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Von Willebrand Disease

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The blood clotting process is extremely complex. If something goes wrong with the process, and a person or animal is unable to control the minor damage to blood vessels which occurs during the course of living, or even worse if they experience serious injury or surgery, the results can be extremely devastating. Von Willebrand disease (vWD) is not common within our breed, but it does occur, and has proved fatal to more than one Beardie. It is inherited. In Dobermans 90% of dogs were carriers or affected with the disease at one time, by careful screening the occurrence has been reduced to less than 70%. Just one popular sire was found to be the source of the problem. Let's not let it happen to Beardies.

In order for blood to clot it requires thirteen "factors" (handily numbered I to XIII) or proteins made in various parts of the body, calcium, platelets and von Willebrand factor. Chemical signals initiate clotting, and yet other factors oppose clotting, and encourage the clot to break up (hopefully) after it's served its intended function. Lack of one or more of the factors, a reduction in the number of platelets, or a loss of their cohesiveness, or an exuberance of action by the anticoagulants (or introduction of artificial anticoagulants - such as aspirin, warfarin or other rat poisons), can all lead to abnormal bleeding.

The three most common inherited conditions, in which deficiency of a single factor leads to impaired clotting or spontaneous bleeding, are hemophilia A (deficiency of factor VIII:C), hemophilia B or Christmas disease (deficiency of factor IX), and vWD (deficiency of von Willebrand factor - vWF). While large hematomas may be seen more commonly with one of the hemophilias, vWD is more likely to produce chronic bleeding of mucous membranes (gums, gastrointestinal and urogenital tracts, nose bleeds) and skin, and may more closely resemble platelet deficiency.

Both hemophilias are X-linked traits. Carrier dams will pass the condition to approximately 50% of their sons. Bitches are only affected if they received defective X genes from both parents. VWD is the most common of the three. In Beardies and most other dog breeds, the condition is inherited as an autosomal, incompletely dominant trait, with variable depth of penetrance,



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accounting for varying degrees of expression (type 1 vWD). A rare homozygous form is lethal, pups may be resorbed, born dead or die within a few days. VWD is exacerbated by concurrent hypothyroidism. Daily replacement thyroid medication may resolve clinical signs in mild to moderate cases. Abnormal platelet function and thrombocytopenia (low platelet count) may also accompany hypothyroidism, exacerbate the tendency to bleed and respond to thyroid replacement therapy. VWF is made by the cells lining blood vessels. It forms a complex with the factor VIII:C. The complex acts as a precoagulant, speeding up clot formation. VWF is also necessary for normal adhesion of platelets to injured blood vessels, especially when blood flow is rapid or turbulent, and to attract further platelets to the growing clot.

The only way to be certain that a particular dog is not a carrier of vWD is to measure the level of vWF. This is not always as simple as it sounds. Blood samples must be collected using clean venipuncture and good blood flow directly into tubes or syringes containing trisodium citrate in a ratio of 9 parts blood:1 of citrate. If the sample is not obtained cleanly or the animal was stressed, there will be hemolysis (breakdown of red blood cells) or minute clots in the sample - these may raise or lower the level of vWF antigen in the sample. If there is any question about sample quality, retest. More than one test with the same result increases confidence in the accuracy of the results. If clots are seen in the sample, discard and obtain a second sample, preferably from a second vein or a different location on the same vein, using a new needle and syringe. After blood collection, it is mixed thoroughly with the citrate and then centrifuged. The plasma is transferred to a new tube, and should be packaged in an insulated container with an ice pack and shipped overnight to the testing laboratory. VWF levels are increased if the sample becomes heated during shipment. Any result over 200% is rejected, and improper handling is assumed.

The table below provides an interpretation of vWF antigen results.

Bleeding Time	vWF:Ag(%)	Interpretation
Normal	60 or >	Normal range 70-172%
Normal*	60-69	Low end of normal; mates should have higher levels and pups should be checked
Normal/prolonged*	50-59	Equivocal range (this may be considered to be 50-69%), may be borderline



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		normal or heterozygous carrier of vWD gene. Retest and/or breed only to higher testing mate. Pups should be checked.
Normal/prolonged*	<50	Heterozygous carrier of vWD gene, if asymptomatic. Carriers may revert to affected status, particularly if stressed. Breed only to vWD normal mates and test pups.
Prolonged*	< 50	Type 1 vWD. Clinically affected heterozygote. Should not be used for breeding.
Normal/prolonged*	<7 (undetectable)	Severe (penetrant) heterozygous carrier of vWD gene, is asymptomatic. Inadvisable to breed.
Prolonged*	<7 (undetectable)	If clinically affected has severe form of type 1 vWD (heterozygotes, as homozygosity is lethal). Should not be bred.
Normal	200 or >	Probably reflects stress, incorrectly collected sample or activation of vWF by disease. Retest.

* Concomitant thyroid dysfunction (hypothyroidism) alone will aggravate existing vWD and increase the risk for bleeding with or without vWD being present. In general, 80% of dogs with a vWF:Ag of less than 35% will have abnormal bleeding. With vWF levels between 35-50% about 20% of dogs will bleed abnormally, and from 50-70% the percentage of dogs showing abnormal bleeding approaches 20%. Bleeding time is assessed by cutting one or more claws too short using a sharp blade. Blood should be allowed to flow freely with no attempt made to stop bleeding. Normal bleeding time is up to 5 minutes for the dog.

Table courtesy of W. Jean Dodds DVM

(Editor Note: Gene markers have been identified for several breeds with vWD and a genetic screening test will be a more reliable indicator of a dog's vWD status). If you belong to a breed where the problem has been identified and studied, check with your breed health representative or the



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Canine Health Foundation for more information on the genetic screening tests. Sept 2007).