

Wire Fox Terrier Genetic Tests

By Dr David Hughes MRCVS

There are many tests available for genetic conditions across the many recognised Kennel Club breeds. Specifically related to the Wire Fox Terrier (WFT), there are three genetic tests people have approached me repeatedly to discuss:

- **Van Den Ende Gupta Syndrome (VDEGS)**
- **Primary Lens Luxation (PLL)**
- **Degenerative Myelopathy (DM)**

All 3 of the above conditions have an autosomal recessive pattern of inheritance. This means both parents have to carry at least one copy of the mutated gene to produce an affected/at risk puppy.

In my opinion, the condition of priority for WFT breeders at this time is VDEGS. Concerning PLL and DM, I would not actively promote testing for reasons I hope will become clear through this article.

VAN DEN ENDE GUPTA SYNDROME (VDEGS)

What is VDEGS?

Sometimes referred to as ‘mungo puppies’ colloquially by people involved with WFTs, VDEGS is a genetic condition causing a wide range of physical abnormalities.

Visible abnormalities with VDEGS affected dogs



HEAD

- Very pronounced undershot bite
- Deformed upper jaw, with narrow beaked nose (with or without cleft palate)
- Misaligned nose
- Small eyes with underdeveloped eyelids
- Prominent deformed ears



BODY

- Weedy, long bones through feet often turned at an extreme angle
- Dislocated elbow and patella
- Thighbone distorted (bowed shape)
- May present with contracted limb muscles

Information on the VDEGS test

This is a very reliable test and I would urge anyone breeding to make use of the test. AFFECTED puppies are generally very apparent from the physical abnormalities described above. Therefore, the genetic test available is mainly to identify CLEAR and CARRIER dogs in a breeding program.

This test is available through various laboratories. I have ordered kits through Laboklin, where testing costs £54, although I believe the test may be available through other labs at a lower cost. All the required materials and paperwork are provided within the kit. A swab is provided in the kit to collect cells by brushing on the inside of the cheek to collect a few cells. Prior to swabbing the mouth, no food should be given for at least 2 hours before sample collection as this may contaminate the sample.

Breeding strategies depending on results

Breeding AFFECTED

- With the physical abnormalities, particularly of the head, I would anticipate many VDEGS AFFECTED puppies die within days of birth due to an inability to suckle properly. Therefore, most probably don't live long enough to reproduce.
- Where VDEGS AFFECTED dogs do live to adulthood, the physical abnormalities are very apparent, I would hope no breeder would consider these animals to have sufficient merit to be included within a breeding program.

Breeding CARRIER to CARRIER

- Statistically, $\frac{1}{4}$ puppies are likely to be AFFECTED with VDEGS, $\frac{1}{2}$ puppies will be CARRIERS and $\frac{1}{4}$ will be CLEAR. In my opinion, this breeding combination should be avoided as it is unnecessary and unethical to knowingly risk producing VDEGS AFFECTED puppies.

Breeding CARRIER to CLEAR

- Statistically, ½ puppies will be CARRIERS and ½ CLEAR of VDEGS
- As WFTs are a numerically small breed with a limited gene pool, a practical strategy would be to include CARRIERS within a breeding programme but only to breed to other WFTs which are tested as CLEAR.
- Completely removing CARRIERS from a breeding program may have detrimental consequences. There is a large body of evidence that a reduction in genetic diversity is connected to an increased risk of genetic disorders.
- Reducing the proportion of CARRIERS within the breed should be a long-term goal to help maintain an adequate level of genetic diversity within the breed.
- Puppies born to parents of this combination should be tested to identify if they are CLEAR or CARRIERS.

Breeding CLEAR to CLEAR

- All puppies born to this combination will be hereditary CLEAR - further genetic testing of progeny is not required.

PRIMARY LENS LUXATION (PLL)

What is it?

A genetic defect which results in luxation (abnormal displacement) of the lens in the eye, typically around 4-7 years of age. This condition can then be a precursor to glaucoma (an increased pressure in the eye) a painful condition for the dog in question.

Information on the PLL test

Many of you may have heard me chatting about this condition, it is my belief at this time that WFTs do not appear to have the mutated gene responsible for this disease. I suspect historically breeds/cross breeds have been misidentified as WFTs and this mistake has been passed through the literature. In the absence of convincing evidence that the condition occurs within the breed, I would not consider it a high priority to test for PLL. If anyone knows of or has had a WFT with this condition could they please contact me. I have been involved with several WFTs tested for PLL - all have tested CLEAR.

**NOTE: This is NOT the advice I would give regarding Welsh Terriers (another breed I am actively involved with) as it DOES occur within that breed, potentially leading to the necessity of eye removal!*

DEGENERATIVE MYELOPATHY (DM)

What is DM?

Progressive physical changes occur within the spinal cord which cannot be visibly seen, typically in dogs 8 years old and over.

Visible clinical signs with DM affected dogs

Early stages

- Progressive weakness of hindlimbs
- Easily fall over - poor balance, can be seen to sway in the rear
- Feet scraping on the floor when walking
- Knuckling of paws upon walking which may result in worn nails

Late stages

- Weakness in front limbs
- Muscle wastage
- Pressure sores and unable to rise
- Urinary and faecal incontinence
- Difficulty breathing



Leg braces or a cart can help with mobility during early stages of DM

Although clinical signs may strongly indicate DM a definitive diagnosis can only be made upon examination of the spinal cord under a microscope post-mortem.

Information on the DM test

It is important to acknowledge the genetic test available for DM is an indicator of risk of development of this disease rather than a definitive test identifying affected animals. Dogs with the genetic sequence identified as increased risk for DM are more likely to develop the condition. However, even dogs without the at-risk sequence may develop DM.

It is clear our understanding of DM is insufficient to completely understand the development of the disease and other factors must be at play – possibly other genetic components and/or environmental components?

It should be noted that the research was based across a very large number of breeds and therefore conclusions were drawn across the breeds rather than on a breed-specific basis. Within the study, 94% of WFT's resulted in having 2 copies of the at-risk genetic sequence. WFTs had by far the greatest proportion of dogs tested as having 2 copies of the at-risk sequence of any breed involved in the study. This is quite alarming to read and with such a high proportion of WFTs tested as being at-risk, it leaves no practical breeding strategies, as doing so could cause the downfall of the breed through a genetic bottleneck.

It is also worth looking at our dogs in the real world and not just results published in the literature. Although this disease does occur within the breed, there are far fewer WFTs affected with the disease than the at-risk genetic sequence would suggest.

It can be suggested that for WFTs actively testing should be avoided for DM to prevent genetic bottlenecks through selective breeding. Especially when DM is a condition we have incomplete information on the development of the condition. If in time it becomes apparent DM is a significant health and welfare concern in our breed this recommendation may change.

CONCLUSION

I hope through this article I have encouraged other breeders to make use of the VDEGS genetic test. Several breeders have already been making use of the test and hope these breeders continue to do so in the future and help promote its importance to other breeders.

At this time, I would not recommend using the tests available for PLL and DM. If anyone reading this article has any experience of these diseases within WFTs I would be very grateful to hear from you.

Wishing you and your dogs the best of health for 2020.

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