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## DELAYED POSTOPERATIVE HEMORRHAGE IN WHIPPETS



**GUILLERMO COUTO, DVM, DACVIM (SAIM, ONCOLOGY)**  
**JAY TIBBITTS, DVM, PHD (SECRETARY, WHIPPET HEALTH FOUNDATION)**  
**COUTOVETCONSULTANTS@GMAIL.COM**  
**TIBBITTSJAY61@GMAIL.COM**

Sighthounds have been around since 6,000–7,000 B.C. Since then, they developed many physiological adaptations to pursue prey by sight. Although not all sighthound breeds were created equal, several share unique anatomical and functional features.

Over 2 decades ago, we recognized delayed postoperative bleeding in Greyhounds (1). Dogs with this potentially fatal condition bleed excessively after routine surgery or trauma, oftentimes requiring life-saving blood transfusions. Affected dogs have normal results of tests of coagulation. Since we started using the preventative medications aminocaproic or tranexamic acid preemptively before surgery or after trauma almost 20 years ago (2–3), the severity and mortality of this condition has decreased markedly. This disorder has been recognized in other sighthound breeds and is now referred to as Delayed Postoperative Hemorrhage (DEPOH).

In normal dogs, blood clots immediately after trauma, but if it continues to clot for a long time, the clot would eventually occlude the affected blood vessel and prevent blood flow. Therefore, animals have developed a variety of “clot busting” mechanisms that prevent this from happening; the main one is referred to as fibrinolysis. It was originally thought that dogs with DEPOH had overactive fibrinolysis. Recently, Dr. Court’s group at Washington State University reported that affected dogs have a mutation in the gene (denoted SERPINF2) responsible for the production of a protein called antiplasmin (an inhibitor of the fibrinolytic system) (4). When this protein is absent or in low concentrations as a result of the gene mutation, it “frees” the fibrinolytic system to operate unchecked and can result in excessive bleeding. This mutation affects predominantly sighthounds. We know that Greyhounds have larger spleens than other dogs breeds, and that their spleen sends a large volume of red blood cells into the blood during exercise, thus making the blood thicker. It is likely that Greyhounds and other sighthounds developed this gene mutation to prevent “thick” blood from clotting during exercise.

### Examples of Postoperative bruising due to DEPOH



Dogs with 2 copies of the mutated SERPINF2 gene (denoted as MUTANT/MUTANT) may be at significant risk for DEPOH; dogs with one copy of the mutant gene (denoted MUTANT/Normal) appear to have a slightly higher risk of bleeding than normal dogs. However, it's important to note that the correlation between SERPINF2 mutations and DEPOH has only been validated in Scottish Deerhounds (4). Nevertheless, it is quite likely that the same mechanisms apply to other sighthound breeds. In a recent study (5), the prevalence of SERPINF2 mutations in 168 Whippets was 25%; approximately 5% were MUTANT/MUTANT, and 20% were MUTANT/Normal. Despite the apparently high prevalence of SERPINF2 mutations in Whippets (25%), DEPOH appears to be uncommon.

The diagnostic laboratory at Washington State University offers a genetic test for mutations in the SERPINF2 gene called the DEPOHGEN test and is valid for use in Whippets. This test uses a simple cheek swab. While the DEPOHGEN test can provide information on the genetic status of your Whippet, the lack of a clear understanding of the association between SERPINF2 mutations and DEPOH in Whippets presents some challenges to Whippet owners with respect to the potential utility of the DEPOHGEN test and risks of DEPOH. Based on the currently available data, the Whippet Health Foundation has the following advice for Whippet owners:

- **Should I perform a DEPOHGEN test on my Whippet prior to surgery?**
  - The practical value of DEPOHGEN testing as a predictor of the development of DEPOH has not yet been shown in most sighthound breeds, including the Whippet. Therefore, knowing the results of a DEPOHGEN test for your dog may not provide clear guidance on the risk for postsurgical bleeding.
- **If my Whippet tests MUTANT/MUTANT or MUTANT/Normal, will that correlate with the probability and severity of DEPOH?**
  - To date, it is not known whether mutations in the SERPINF2 gene confers additional risk of DEPOH in Whippets. Thus, it is not possible to know how the results in the DEPOHGEN test may inform you of your dog's risk of DEPOH.
- **Should I preemptively treat my Whippet with aminocaproic or tranexamic acid prior to surgical procedures?**
  - We advise families and veterinarians that, if they are going to perform major surgery (abdominal thoracic, cancer surgery, amputation, etc), using aminocaproic or tranexamic acid preemptively before surgery should be a strong consideration. The safety profiles of aminocaproic and tranexamic acid are very broad; for example, in a 30kg Greyhound we use 500 mg of aminocaproic acid per dose. The toxic dose for dogs is approximately 500 mg/kg of body weight (or 15,000 mg per 30 kg dog).
- **What should I look for after injury or surgery that might indicate that my Whippet has DEPOH?**
  - In most dogs with DEPOH, the surgical site bruises within 36 hours of surgery; the bleeding under the skin may extend beyond the surgical site. If DEPOH occurs after trauma or an injury, the affected site will start bleeding approximately 36 hours after the event), and new fresh blood will appear in the area. This also applies to bleeding after dental extractions.

- 1.Lara García A, Couto CG, Iazbik MC, Brooks M: Postoperative bleeding in retired racing Greyhounds. J Vet Intern Med 2008; 22:525–533.
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- 4.Court M, Kiser J, Neibergs H, et al.: Identification by whole genome sequencing of genes associated with delayed postoperative hemorrhage in Scottish deerhounds. J Vet Intern Med, 2023 Mar;37(2):510–517
- 5.Court M, Hardy M, Forbes K, et al.: Delayed postoperative hemorrhage (DEPOH) in an Irish Wolfhound with the SERPINF2 c.605 T/T genotype: Case report and variant prevalence across dog breeds. Front Vet Sci – Sec. Veterinary Emergency and Critical Care Medicine, Volume 12 – 2025
- 6.Gilman OP, Borgeat K, Wilson HE: The effect of prophylactic tranexamic acid on the incidence of postoperative hemorrhage in Greyhounds. Vet J 2024; 308 : 1–4.