog as well as mixed breeds and cats, says Acland, who has been studying PRA for decades. Some forms appear to be breed-specific, while others affect several breeds.

In Dachshunds, the genetic mutation for cone-rod dystrophy 1-PRA was discovered by researchers at the Animal Health Trust in Suffolk, England. This form of PRA affects Miniature Long-haired Dachshunds — like Sunshine — as well as Miniature Smooth Dachshunds and English Springer Spaniels. The mutation was found in the RPGRIP1 gene, which codes for a key protein in photoreceptor cells. The genetic test for cord1-PRA was developed in 2007 and is available through U.S. genetic test laboratories as well as the Animal Health Trust.

Cord1-PRA recently was also detected in Miniature Wirehaired Dachshunds via testing at VetGen veterinary genetics service in Ann Arbor, Mich. Crossbreeding between varieties contributes to the disease spreading to other varieties, says Robert Loechel, chief scientific officer at VetGen.

The mutation for cone-rod dystrophy PRA in Standard Wirehaired Dachshunds was discovered in 2008 by researchers at the Norwegian School of Veterinary Science in Oslo, Norway. A deletion in the gene nephroretinin or NPHP4, results in a truncated protein that affects other proteins in the retina.

“The cord1-PRA and cone-rod dystrophy PRA vary considerably in the age of onset and rate of progression,” says Acland. “We believe it is possible there may be different forms of cord1-PRA. Although cord1-PRA is associated with the RPGRIP1 gene mutation, it is not necessarily caused

Breeding Implications for Cord1-PRA* in Dachshunds

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* Cord1-PRA has an autosomal recessive form of inheritance, thus an affected dog receives a copy of the gene mutation from both his sire and dam.
Cord1-PRA Genetic Testing

by it. In fact, the cord1-PRA test can yield false positive results.”

Dachshunds may even be affected by other forms of PRA, Acland con-
tinues. “PRA has been observed in several Dachshunds of all varieties
that is not associated with the RPGRIP1 mutation, the NPH4 mutation or the
prcd (progressive rod cone degenera-
tion) mutation that causes PRA in
many other breeds,” he says. “These
cases may represent one or more
disease-causing mutations. My labo-
atory and those of many of my col-
leagues are working to identify as
many of the genetic causes for PRA
in dogs as possible.”

Pathogenesis & Genetic Testing

Progressive retinal atrophy is a
disease-causing degeneration of the
retina, the tissue at the back of the
eye that converts light into electrical
impulses. These impulses are sent to
the brain and interpreted as images.
The retinal tissue is made up of light
receptor, or photoreceptor, cells called
rods and cones. Rod cells function in
low light by detecting shapes and
motion. Cone cells operate in bright
light, perceiving definition and color.

Board-certified veterinary ophthalmo-
ologists perform CERF eye tests, which
cover 25 conditions and diseases.
The many forms of PRA combined
with other potential causes of vision
loss can make diagnosis difficult. Some
dogs with PRA have been known to
develop cataracts, which can be mis-
takenly diagnosed as the cause of a
vision deficit. The unpredictable cause
of PRA makes it easy to unknowingly
breed a dog with the disease.

Genetic testing is key to reducing
the incidence of PRA, although at this
time a genetic test is only available for
cord1-PRA in Miniature Dachshunds.
Genetic testing of dogs before breed-
ing can help limit the production of
 carriers and affected dogs.

Shannon Glines of Bellaluna Dach-
shunds in Atascadero, Calif., had a
cord1-PRA test performed on her fin-
ished conformation champion, “Jack,”
a Miniature Longhaired Dachshund.
When positive test results came back,
Glines changed her plans for breeding.

Owners May Submit Samples for PRA Research

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eers of Dachshunds diag-
nosed with progressive retinal atrophy (PRA) are encouraged to
submit blood samples for genetic
research under way at the
Cornell University Baker Institute
for Animal Health. For informa-
tion, please call 607-256-5600.

Dogs with PRA experience a pro-
gressive loss of photoreceptor cells.
In rod cone dystrophies, rod cells are
generally affected first, causing loss
of night vision. As the disease pro-
gresses, cone cell function diminishes,
eventually leading to complete blind-
ness. With cone rod dystrophies, cone
cells are lost earlier. Some forms of
PRA cause photoreceptor cells to
develop abnormally.

An eye examination that includes an
ophthalmoscopy and electroretinogram
can detect PRA, although usually not
until after signs appear. In an ophthal-
moscopy, a veterinarian uses an instru-
ment to examine the retina and look
for late stages of PRA. An electroretinog-
ogram (ERG), which is performed when
a dog is under anesthesia, measures
electrical signals from the retina and
is used for diagnosing early PRA.

Clinical signs of disease include a
decrease in the size and number of
retinal blood vessels and changes in
reflectivity of the eyes. Breeds at risk
for eye diseases, such as PRA, should
have Canine Eye Registration Founda-
tion (CERF) tests prior to breeding.

Competitive Breeders Request Samples

While many dogs with PRA are
blind, some still have useful vision.

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iniature Dachshunds are at risk for developing cone-rod dystrophy
1-PRA, which is also known as cord1-PRA. This type of PRA affects
how a dog sees in bright light and his ability to perceive definition and
color. Eventually, many dogs become blind. Testing for the genetic eye
disease can be performed at any age with a cheek swab DNA test. For
information about having your dog tested, please contact these veteri-
nary testing laboratories:

University of Missouri
College of Veterinary Medicine
Animal Molecular Genetics Laboratory
Columbia, Mo.
$40 for testing
www.caninegeneticdiseases.net
573-884-3712

Purina appreciates the support of
the Dachshund Club of America and
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chairwoman of the DCA Health
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topics for the Purina Pro Club
Dachshund Update newsletter.

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VetGen Veterinary Genetics Service
Ann Arbor, Mich.
$75 for testing
www.vetgen.com
800-483-8436

Testing for Cord1-PRA

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