

## **PHOSPHOFRUCTOKINASE (PFK)**

### **What is PFK?**

PFK deficiency is an autosomal recessive inherited storage disease which causes abnormalities in red blood cells and muscle cells. Clinical signs include intermittent dark urine, anemia, fever, weakness, or muscle fatigue. It is sometimes confused with autoimmune hemolytic anemia and other acquired diseases. Dr. Giger and colleagues at the University of Pennsylvania have developed a genetic test for carrier and affected dogs. During the past decade before this study, approximately 500 dogs (a very small percentage of all registered English Springer Spaniels) had been tested for PFK deficiency finding more than 50 affected dogs.

The genetic defect underlying phosphofructokinase deficiency in English Springer Spaniels has been identified by research groups at the University of Pennsylvania (See Article below) \*\*

It is a tiny change (point mutation) in the M-type phosphofructokinase gene. The DNA test involves determining the sequence (ie the structure) of the gene in the critical region by amplifying the part of the gene containing the mutation using the polymerase chain reaction.

This disorder shows an autosomal recessive mode of inheritance, and has also been shown to be present in American Cocker Spaniels.

This test requires 2mls EDTA blood. Samples for testing should be sent, together with a completed DNA Testing form and payment of £65 inc VAT (cheque or credit card) for each sample to Genetic Services, Animal Health Trust, Lanwades Park, Kentford, Newmarket, Suffolk CB8 7UU.

DNA testing forms can be downloaded at [www.aht.org](http://www.aht.org)

Enquiries should be made to Symone Ingram telephone +44 (0) 8700 509144 or fax +44 (0) 8700 502461 or via e-mail to [dnatesting@aht.org.uk](mailto:dnatesting@aht.org.uk).

## **FREQUENCY OF PHOSPHOFRUCTOKINASE (PFK) DEFICIENCY IN ENGLISH SPRINGER SPANIELS: A LONGITUDINAL AND RANDOMIZED STUDY**

U. Giger, A. Kimmel, D.E. Overley, L.T. Schwartz, B.F. Smith, Y. Rajpurohit. Section of Medical Genetics, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, PA

*Paper presented at the American College of Internal Veterinary Medicine conference in Seattle in May, 2000. This paper is a report of ESSFTA Foundation sponsored research.*

Muscle-type phosphofructokinase (PFK) deficiency causes alkaline-induced hemolytic crises and exertional myopathy in English Springer Spaniel (ESSP) dogs and is inherited as an autosomal-recessive trait. A single base missense mutation in the PFK gene results in truncation and instability of the enzyme. A DNA test has been available for the past decade to survey ESSP dogs for PFK deficiency. In this paper, we present data on the frequency of PFK deficiency in ESSP dogs based on the results of screening tests performed at the Veterinary Hospital at the University of Pennsylvania from 1992-1999 and on the results of a randomized trial completed in 1998-1999.

The randomized trial included 692 dogs that were either active in field trials or were AKC conformation champions. All dogs were born between 1987 and 1995, had been bred at least once, and were selected randomly from AKC records. Cheek swab samples were obtained for 368 dogs (53%), and the samples were screened for the mutant PFK allele. The total frequency of carriers was 2.7%, with a higher proportion (4.0%) of carriers in the field trial group versus the conformation (1.2%) group. Pedigree analysis revealed that all of the field trial carriers were related.

Testing was also performed on blood or cheek swab samples of a non-randomized group of 575 field trial dogs between 1992 and 1999. In this group, 14.1% percent were carriers, and 6.4% were affected dogs. Thirty-seven percent of the dogs that were tested because they had suspicious clinical signs (as noted by the owner or referring veterinarian) were, in fact, affected with PFK deficiency. The frequency of carriers peaked at 19% in the period from 1995-1997 and was lowest in 1998-1999 with 8.1%. The proportion of PFK deficient dogs was highest (8%) before 1994 and was lowest (4%) in 1998-1999.

Results from the 1998-99 randomized study and from general screening during 1992-99 indicate that the frequency of affected and carrier ESSP dogs has decreased, but PFK deficiency remains a common problem in the breed. The randomized study reveals a current 2% PFK mutant allele frequency in the field trial ESSP breeding population. Based on these results, we recommend the screening of all breeding ESSP dogs and of dogs with suspicious clinical signs in order to eliminate the disease from the breed and to provide appropriate treatment of PFK-deficient dogs.

