

The Genetic Test for Persian-related PKD: Will it be constructive or destructive?

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A genetic test is the hope for every disorder. Once one is found, it is a double-edged sword: Its use can enable breeders to improve a breed or devastate it. Cat breeds have closed gene pools; in other words, the diversity of genes in a given breed is fixed. However, once a genetic test is developed that allows breeders to positively determine if a cat is affected or a carrier of a defective gene, many owners are likely to remove all of these cats from their breeding stock.

It is important to carry on lines. A test that should be used to help maintain breed diversity should not result in limiting it.

The Dangers

It is important that breeders and owners are educated on how genetic tests should be properly interpreted and used. History in other domestic animal species has shown that breeders can be successful in reducing breed-wide genetic disease through testing and making informed breeding choices. You should remember, however, that there are also examples of breeds that have actually experienced more problems as a result of excessive culling and restriction of their gene pools.

Polycystic Kidney Disease (PKD)

PKD is an autosomal dominant genetic disorder in Persian and Persian-related cats. Affected cats inherited the defective gene from one of their parents, who was also affected, and can pass the gene to approximately half of their offspring. Of Persians in the United States, 38% carry

the defective gene, and therefore are affected with polycystic kidney disease.

Up until now, the only diagnosis of PKD was through abdominal ultrasound of the kidneys. At ten months of age, 98% of affected cats can be diagnosed by ultrasound. Now, with the (cheek swab) DNA test for PKD that has been developed

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in Dr. Leslie Lyon's lab at UC-Davis, affected cats and kittens can be identified at any age.

The standard recommendation to manage autosomal dominant genetic disorders is to not produce, and therefore not breed affected cats. To produce the next generation of a line, a normal full sibling of an affected cat, the normal parent, or a normal prior-born offspring can be used to replace the affected cat in the breeding program. By replacing, but not eliminating breeding lines, genetic diversity can be maintained.

The only difference with the introduction of the DNA test for PKD is the age of diagnosis. The genetic test now allows breeders to determine which kittens should be placed in breeding homes.

The availability of the genetic test creates an important opportunity for breeding decisions regarding PKD. It is obvious that breeders do not want to produce additional affected cats, and this test can guarantee against this. However, the wide scale elimination of 38% of the breed in a short period of time would put a significant negative pressure on the gene pool – even

one as large as the Persian breed. The amount of quality genes and quality cats that can be lost forever from such selection could be devastating.

PKD shows variable expressivity, which means that the age when affected cats develop kidney failure varies. Most affected cats will develop kidney failure between 3 to 10 years of age, with an average of 7 years of age. Some affected cats can develop small cysts in their kidneys, but not progress to kidney failure.

Knowledge of the size of the kidney cysts (but not necessarily the number of cysts) is instrumental in identifying those cats that will progress to early kidney failure: The larger the cysts, the more severe the disease. However, only the disease itself, and not cyst size or disease severity is passed on from an affected parent. A mildly (late-onset kidney failure) affected cat can produce a severely affected (early onset kidney failure) cat and vis versa.

Breeders must make decisions that benefit their breeding program and the breed as a whole. If a quality PKD-affected cat can be replaced in a breeding program by a quality sibling, non-affected parent, or non-affected prior-born offspring, then a breeding line can be continued. This is the recommended method for reducing the frequency of the defective gene and maintaining breed diversity. However, if a superior PKD affected cat does not have quality relatives with whom it can be replaced, it is acceptable to breed the cat and attempt to produce a quality, normal-testing offspring for replacement in the breeding program. Affected offspring should be selected against and not placed in breeding homes.

Hopefully breeders will not institute widespread euthanasia as a result of early PKD testing of kittens. While approximately 50% of offspring from an

affected parent can be affected, the majority of these cats will live seven or more years before developing kidney failure. Concurrently preserving the diversity of the gene pool over the next few generations while at the same time eliminating the defective gene is the most practical and desirable way to manage the disorder.

Breeders are the custodians of their breed's past and future. "Above all, do no harm" is a primary oath of all medical professionals. Genetic tests are powerful tools, and their use can cause significant positive or negative changes. Breeders should be counseled on how to utilize test results for the best interests of the breed.

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