Fall 2025

AVHTM Newsletter

A 501(c)(3) nonprofit professional association

Volume 9, Issue 3

Upcoming Events:

ACVIM Forum 2026
Seattle, Washington
June 11 - 13, 2026

ACVIM Forum with AVHTM Special Interest Group (SIG) dinner on June 12 (see p. 2)
6:30 - 9:30 pm

Welcome to the Fall 2025 AVHTM Newsletter

Hello and welcome to the fall issue of the AVHTM newsletter. Since our last newsletter we have had AVHTM lectures at ACVIM and IVECCS (see report later) and planning is well underway for our 2026 events. If there is anything particular you would like us to consider for lecture ideas in the future, please do let us know by emailing us at info@avhtm.org. This summer we also offered our inaugural AVTHM Master Series: Veterinary Blood Banking Basics and Beyond, hosted by HemoSolutions LLC in Colorado Springs, CO. The course was a phenomenal weekend of learning and networking and plans are already underway for the next course! We have our usual round up of pertinent literature as well as reports from two particularly interesting recent papers. We've also had some great discussion recently on the Google Group, thinking about the use of expired blood products, donor illness and blood typing options. Keep the questions and comments coming - we all learn together.

AVHTM at IVECCS by Dr. Sarah Musulin

The 2025 International Veterinary Emergency and Critical Care Symposium (IVECCS) was held in San Diego, CA this year and was a huge success. The AVHTM has been an IVECCS affiliate since 2016. This has been a wonderful partnership to further scientific knowledge in veterinary hematology and transfusion medicine. Out of the 7740 attendees, 154 (2.4%) registered as AVHTM members. Among a vast array of emergency and critical care lectures, the AVHTM sessions were well attended and received. The AVHTM lectures included:

- Platelet Pathology in Practice: An Overview of an Overlooked Cell
  Matthew Kornya, DVM, DVSc, DACVIM (SAIM), Resident ACVECC
- Are Platelets the Enemy in Pulmonary Hypertension?
  Ronald H. L. Li, DVM, MVetMed, PhD, DACVECC
- Red Blood Cells as Inflammatory Markers
  Jake Wolf, DVM, DACVECC
- Fibrinolytic Disorders: Where Are We?
  Ian DeStefano, DVM, DACVECC
- Factor XIII – The Good, The Bad, and the Unknown
  Audrey Tinsman, DVM, MSc, DACVECC
- Massive Transfusion – Practicalities in Dogs and Cats
  Claire Sharp, BSc, BVMS(Hons), MS, DACVECC
- The Haves and Have Nots: Ethics of Limited Resource Allocation in Veterinary Medicine
  Nathan Peterson, DVM, MBE, DACVECC

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AVHTM at the ACVIM Forum — See you there!

We have the following lectures in our AVHTM stream:

- ACVIM Forum 2026, Seattle, Washington, June 11-13

AVHTM Lectures will be held on Thursday afternoon, June 11; times not yet assigned.

- **Hemostasis in Canine Hepatobiliary and Gastrointestinal Disease: Principles and Case Examples.** Sara Jablonski and Sarah Shropshire, in person, 1.5 hours
- **The Evolving Landscape of Platelet Transfusions: From Indications to Innovation.** Jillian Haines, in person, 1 hour
- **Bone marrow examination: when, how, and what you can get from it?** Cynthia Lucidi, in person, 1 hour
- **Transfusion medicine for non-blood bankers.** Marie-Claude Blais, virtual, 1 hour

Special Interest Group (SIG) topic: What to do with antithrombotics when interventions are needed

Hosted by Dr. Stephan Moll

Join us for dinner and drinks at the AVHTM SIG during the ACVIM Forum

June 12, 2026

6:30 - 9:30 pm Pacific

Wild Ginger

1401 3rd Ave
Seattle WA 98101

Registration will open soon!

AVHTM at IVECCS by Dr. Sarah Musulin

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- Blood As a Limited Resource – Case-based Panel Discussion
  Panelists - Sarah Musulin, DVM, DACVECC, Jeanine Persano, DVM, Nathan Peterson, DVM, MBE, DACVECC, Meghan Respess, DVM, DACVECC
- Diagnosing Ineffective Hematopoiesis: PIMA, IMN, and Beyond
  Cynthia Lucidi, DVM, MS
- Management of Ineffective Hematopoiesis
  Ari Jutkowitz, VMD, DACVECC
- Don't Discount Dyshemoglobinemia
  Jake Wolf, DVM, DACVECC

AVHTM Members were also involved in coordinating and teaching the following workshops:

- Blood Banking How-to Workshop
  Sarah Musulin, DVM, DACVECC
- Rebecca Nusbaum, CVT, VTS (ECC)
  Jessie Brown, LVT
- Transfusion Medicine Workshop
  Julie Walker, DVM, DACVECC
- Amanda Cavanagh, DVM, DACVECC
  Sarah Musulin, DVM, DACVECC

Thank you to ABRI for your sponsorship of many of these AVHTM lectures and workshops.

Evaluation of Iron Status and Hematologic Parameters in Canine Blood Donors With Various Donation Frequencies

Kristina K. Maier-Millar, Kate S. Farrell, Steven E. Epstein
Report by Kate Farrell

Frequent blood donation is well recognized to cause iron deficiency in human donors, prompting guidelines that balance donation frequency with donor safety. Whether the same risk applies to canine donors is less clear. Since veterinary blood banks increasingly rely on repeated donations from healthy dogs, understanding whether donation frequency predisposes them to anemia or iron depletion is critical to ensuring both donor safety and transfusion program sustainability. This study aimed to evaluate iron status and hematologic parameters in first-time and frequent canine donors to determine whether repeated collection has measurable effects on iron stores or erythrocyte and reticulocyte indices.

A total of 61 client-owned dogs were prospectively enrolled from a university blood donor program between 2022 and 2023, including 20 first-time donors and 41 experienced donors (≥6 donations in the prior 12 months, with donations of 15-18% of blood volume per donation). Each dog had a complete blood count, reticulocyte analysis, and serum iron studies performed at the time of donation. Overall, hematologic values (both erythrocyte and reticulocyte indices) remained within reference intervals regardless of donation frequency. The only significant difference detected was a slightly lower mean corpuscular hemoglobin concentration (MCHC) in experienced donors compared to first-time donors. Of 6 experienced donors with an MCHC below the reference interval, none had concurrent abnormalities in ferritin, hematocrit, or other hematologic parameters. Serum ferritin, an established marker of total body iron stores, did not differ did not differ significantly between groups. Two experienced donors (5%) did have ferritin concentrations below the reference interval, though the percentage of donors with low ferritin did not differ statistically between groups.

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Evaluation of Iron Status and Hematologic Parameters in Canine Blood Donors With Various Donation Frequencies

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Notably, one of the experienced donors with low ferritin was the program's highest-volume lifetime donor, though both dogs with low ferritin had otherwise normal hematologic profiles.

These findings suggest that routine, repeated blood donation in dogs (defined here as ≥6 collections per year) does not commonly result in clinically apparent anemia or iron deficiency. While most canine donors appear to tolerate frequent donation without adverse hematologic consequences, rare individuals may develop low ferritin. For veterinary blood banks, this study provides reassurance that current donation practices are generally safe, though blood banks could consider periodic iron monitoring in long-term or high-frequency donors.

Development and Evaluation of a PCV-Dependent Visual Hemolysis Color Scale for Packed Red Blood Cell Products

Hyein Jung, K Jane Wardrop, Sabrina N Hoehne, Linda G Martin, Jillian M Haines, Trey L DeJong, Elizabeth B Davidow
Report by Hyein Jung

The administration of hemolyzed blood products can be detrimental to patients not only because hemoglobinemia is systemically toxic, but also because hemolysis of red blood cell (RBC) products may indicate that the affected unit has developed storage lesions. When new RBC storage solutions are developed, manufacturers are required to demonstrate to the U.S. Food and Drug Administration (FDA) that at least 75% of transfused RBCs remain in circulation 24 hours after transfusion. This is done by performing radiolabeling studies in healthy volunteers and showing that the percentage hemolysis of the RBC products is <1% at the end of storage. The percentage hemolysis is calculated as: (100 − PCV) × (free plasma hemoglobin / total hemoglobin). Regulation of percentage hemolysis follows the "95/95 rule," whereby the manufacturer of the blood storage bag and solution must prove that 95% of the units meet the standard with 95% statistical certainty. Although there is no FDA requirement regarding the degree of hemolysis in canine or feline RBC units, the recent Association of Veterinary Hematology and Transfusion Medicine (AVHTM) Transfusion Reaction Small Animal Consensus Statement guidelines recommend that canine and feline RBC units be checked for hemolysis prior to administration and not used if the hemolysis percentage is ≥1%. The routine storage time for canine RBCs with various additive solutions has been determined in part based on this 1% hemolysis standard.

The gold standard method to measure free hemoglobin in blood bags is by using a hemoglobin meter, which many veterinary hospitals do not have. The traditional method in clinical settings is to visually inspect the color of the supernatant in the blood product. However, visual inspection has been shown to be unreliable and inaccurate. A previous veterinary study reported this inaccuracy, which may be due in part to the standard being based on a percentage—meaning the acceptable free hemoglobin level will vary based on the total hemoglobin content of the unit. The total hemoglobin in a unit is expected to correlate with its PCV. Thus, packed red blood cell (pRBC) units with a higher PCV, and therefore a higher total hemoglobin concentration, should have a higher absolute acceptable free hemoglobin level and a darker supernatant color than less concentrated units.

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Join us for dinner and drinks at the AVHTM SIG during the ACVIM Forum

June 12, 2026, Seattle, Washington

Development and Evaluation of a PCV-Dependent Visual Hemolysis Color Scale for Packed Red Blood Cell Products

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In this prospective study, we developed a PCV-dependent hemolysis color scale and evaluated its accuracy in predicting supernatant hemoglobin concentration in pRBC products, aiding in transfusion safety assessment. Serial dilutions of a pRBC unit were performed to create a range of hemolyzed supernatant samples. A commercial graphics program was used to assign computer-generated colors to each hemolyzed sample, constructing a color scale. Study participants were then asked to use the color scale to estimate the hemoglobin concentration of a provided supernatant sample. The color estimation data were analyzed to determine whether the unit should be transfused, as pRBCs should not be transfused if the product's percentage hemolysis exceeds 1%.

Visual inspection using the color scale was evaluated with seven supernatant test samples containing different free hemoglobin concentrations (0.3–8.0 g/L). The overall percentage of correct color estimations was 61.9%. The percentage of correct transfusion decisions based on the scale was 93.7%. All incorrect estimations were within one color range (approximately a 1.0 g/L difference between ranges) of the correct estimation for all samples.

In conclusion, the color scale aided in the visual assessment of hemolysis, improving the accuracy of transfusion decisions to 93.7% in this study, compared to 60% in a previous veterinary study. However, visual inspection with the color scale may still be inaccurate near the cutoff color corresponding to <1% hemolysis in each PCV range. If the supernatant color of a unit is estimated to be within one color range of the cutoff, the cell-free hemoglobin concentration should be measured and the percentage hemolysis calculated to determine whether the unit meets the <1% standard.

Recently Published Articles

- **A Prospective Multicenter Observational Study Assessing Incidence and Risk Factors for Acute Transfusion Reactions in Cats** Hall GBF, Birkbeck R, Brainard BM, Camacho F, Davidow EB, LeVine DN, Mackin A, Moss T, Nash KJ, Stanzani G, Starybrat D, Stoye DQ, Tai C, Thomason J, Walker JM, Wardrop KJ, Wilson H, Wurlod VA, Humm K. J Vet Intern Med
- **Zoonotic variants of Bartonella henselae in domesticated cats, including blood donors, in central-western Brazil** das Neves LF, Dias CM, Mongruel ACB, Lopes GO, Batista LMDR, Araujo FAA, Pereira GT, Machado RZ, André MR. Comp Immunol Microbiol Infect Dis
- **Quantitative Assessment of TPE Antibody Removal and Clinical Response in a Dog With Severe Type III Hypersensitivity Reaction and AKI due to Human Albumin Administration** Yui Pargätzi G, Iannucci C, Luisa Michela Meli M, Meili T, Rosati T, Vigani A. J Vet Emerg Crit Care (San Antonio)
- **Recognition of Transfusion With Microcytic Packed Red Blood Cells on ADVIA 2120i RBC V/HC Cytograms: A Case Report** Cohen HR, Wun MK, Haines J, Guess SC, Varvil MS, Wardrop KJ. Vet Clin Pathol
- **Retrospective Evaluation of Blood Product Transfusion Outcomes and Risk Factors for Transfusion Reactions in Dogs at a Veterinary Teaching Hospital with an Established Blood Bank: 137 Dogs (2018-2022)** Holm NG, Nielsen LN, Langhorn R. J Vet Emerg Crit Care (San Antonio)
- **Retrospective Evaluation of Cryoprecipitate Transfusion in Dogs to Prevent or Treat Hemorrhage: 21 Cases (2009-2023)** Lam WYE, Martin LG, Wardrop KJ, Haines JM. J Vet Emerg Crit Care (San Antonio)

Recently Published Articles - continued

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- **EXPRESS: Nucleated red blood cells in critically ill cats** Dörfelt R, Pabst K, Hartmann K. J Feline Med Surg
- **Feline leukaemia virus (FeLV) infection in domestic pet cats in Australia and New Zealand: Guidelines for diagnosis, prevention and management** Westman ME, Coggins SJ, van Dorsselaer M, Norris JM, Squires RA, Thompson M, Malik R. Aust Vet J
- **Clinical Response to Imatinib Mesylate and Toxicity Profile in 35 Dogs With Mast Cell Tumours** Treggiari E, Catania E, Valenti P. Vet Comp Oncol
- **Prevalence and Risk Factor Analysis of Feline Blood-Borne Pathogens in Bangkok and Vicinities, Thailand** Rodmanee N, Umnuayyonvaree D, Kaewthamasorn M, Hunprasit V, Ritthikulprasert S. Vet Med Int
- **Observer reliability and components of variance in counting spherocytes in canine blood samples** Jensen AL, Fink -Jensen HH, Krogh AKH. Vet J
- **Insights into the Canine Blood Donor Experience: A Multicenter Study on Physiological and Behavioral Changes** Dini R, Agnoli C, Mariti C, Gori E, Vasylyeva K, Tumbarello M, Marchetti V. Vet Sci
- **Understanding the biochemical impact of leukoreduction on canine pRBC storage: a focus on reactive oxygen species and storage lesions** Shin SW, Kim M, Shin C, Bae H, Park J, Jung DI, Cho KW, Yu D. Front Vet Sci
- **A combination of clinical and laboratory markers can be used as a tool to differentiate between primary and secondary immune thrombocytopenia in dogs** Bak-Jacobsen N, Jessen LR, Grønlund CM, Sørensen AH, Krogh AKH, Nielsen LN, Langhorn R. Am J Vet Res
- **Time-Dependent Changes in Malondialdehyde and Free-Hemoglobin in Leukoreduced and Non-Leukoreduced Canine Packed Red Blood Cells Units During Storage** Miglio A, Barbetta A, Cremonini V, Barbato O, Ricci G, Toppi V, Avellini L, Cavani V, Antognoni MT. Vet Sci
- **Seroprevalence of Ehrlichia canis in Clinically Suspect Dogs and Its Association with Clinical and Social Factors in Urban and Rural Areas of North-Central Mexico** Cárdenas-Arias MC, Rodríguez-Venegas R, Robles-Trillo PA, Véliz-Deras FG, Alvarado-Espino AS, González-Álvarez VH, Legarreta-González MA, Rodríguez-Martínez R. Vet Sci
- **Comparison of intravenous mixed micelle phytomenadione (vitamin K1) and traditional therapies for the treatment of anticoagulant rodenticide toxicosis in dogs and cats: a retrospective study** Agostini G, Mooney ET, Wilkie E, White JD. Aust Vet J
- **Prevalence of Dal blood type and dog erythrocyte antigens 1 and 4 among canine blood donors and recipients in Seoul, South Korea** Kim H, Han HJ. BMC Vet Res
- **Evaluation of Iron Status and Hematologic Parameters in Canine Blood Donors With Various Donation Frequencies** Maier-Millar KK, Farrell KS, Epstein SE. J Vet Emerg Crit Care (San Antonio)
- **Coagulation status of immune-mediated polyarthritis in dogs** Packham LAF, Black V. J Small Anim Pract
- **Lymphocyte immunophenotype in dogs with immune-mediated hematologic disease** Blois SL, Cuq BY, Bienzle D. PLoS One
- **Sudden Cardiac Death due to Ventricular Fibrillation in a Dog Following Packed Red Blood Cell Transfusion** Ryave J, Gunasekaran T, Sanders RA. Case Rep Vet Med
- **Transfusion related acute lung injury and associated transient pulmonary hypertension in a dog** Pagnamenta S, Müller C, Meunier S, Dennler M, Glaus TM. Schweiz Arch Tierheilkd
- **A handheld rapid infuser device effectively delivers blood products in the management of life-threatening anemia in 6 dogs** Lawnichak T, Odunayo A, Arjoonsingh A, Moore V. J Am Vet Med Assoc
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Recently Published Articles - continued

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- **Neutrophil-to-lymphocyte, monocyte-to-lymphocyte, and platelet-to-lymphocyte ratios as prognostic markers in canine osteosarcoma: Correlation with cytological and histopathological features** de Almeida Fernandes E Silva G, Jimenez JJ, de Moura FBC, de Souza Gomes T, Ordoñez FJP, Florez LMM, Barbisan LF, de Oliveira RA, Zambrano CMG, Dias-Melicio LA, Rocha NS. Res Vet Sci
- **Optimization of conditions related to Chrono-log platelet aggregation in feline whole blood** Huang W, Carr A, Cosford K. Can J Vet Res Pure red cell aplasia and amegakaryocytic thrombocytopenia in a cat Suwa A. J Vet Med Sci
- **Evaluating the feasibility of platelet-derived gene expression profiling in dogs with sepsis** Goggs R, Brooks M, Zhu Y, Cawley J, Khanna C, Stewart SD. Am J Vet Res
- **What Is Your Diagnosis? Marked Discrepancy Between Sysmex XN-9100V Platelet Optical (PLT-O) and Platelet Impedance (PLT-I) Measurements in a Dog** Pali_ J. Vet Clin Pathol
- **The Hemoglobin, Albumin, Lymphocyte, and Platelet Score as a Prognostic Indicator for Dogs with Congestive Heart Failure Secondary to Myxomatous Mitral Valve Disease** Park J, Chae Y, Lee S, Koo Y, Kim H, Kang BT, Yun T. Vet Sci
- **Applicability of Global Hemostatic Tools for Evaluation of Hemostatic State and Detection of Thrombosis in Cats With Cardiomyopathies** Langhorn R, Bach MBT, Gravgaard AS, Graversen N, Olsen CL, Monrad KH, Koch J, Schrøder AS, Willesen JL, Kristensen AT, Nielsen LN. J Vet Intern Med
- **Relationship Between Vitamin D Supplementation and Platelet Parameters, Platelet Aggregation and Thrombosis in Healthy Adult Male Dogs: A Pilot Study** Daneshpour P, Derakhshandeh N, Nazifi S, Haghighi ZS. Vet Med Sci
- **Therapeutic application of canine adipose tissue-derived mesenchymal stromal cells in a dog with refractory immune-mediated thrombocytopenia, with diabetic ketoacidosis, and gastrointestinal bleeding induced by immunosuppressive treatment** Jang HW, Lim GH, Jeung SY, Ah JG, Kim SS. Vet Res Commun
- **Centrifugation force and time influence on platelet, leukocyte, and growth factor concentrations in canine platelet-rich plasma** Fernandez M, Kieves NR. J Am Vet Med Assoc
- **Effect of N-Acetylcysteine on Oxidative Stress and Hematological Recovery in Dogs with Babesia Gibsoni Infection** Mundassery AI, Latha RR, Kulangara V, Mampilli P, Chitharalil BK, Abbdulkhaderkunju J, Meleppat DP. Acta Parasitol
- **Spurious increase in automated optical platelet counts associated with lipemia in dogs** Fasoli S, Vasylyeva K, Ferrari MG, Lunetta F, Brini E, Gruarin M, Agnoli C, Dondi F. J Vet Diagn Invest
- **Pro-Angiogenic Effects of Canine Platelet-Rich Plasma: In Vitro and In Vivo Evidence** An SW, Kwon YS. Animals (Basel)
- **Comprehensive characterization of platelet function in dogs with hyperadrenocorticism** Kim S, Lee D, Chaudhary PK, Kim H, Kang BT, Kim S. Haematologica
- **What's Your Diagnosis? A Case of Extreme Thrombocytosis in a Dog** Anderson SF, Lee KLH, Dietz M, Guess S, White L, Varvil MS. Vet Clin Pathol
- **Hematologic abnormalities do not correlate with survival in dogs with multiple acquired portosystemic shunts** Albrecht L, Dehghanpir SD, Liu CC, Rademacher N, Johnston AN. J Am Vet Med Assoc
- **Evaluation of clopidogrel responsiveness using the Platelet Function Analyzer-200 (PFA-200) in dogs** Shin JH, Han HJ. Front Vet Sci
- **Hematological Changes and Immunomodulation of Neutrophil and Monocyte Populations in Shelter Dogs** Kulka M, Szopa IM, Klockiewicz M. Animals (Basel)
- **Immune-Mediated Hemolytic Anemia in Cats with Feline Infectious Peritonitis** Černá P, Knies M, Assink M, Evans S, Tasker S, Gunn-Moore DA, Hartmann K, Buchta K, Taylor S, Meunier S, Hofmann-Lehmann R, Jacque N, Koonce A, Jacobs C, Gillett A, Lappin MR. Pathogens
- **Use of Immunosuppression, Romiplostim, and Splenectomy to Achieve Remission in a British Shorthair Cat With Primary Immune-Mediated Thrombocytopenia** Kennils JM, Wilson HE. J Vet Intern Med

AVHTM
ASSOCIATION OF VETERINARY HEMATOLOGY AND TRANSFUSION MEDICINE

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Business Name

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AHVTM is an IRS approved 501(c)(3) nonprofit professional association composed of veterinarians, hematologists, academics, veterinary technicians, blood bankers, and interested public who desire to further scientific advances in transfusion medicine and veterinary hematology.

We engage in veterinary research, promote industry standards, develop guidelines for canine and feline blood collection and processing, and publish scientific research in peer-reviewed publications.

Visit us online to learn more about AVHTM!

Participating in the AVHTM Google Group is a benefit of membership. Members whose memberships have lapsed have a 30-day grace period to renew their membership before they are removed from the group. Be sure to keep your membership active to continue participating in our interactive online discussions!

Click here to ➡ JOIN/RENEW

MEMBERSHIP BENEFITS

As an AVHTM member, you are eligible for the following:

- Reduced IVECCS registration fee (veterinarians save $100 and technicians save $25!)
- Access the a "Members Only" section of the AVHTM website, which includes access to:
  - Other AVHTM profiles
  - PubMed articles
  - Forum for posting questions, cases, and research
- Ability to ask and answer questions posted to the AVHTM members-only Google group.

Please feel welcome to share this newsletter with interested colleagues and encourage them to become an AVHTM member!