Summer 2025

AVHTM Newsletter

A 501(c)(3) nonprofit professional association

Volume 9, Issue 2

Upcoming Events:

ACVIM Forum 2025
Lousiville, Kentucky
June 19 - 21, 2025

ACVIM Forum with AVHTM Special Interest Group (SIG) dinner on June 20 (see p. 2)
6:30 - 9:30 pm

IVECC Symposium
San Diego, California
September 2 - 8, 2025

Welcome to the Summer 2025 AVHTM Newsletter

Welcome to the latest AVHTM newsletter. We have reports on two very interesting papers, one looking at attempts to reduce erythrocyte antigenicity and another considering carboxyhaemoglobin in haemolytic anaemia. We also have our regular round up of recent articles we think you will find interesting. We are looking forward to our Special Interest Group session at ACVIM and we hope to see you there!

Upcoming Events

Our SIG meeting features Dr. Georgina Hall MA VetMB PGCert MVetMed DACVECC MRCVS (in-person), Consultant in Emergency and Critical Care at DWR Veterinary Referrals and Dr. Karen Humm MA VetMB CertVA DACVECC DECVECC FHEA MRCVS (virtual), Professor in Transfusion, Emergency and Critical Care Medicine at the Royal Veterinary College talking about 'Do we need to change TRACS? Questions generated by application of the consensus statement to a prospective patient population'.
We are expecting a lively and productive discussion!

The venue is Porch Kitchen & Bar, 331 S 3rd St, Louisville KY 40202 on Friday, June 20, 2025, 18:30 - 21:30 pm ET. This evening is sponsored with a generous donation from Alvedia Laboratories, Innovative Animal Supplies, Ethos Veterinary Health, Nine Lives Blood Services, and HemoSolutions.

This SIG is exclusively available for AVHTM members and includes dinner and drinks. There are still some spaces left so **book** quickly. There is a charge of $45 (or $10 for trainees), but attendance will mean that your AVHTM membership renewal cost (current or future depending on your membership status) is decreased by the same amount, essentially meaning a free dinner with excellent company and CE!

SIG SPONSORS

AVHTM at the ACVIM Forum — See you there!

We have the following lectures in our AVHTM stream:

- ACVIM Forum 2025, Louisville, Kentucky, June 19-21

AVHTM Lectures will be held Saturday, June 21st:

• 8:00 - 9:00 am: Anemia and transfusion on a budget: A Spectrum of Care approach to anemia and blood loss. Emily McCobb and Liz Rozanski, in person, 1 hour.

• 9:10 -10:10 am: The changing landscape of antithrombotic medications in veterinary medicine: updates from CURATIVE. Ben Brainard, in person, 1 hour.

• 10:20-11:20: Diagnosis and management of erythrocytosis in companion animals. Ann Hohenhaus, in person, 1 hour.

• 11:30-12:30: Individualized approach to anemia in feline chronic kidney disease. Jessica Quimby, in person, 1 hour.

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

June 20, 2025

Louisville, Kentucky

Register at: ww.avhtm.org/acvim-sig/

Evaluation of Canine Erythrocyte Surface Antigens and Morphological Alterations Induced by Trypsin Treatment

Professor Hyun-Jung Han, DVM, PhD
Head director, KU I'M DOgNOR Blood Donation Center

Blood transfusions are often limited by factors such as blood product shortages and the risk of fatal transfusion reactions. To address these challenges, various antigen modulation strategies have been explored to reduce or eliminate the antigenicity of erythrocyte surface antigens. However, compared to human medicine, research in veterinary medicine remains limited due to an insufficient understanding of erythrocyte surface antigens. Recently, trypsin, a broad-spectrum protease, has been proposed as a potential agent for reducing the antigenicity of canine erythrocytes. Nonetheless, this study found that trypsin produced inconsistent effects on three erythrocyte surface antigens—DEA 1, DEA 4, and Dal—which are known to cause acute hemolytic transfusion reaction (AHTR).

For this study, blood samples were collected from 8 healthy dogs that visited the KU I'M DOgNOR Blood Donation Center at Konkuk University (Seoul, Republic of Korea). Erythrocyte antigenicity and morphological analysis were assessed before and after treatment with 1mg/mL of trypsin. The results showed that trypsin significantly enhanced the antigenicity of DEA 1 (1.9 ± 0.6 to 3.0 ± 0) and DEA 4 (2.6 ± 1.0 to 3.9 ± 0.3) and even promoted agglutination when mixed with autologous plasma. In contrast, the antigenicity of Dal decreased (2.9 ± 1.0 to 0.8 ± 0.4) following trypsin treatment.

Based on these findings, trypsin is insufficient for enzymatic antigen conversion. The lack of antigenic data complicates the selection of specific enzymes for antigen modulation. Therefore, further research should prioritize a deeper understanding of the antigenic properties of these three canine erythrocyte surface antigens. Once this foundational knowledge is established, an appropriate enzyme can be chosen to selectively modulate the antigens, ultimately contributing to the development of canine universal blood.

Carboxyhemoglobin- a novel biomarker of hemolysis?

Dr Ran Nivy DVM, Dip. ECVIM-CA (Internal Medicine)

Etiologies of hemolytic anemia (HA) are diverse, and include infections, intoxications (e.g., zinc, copper, garlic/onion), Heinz body anemia, microangiopathy, hereditary diseases, transfusion reactions and splenic diseases. Immune mediated HA (IMHA), yet another etiology, is the most common cause of hemolysis in dogs. In addition to the direct, harmful effects of anemia, HA in general, and IMHA in particular, engenders a pro-inflammatory, pro-thrombotic state which leads to further complications, increases morbidity and can prove life-threatening. Diagnosing HA is challenging due to the limited sensitivity and specificity of current tests. Common diagnostic markers of hemolysis like hemoglobinemia/ hemoglobinuria, hyperbilirubinemia, and spherocytosis are either insensitive or non-specific. Tests for autoimmunity, such as the saline agglutination test and direct antiglobulin test also suffer from low diagnostic accuracy. Thus, diagnosis of HA and IMHA often relies on a combination of laboratory and imaging findings rather than a definitive biomarker.

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Carboxyhemoglobin- a novel biomarker of hemolysis?

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Carboxyhemoglobin (COHb), a compound formed during binding of carbon monoxide (CO) to hemoglobin, may offer a novel diagnostic approach. Carbon monoxide is commonly produced during burning of carbon-containing fuels, and elevated COHb levels in the blood are often the result of environmental CO poisoning. However, CO is also produced endogenously, within the body, during hemoglobin breakdown. Therefore, basal levels of COHb invariably exist in any mammal, and increase in states of increased hemoglobin catabolism, as is the case during hemolysis. Elevated COHb levels in the blood are associated with various hemolytic conditions in humans, and prove a highly useful, discriminatory diagnostic tool in anemic human patients.

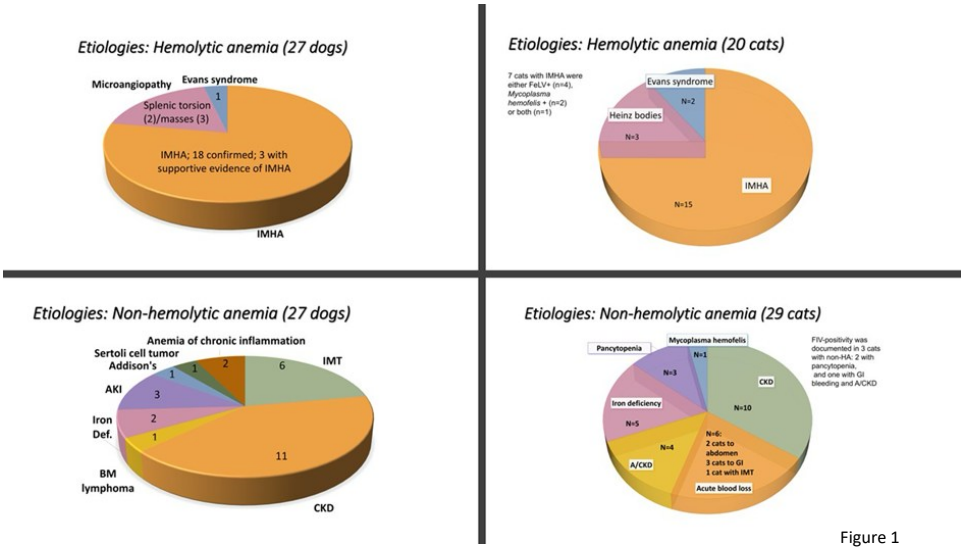

Figure 1

Owing to the shortcomings of currently available tests for HA in small animals, and the importance of timely and accurate diagnosis, we investigated the utility of COHb measurement in dogs and cats with anemia of different etiologies, compared to healthy controls (Figure 1). In both dogs and cats, blood COHb levels proved to be an excellent marker HA, differentiating dogs and cats with HA of various causes from other cases of non-HA (Figure 2 & 3). Notwithstanding its diagnostic utility, COHb was not associated with the magnitude of hemolysis or with survival in either cats or dogs. Furthermore, non-anemic cats with marked Heinz body formation also had very high COHb levels, underscoring the sensitivity of this biomarker for hemolysis and increased hemoglobin catabolism, irrespective of the presence of anemia.

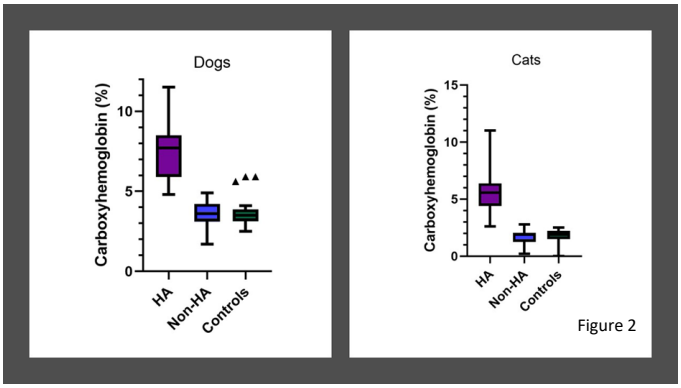

Figure 2

Optimal cut-off points for prediction of hemolytic anemia among anemic cats & dogs

	COHb levels (%)	Sensitivity (%)	Specificity (%)
	> 2.95%	95%	100%
	> 5.05%	92.6%	100%

Figure 3

Collectively, these findings support the use of COHb as a highly discriminatory, ancillary test in dogs and cats with suspected HA, in which diagnosis cannot be confirmed with currently available tests. In addition, since COHb is a stable compound, heparinized blood samples for COHb measurement can be shipped to referral laboratories if unavailable in-house. Since COHb is a surrogate marker of increased RBC clearance, secondary to a myriad of injuries,

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Carboxyhemoglobin- a novel biomarker of hemolysis?

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including oxidative damage, future studies are underway to investigate its clinical and prognostic usefulness in different diseases including hormonal, metabolic, neoplastic and inflammatory ones. Furthermore, it might prove useful for predicting transfusion outcome, including percent change in packed cell volume in the recipient animal and transfusion-related complications, when high levels thereof are found in donor blood.

Despite its promise, one must remember carboxyhemoglobinemia is not synonymous with IMHA and merely suggests increased hemoglobin catabolism. Moreover, it can develop under additional clinical conditions, such as absorption of large hematomas. These caveats must therefore be considered when applying the present findings to the clinical and research setting.

References:

Nivy R, Sutton G, Bruchim Y. Carboxyhemoglobin as a diagnostic and prognostic biomarker of hemolytic anemias in dogs. J Vet Intern Med. 2023 Jan;37(1):110-116.

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Recently Published Articles

- **In vitro feasibility of bovine and canine whole blood and commercially prepared canine packed red blood cells as a source of xenotransfusion in swine (Sus scrofa domestica)**, Diaz V, Schaefer DMW, Mulon PY, Zhu X, Smith J, Giori L, Hampton C., PeerJ.
- **Assessment of Oxidative Stress Markers in Cats Undergoing Ovariohysterectomy by a Midline or Flank Approach**, Nazari Z, Mohri M, Heidarpour M, Kazemi Mehrjerdi H., Vet Med Sci.
- **Retrospective Evaluation of Hematological Ratios in Dogs With Nonassociative Immune-Mediated Hemolytic Anemia: 206 Cases**, Duclos AA, O'Sullivan L, McPhedran C, Hocker S, Le Boedec K, Blois S, Cuq B., J Vet Intern Med.
- **Prevalence of a Novel Immunogenic Feline Erythrocyte Antigen (FEA 6) and Expression Patterns Between FEAs**, Bajon F, Arsenault J, Blais MC., J Vet Intern Med.
- **Red blood cell transfusion in canine and feline patients under general anaesthesia**, Brodie H, Talbot CT, Foster A, Tinson E, Humm K., Vet Anaesth Analg.
- **Prognostic factors and long-term outcome in dogs diagnosed with primary and secondary immune thrombocytopenia in Ireland**, López-Bailén E, Duclos A, Mullany D, Le Boedec K, Cuq B., J Small Anim Pract.
- **Hematological and Biochemical Parameters of Subadult Captive Siberian Tigers (Panthera tigris altaica)**, Liu X, Qazi IH, Wang H, Han Z, Li X, Zhang X, Du R, Yao N, Xu C., Animals (Basel).

Recently Published Articles - continued

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- **Seroprevalence of zoonotic pathogens and related haematological and biochemical profiles in Fonni's dogs in rural conditions**, Cocco R, Sechi S, Marín-García PJ, Liotta L, Llobat L., Vet Microbiol.
- **Effect of repeated vincristine administration on platelet count in cats with lymphoma**, Marceglia G, Zoia A, Petini M., Vet Rec.
- **Oral haematomas as the major presenting sign of primary immune thrombocytopenia in a cat**, Cammack L, Sutch A, Choi YR, Barrs VR, Beatty JA., JFMS Open Rep.
- **Prevalence and characteristics of adverse reactions in dogs donating blood**, Ferreira HCM, Ferreira RRF, Pinto SCP, Mesa-Sanchez I., J Small Anim Pract.
- **The Role of Hematologic Markers, Procalcitonin and Neopterin in Inflammatory Response in Cattle With Theileria annulata**, Aydın Ö, Aktaş MS, Eren E, Apaydın Yıldırım B, Bolat İ., Parasite Immunol.
- **In vitro-induced Heinz bodies showed no impact on feline reticulocyte haemoglobin content measurement using the Advia 2120i analyser**, Jensen AL, Vestergaard JD, Nielsen LN, Krogh AK, Langhorn R., J Feline Med Surg.
- **Response to Response to Letter Regarding "Plasma Concentration of Thrombopoietin in Dogs With Immune Thrombocytopenia"**, Wun MK., J Vet Intern Med.
- **Response to Second Letter on Response Letter Regarding "Plasma Concentration of Thrombopoietin in Dogs With Immune Thrombocytopenia",** Brooks MB, Brooks JC, Catalfamo J, Zhu Y, Goggs R, Babasyan S, Wagner B, LeVine DH., J Vet Intern Med.
- **Relationship Between Red Blood Cell Indices and Myxomatous Mitral Valve Disease in Small-Breed Dogs: A Retrospective Study**, Hong EJ, Jeong Y, An JH, Choi S, Chung JY, Ahn JO., Vet Med Sci.
- **Efficacy of a high dose of isometamidium chloride treatment in single and mixed experimental infections with T. congolense and T. brucei brucei in dogs**, Ezeokonkwo RC, Obi CF, Okpala MI, Iheagwam CN, Ezeh IO., Comp Immunol Microbiol Infect Dis.
- **Same story, different endings: clinical course and outcomes of two dogs treated differently for delayed fulminant pulmonary haemorrhage 20 h after eastern brown snake (Pseudonaja textilis) envenomation**, Mak HY, Hardjo S., Aust Vet J.
- **Coagulation status of immune-mediated polyarthritis in dogs**, Packham LAF, Black V., J Small Anim Pract,
- **Evaluation of Canine Erythrocyte Surface Antigens and Morphological Alterations Induced by Trypsin Treatment**, Geum YJ, Han HJ., Animals (Basel).
- **Observer reliability in counting erythrocyte ghost cells and impact of short-term storage of canine and feline blood samples,** Jensen AL, Bruun KSG, Heimann S, Langhorn R, Krogh AKH., Vet J.
- **N-acetylcysteine enhances bone marrow activity in treating pancytopenia induced by canine hemoprotozoan diseases**, Yadav N, Mondal D, Raja R, Ma EL, Singh KP, Sharma DK, Das AK., Vet Res Forum.

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ASSOCIATION OF VETERINARY HEMATOLOGY AND TRANSFUSION MEDICINE

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AVHTM

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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!

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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!