Polycystic kidney disease (PKD) in cats

Cross section of a severely affected kidney showing cysts throughout

Polycystic kidney disease is a disease in which a large number of fluid filled cysts form within the kidneys. These cysts are present from birth in affected cats but they start off very small and then gradually increase in size until eventually they compromise the surrounding normal kidney tissue and cause kidney failure.

Polycystic kidney disease is now recognised as a particular problem in Persians and Exotic Shorthairs because it is an inherited disease which has become very common in these breeds. Many Persian breeders are now aware of this problem and are aiming to avoid breeding from affected cats. The Feline Advisory Bureau has therefore set up a nationwide screening programme to identify those cats that are affected and to allow breeders to make informed decisions about which cats to use for future breeding.

The FAB PKD Screening Scheme involves a panel of approved, highly-qualified veterinary ultrasonographers who will ultrasound scan the cat's kidneys looking for the presence of fluid-filled cysts. They will then issue an FAB-approved certificate stating the result of the scan for that particular cat.
Polycystic kidney disease

More about the disease

What is polycystic kidney disease?
Polycystic kidney disease (PKD) is an inherited condition that causes multiple cysts (pockets of fluid) to form in the kidneys. These cysts are present from birth. They start out very small but they grow larger with time and may eventually severely disrupt the kidney; when that happens the kidney can no longer work and kidney failure develops. The cysts usually grow quite slowly, so most affected cats will not show any signs of kidney disease until relatively late in life, typically at around seven or eight years old. However, in some cats kidney failure will occur at a much younger age and at the moment there is no way of predicting how rapidly the disease will progress in any particular cat.

How common is PKD in cats?
Unfortunately PKD has now become very common in some cat breeds. Persians and Exotic Shorthairs have the highest incidence of problems and studies around the world have shown that around one in three cats from these breeds are now affected by the disease. Other cat breeds that have been developed using Persian bloodlines, and breeds that have allowed outcrossing to Persian cats (eg British Shorthairs) may also have a proportion of affected cats, but in other unrelated breeds it is an extremely rare condition.

How is PKD inherited?
PKD is the result of a single, autosomal, dominant gene abnormality. This means that:

- Every cat with the abnormal gene will have PKD; there are no unaffected carriers of the gene.
- Every cat with PKD will have the abnormal gene, even if that cat only has a few small cysts in its kidneys.
- A cat only needs one of its parents to be affected with PKD in order to inherit the abnormal gene.
- Every breeding cat with PKD will pass the disease on to a proportion of its kittens, even if it is mated with an unaffected cat.

It appears that inheriting two copies of the abnormal gene, ie, one from each parent, causes such severe disease that the affected kitten dies before birth. All affected cats are therefore considered to be heterozygous (ie they carry one PKD gene and one normal gene).

Why has PKD become so common?
PKD doesn't usually cause kidney failure until quite late in life, so an affected cat may have been used to produce a large number of litters of kittens before it becomes ill itself.

Can PKD be cured?
Unfortunately there is no available treatment that will prevent the development of kidney failure in a cat that is affected by PKD. The cysts are present from birth and cannot be removed, nor can they be prevented from growing.

Once kidney failure has actually developed, treatment can be used to try to reduce the amount of work that the kidneys have to do, and to try to reverse the secondary effects of renal failure. Such treatment will improve the cat's quality of life, but will not alter the underlying disease or stop the cysts from growing larger.

Do all cats with PKD die of renal failure?
The number of cysts present in each kidney, and the rate at which the cysts grow, varies considerably from cat to cat. Severely affected cats or cats with rapidly growing cysts will develop renal failure at an early age, and will die from PKD. Most affected cats will appear to be quite healthy until later in life, but will eventually succumb to renal failure and die from PKD. Some cats with few cysts or slowly growing cysts may remain healthy into old age, and may die from other conditions before renal failure develops.
Unfortunately there is currently no way to predict how quickly the condition will progress in an individual cat, and at what age renal failure will occur.

**What can be done about PKD?**

All cats that carry the abnormal gene are affected with PKD, and affected cats can be identified before they reach breeding age. This makes it relatively easy to eliminate the disease from a breeding group; if all cats in the high-risk breeds were to have their kidneys scanned before they were used for breeding, and if affected cats were not then used for breeding, then PKD could be eradicated from those breeds in a single generation.

**More about testing for PKD**

![Persian cat being scanned at the Feline Centre, University of Bristol](image)

**How can I tell if my cat is affected?**

In the early stages of the disease, when the cysts are very small, the kidneys will feel normal on palpation, they will look normal on an X-ray examination, and blood and urine tests will not show any abnormalities. Diagnosis at this early stage can best be achieved by examining the cat's kidneys using a high definition ultrasound scanner to look for evidence of fluid-filled cysts within the kidneys.

**Is there a genetic test for PKD?**

Research is underway to identify which gene is responsible for PKD, and promising advances have been made in the search for the gene. Once the gene has been identified it should be possible to develop a blood test to identify affected cats, but it is likely to be some years before such a test is available. For the moment ultrasound examination of the kidneys is the only practical means of identifying affected cats.

**More about the FAB PKD Screening Scheme**

**How accurate is ultrasound scanning?**

Ultrasound scanning of cats over 10 months of age, by a highly skilled veterinary ultrasonographer, using a high-definition machine, has an accuracy rate of over 95 per cent.

**How is the scan carried out?**

An ultrasound probe, which emits high frequency energy waves, is placed against the cat's skin and is used to generate a black and white picture of the cat's internal organs. Ultrasound scanning is believed to be completely safe, and is not painful for the cat, but:-

Ultrasound waves are unable to pass through air, so a layer of gel is used to ensure good contact with the skin.

It is usually possible to get a good image of the kidney without needing to clip the hair, but in some cases this may be necessary in order to get a clear enough picture to identify very small cysts.
The cat must lie still for long enough for both kidneys to be thoroughly examined. Some cats may need to be lightly sedated in order to ensure that an accurate result is achieved, but this is rarely necessary.

All cats must be identified with a microchip before a certificate can be issued.

**My local vets have an ultrasound scanner, why can't they scan my cat's kidneys?**
With appropriate expertise and equipment ultrasound scanning can be a very reliable indicator of the presence of cysts in the kidneys, but it is a very specialised task. If there are many large cysts they will be easy to recognise, but frequently the cysts will be tiny - less than 1mm in diameter. To identify these cysts a very high quality ultrasound machine is needed, and all of the kidney tissue must be thoroughly scrutinised. A cat cannot be said to be free of cysts unless the ultrasonographer can be confident that even the tiniest of cysts would have been seen if it was present.

When screening potential breeding stock for the presence of an inherited disease it is essential that the diagnostic test that is used is as accurate as possible. The FAB PKD Screening Scheme has been set up to achieve the highest possible standard of accuracy. An FAB PKD certificate provides a guarantee that the result recorded on the certificate is as accurate as it is possible to be.

**At what age can I have my cats scanned?**
Studies have indicated that once a cat has reached 10 months of age cysts can be identified with greater than 95 per cent accuracy. Below this age it may be possible to see cysts and hence to diagnose PKD, but at this young age if cysts are not seen then it doesn't mean that they aren't there.

**Both the parents of my cat have been scanned and were negative. Do I still need to have my cat scanned?**
When two unaffected cats are mated all the resulting kittens will also be unaffected. However, while ultrasound scanning is currently the most reliable test for PKD, a small proportion of cats (less than 5 per cent) may have cysts that cannot be seen. It is therefore recommended that ALL Persian and Exotic Shorthair cats are scanned before they are used for breeding, even if both parents have negative certificates.

You cannot advertise your cat as 'FAB PKD screened negative' unless a certificate has been issued for that cat.

**How much will it cost to have my cats scanned?**
The cost of the scan itself will be set by the ultrasonographer who performs the scan. A small additional charge will be made by the FAB, to cover the administrative costs of running the scheme. There is a reduction in price when more than four cats belonging to the same owner are scanned on the same day. A list of the approved ultrasonographers and their current prices is available on the website or from the FAB office.

**How often does a cat need to be scanned?**
In most cases each cat will only need to be scanned once, however very small cysts can be extremely difficult to see clearly on an ultrasound scan. If for any reason it is difficult for the ultrasonographer to be sure whether cysts are present or not they will record an 'equivocal' result on the certificate. These cats must be re-scanned after at least six months, by which time if cysts are present they may have grown sufficiently large to be clearly recognised. Equivocal results have been recorded for less than 2% of cats under the FAB scheme.

Ultrasound scanning under the FAB scheme is accurate in at least 95% of cases, however it is inevitable that errors will occasionally occur. These errors will usually come to light in the second generation, if a mating between two cats that were thought to be unaffected produces a kitten that is found to be affected by PKD. This is a very rare occurrence within the FAB Scheme (less than 1% of cats seen), but whenever it occurs the FAB is committed to investigating the source of the error. This will involve re-scanning the cats involved, which will be done at no cost to the owner(s) of the cats, but does require that owners and breeders co-operate as far as possible in making these cats available for re-examination.

**My cat is pregnant, can I still have her scanned?**
Ultrasound scanning of pregnant cats is believed to be safe, but can only be carried out at the owner's risk.

**Interpreting the results of the scan**
My cat has been scanned under the FAB scheme and no kidney cysts have been seen. What does this mean?
Ultrasound scanning of cats over 10 months of age, by a skilled ultrasonographer, using a high-definition machine, has an accuracy rate of over 95 per cent. So, if no cysts have been seen, you can assume that your cat does not have PKD and it therefore does not carry the PKD-gene and cannot pass PKD on to its kittens. If you mate this cat to another cat that does not have PKD then none of the kittens will be affected. If you mate this cat to a cat that does have PKD then you can expect that approximately half of their kittens will be affected with PKD.

My cat has been scanned under the FAB scheme and kidney cysts have been seen. What does this mean?
Cysts in the kidneys can occur for reasons other than PKD, but this is extremely rare, so if kidney cysts have been seen, you should assume that your cat does have PKD. This means that it carries the PKD-gene and can pass PKD on to its kittens. If you mate this cat to a cat that does not have PKD then you can expect that approximately half of their kittens will be affected with PKD. If you mate this cat to a cat that also has PKD then you can expect that around a quarter of their kittens will die before birth (because they will inherit two copies of the abnormal gene) and that of the remaining kittens around two thirds of them will be affected by PKD and only one third of them will be free of PKD.

My cat has been scanned under the FAB scheme but I was told that it was not possible to say whether there were cysts in its kidneys or not. What does this mean?
Very small cysts can be extremely difficult to see clearly on an ultrasound scan, even when the scanning is done by an ultrasonographer who is highly skilled at examining cats' kidneys using a high definition ultrasound machine. It is very important that you are able to make an informed decision on your cat's breeding future and an inaccurate result would be extremely misleading. For this reason if it is difficult for the ultrasonographer to be sure whether cysts are present or not it is recommended that the cat should be re-scanned after at least six months, by which time if cysts are present they may have grown sufficiently large to be clearly recognised. It is also recommended that the cat is not used for breeding until it has been re-scanned and its PKD status has been clarified.

Accuracy of results within the FAB Scheme
Studies indicate that under ideal conditions, ultrasound scanning for PKD gives a correct result in more than 95% of cases. The FAB PKD Screening Scheme is designed to ensure that the results of screening are as accurate as it is possible to be, but it is inevitable that a small number of errors will occur. These errors have usually been discovered because a mating between two cats that were thought to be unaffected has produced a kitten that is found to be affected by PKD. For this reason it is very important that ALL Persian and Exotic Shorthair cats are scanned for PKD before they are used for breeding, even if both parents have negative certificates.

If the predicted accuracy rate of 95% is achieved, then there will be 5 errors per 100 cats examined. In the first three years that the scheme has been in operation over 1500 cats have been screened and less than 1% of errors have been identified. The FAB is committed to investigating the source of all errors that occur within the scheme, and to re-examining all the cats involved, at no costs to their owner(s).