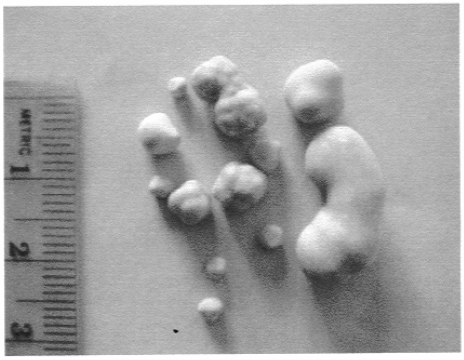
Cystinuria in the UK population of Newfoundland dogs – Survey Results

As many of you will know from a previous article in the newsletter, Cystinuria in the Newfoundland is an inherited disorder that can lead to the formation of cystine stones (also known as uroliths or calculi) within the urinary tract. The formation of these calculi in the bladder and urethra give rise to the clinical signs of dysuria (difficulty passing urine), haematuria (blood in the urine) and recurrent urinary tract infections.



Cystine uroliths

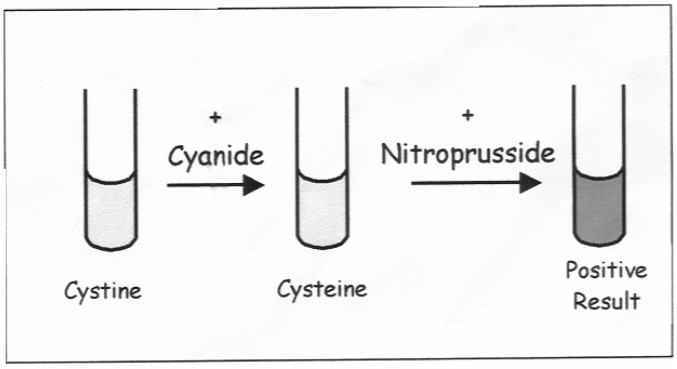
The aim of this article is to report the findings of the survey which was carried out in order to establish the incidence of cystinuria in the UK population of Newfoundland dogs. However before presenting the results I'd like to describe the test that we used to identify dogs with cystinuria and alert readers to the limitations of the test. I will also describe other tests, which are available to identify affected individuals, and also carriers of this genetic defect.

Cystine is an amino acid, which is filtered by the kidneys and then, in normal dogs, it is reabsorbed so that very little is actually excreted in the urine. However in a dog with cystinuria there is a defect in the kidney tubules, which reduces the kidney's ability to reabsorb cystine. This leads to an increased amount of cystine in the urine.

The Cyanide-Nitroprusside Urine test

The **cyanide-nitroprusside (CNP) urine test** was used to screen for cystinuria in 149 Newfoundland dogs in the UK. This test is widely used in human medicine as an inexpensive screening test for cystinuria.

The CNP test uses a series of chemical reactions to identify high levels of cystine in the urine. Briefly, by adding **cyanide** to the urine, cystine is converted to another amino acid called cysteine. If there is sufficient cysteine present the addition of **nitroprusside** causes a magenta colour change.



We must remember that there are some limitations to this test;

- The CNP urine test does not pick up all affected individuals (false negative results); especially if the urine is very dilute (lower concentration of cystine), or if a urinary tract infection is present. We tried to avoid this problem by requesting a morning urine sample (usually more concentrated) and by adding a preservative to the urine (thiomersal).
- The CNP test does not identify carriers of this inherited disorder.
- False positive results occasionally occur, where a positive CNP urine test result is found in a dog that does not have cystinuria.

Although we can use more sensitive methods of screening for cystinuria such as Quantitative Amino Acid Analysis of the Urine this method of testing is only useful for detecting affected dogs. Carriers of the genetic abnormality that causes Cystinuria in Newfoundland dogs do not appear to have high levels of cystine in the urine. This method of analysis cannot therefore be used to identify carriers. h is also much more expensive to perform than the CNP urine test.

Identification of carriers is especially important if we are to eliminate this genetic disorder from the Newfoundland population. It is recommended that Newfoundlands intended for breeding undergo a DNA test.

DNA Testing

The genetic defect that results in Cystinuria in the Newfoundland was recently identified and this had provided a means of identifying both affected individuals (homozygous for the genetic defect) and also carrier animals (heterozygotes). This DNA test is available at the University of Pennsylvania Veterinary School, and by enabling identification and therefore exclusion of carriers from the breeding population it should prove invaluable in eliminating this disorder from the breed.

Survey

Results Of the 149 Newfoundland dogs that were tested at Edinburgh University, 4 were found to be positive. This equates to approximately 2.7% of the Newfoundland dogs tested. Obviously we only detected dogs with cystinuria, NOT carriers of this genetic defect. The number of carriers is likely to be much greater than 2.7%. There has been more widespread testing in the USA using the DNA test. Approximately 5% were found to be homozygous for the disorder i.e. affected. Approximately 30% of those tested in the USA were found to be carriers.

At present the incidence in the UK does not appear to be as high as in the USA. However as there is now a DNA test available which can identify carriers it would make sense to begin testing dogs prior to inclusion in breeding programmes to prevent the disease becoming more widespread.

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