EVALUATION OF VON WILLEBRAND FACTOR DURING PREGNANCY, LACTATION AND ESTROUS CYCLE IN BITCHES AFFECTED AND UNAFFECTED BY VON WILLEBRAND DISEASE

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Abstract
Concentrations of von Willebrand Factor (vWF) increase during pregnancy in humans and dogs, but the mechanism is not well defined. The aim of this study was to evaluate the changes in plasma vWF concentration in pregnancy and during the estrous cycle after pregnancy in bitches affected and unaffected by von Willebrand Disease (vWD) and to evaluate the correlation between plasma vWF and serum cortisol levels. Seven vWD affected (GI) and 9 unaffected (GII) bitches were evaluated during pregnancy, parturition, lactation, and non-gestational estrous cycle at 11 points (pregnancy 1, pregnancy 2, parturition, lactation 1, lactation 2, lactation 3, anestrus, proestrus, estrus, diestrus 1, and diestrus 2). Platelet count, von Willebrand factor antigen (vWF:Ag), albumin and serum cortisol concentration were performed. The vWF:Ag concentration remained stable during the non-gestational estrous cycle, but increased during pregnancy, with the highest value observed at parturition in both groups. Increases of 70% and 124% in vWF were seen in GI and GII, respectively, compared with anestrus. No correlation was found between vWF:Ag and cortisol. Values of vWF:Ag changed during pregnancy, with a peak at parturition in both vWD affected and unaffected animals. The phase of the estrous cycle following pregnancy did not affect vWF:Ag values in either group. Evaluation of vWF during pregnancy can cause false negative results for vWD, but evaluation can be performed at any point of the estrous cycle of non-pregnant bitches.

Introduction
vWD is the most commonly inherited hemostatic abnormality in humans1 and dogs2. Concentrations of vWF increase during pregnancy in healthy and vWD patients.

Objectives
The purpose of this study were to evaluate changes in vWF concentrations found in pregnant bitches and during subsequent estrous cycle following pregnancy in vWD affected and unaffected animals. Correlation between vWF and cortisol during pregnancy and during subsequent non-gestational estrous cycle was investigated.

Material and Methods
16 healthy female dogs (7 vWD affected-GI and 9 unaffected-GII) were assessed during pregnancy, parturition, lactation and non-gestational estrous cycle at 11 points (pregnancy 1, pregnancy 2, parturition, lactation 1, lactation 2, lactation 3, anestrus, proestrus, estrus, diestrus 1, and diestrus 2). Platelet count, von Willebrand factor antigen (vWF:Ag), albumin and serum cortisol concentration were performed. The vWF:Ag concentration remained stable during the non-gestational estrous cycle, but increased during pregnancy, with the highest value observed at parturition in both groups. Increases of 70% and 124% in vWF were seen in GI and GII, respectively, compared with anestrus. No correlation was found between vWF:Ag and cortisol. Values of vWF:Ag changed during pregnancy, with a peak at parturition in both vWD affected and unaffected animals. The phase of the estrous cycle following pregnancy did not affect vWF:Ag values in either group. Evaluation of vWF during pregnancy can cause false negative results for vWD, but evaluation can be performed at any point of the estrous cycle of non-pregnant bitches.

Results
A peak of vWF:Ag was observed in GI and GII at parturition (PART). Mean vWF:Ag values in PART (57.09%) were 70% higher than in anestrous (ANEST) (34.05%) for GI. However the same values in GII were approximately 124% higher (PART 311.73% and ANEST 139.30%), with a statistically significant difference. vWF:Ag values found at LAC3 remained stable throughout the estrous cycle (anestrus, prooestra, estrus and diestra) without statistically significant differences between moments in both groups. Plasma cortisol concentration increased in PART. Cortisol values did not exceed reference values for canines. Also, there were no statistically differences between moments in both groups and there was no correlation between vWF:Ag and cortisol in either group.

Discussion and Conclusion
GI animals showed a statistically significant difference between ANEST and PART, and this increase in vWF concentration can occur during pregnancy by the development of the highly vascular placenta and uterine vascular. GI animals did not show this statistically significant difference, since they are vWD carriers (lesser ability to increase vWF synthesis). Both studied groups showed no statistically significant differences between LAC1 and ANEST for vWF:Ag, probably due to the abrupt loss of placental vascularization. We conclude that vWF:Ag values change during pregnancy, with a peak at parturition. There is no correlation between cortisol and vWF:Ag in the studied animals and moments. Evaluating vWF in bitches during pregnancy can cause false negative results for vWD, but this assessment can be performed at any time during the estrous cycle in non-pregnant bitches.

References