

Monitoring in critically ill dogs and cats

Dr. René Dörfelt
Clinic of Small Animal Medicine
Centre for Clinical Veterinary Medicine, Faculty of Veterinary Medicine, LMU Munich

Coinvestigators

Prof. Dr. Katrin Hartmann	Clinic of Small Animal Medicine, LMU Munich
Priv.-Doz. Dr. Roswitha Dorsch	Clinic of Small Animal Medicine, LMU Munich
Priv.-Doz. Dr. Stefan Unterer	Clinic of Small Animal Medicine, LMU Munich
Prof. Dr. Gerhard Wess	Clinic of Small Animal Medicine, LMU Munich
Hendryk Fischer	Clinic of Small Animal Medicine, LMU Munich
Ute Klein	Clinic of Small Animal Medicine, LMU Munich

Summary

Critically ill dogs and cats are at increased risk of clinical deterioration and death. Therefore, critical care treatment and regular monitoring is mandatory to discover changes and initiate early goal-directed treatment. Monitoring consists of clinical, laboratory and apparative measures. Research aims are to identify and evaluate laboratory and apparative monitoring parameters to provide prognostic information and to identify early deterioration of the patient's situation.

Research Objectives

Multiple laboratory monitoring parameter, such as lactate, hematocrit, leucocyte count, total protein, albumin, glucose, C-reactive protein, coagulation parameters, and nucleated red blood cells have been studied in critically ill dogs and cats.

Occurrence and prognostic significance of nucleated red blood cells in the peripheral blood has been evaluated in critically ill dogs and provided useful information especially in anemic dogs. We currently evaluate acute phase proteins, such as C-reactive protein and Serum Amyloid A, and coagulation function in azotemic dogs and cats. Further aims are to investigate the acid base status as a monitoring tool in cats with obstructive feline lower urinary tract disorders as well as in patients receiving different fluid therapy solutions. C-reactive protein is studied in dogs suffering from acute hemorrhagic diarrhea syndrome, which is often associated with sepsis.

Monitoring tools, such as pulse oximetry, invasive and non-invasive blood pressure, as well as EKG are commonly applied in critically ill dogs and cats. Most of these tools however show variable results depending on different technologies. Evaluation of the reliability of these monitoring tools is one of the aims of the current research. Reliability of different new-generation pulse oximeter, containing specific signal extraction technology is evaluated at standard and alternative probe positions. Several studies focus on point-of-care ultrasound in critically ill dogs and cats. These studies are designed as a multicenter project in cooperation with different international universities. Aim of these projects is to evaluate the sonographic appearance of the lung in anesthetized dogs and cats to evaluate incidence of atelectasis and different positioning and ventilation strategies as well as to assess the volume status during blood donation.

Key Findings

Multiple deviation in clinical pathology in critically ill animals have been identified. Nucleated red blood cells are increased in critically ill dogs and cats especially with anaemia. Myocardial injury is present in septic dogs and can be analysed by troponins. Azotemic dogs and cats have hypo- and hypercoagulable coagulation pattern with hypercoagulability being most common in chronic kidney diseases. Serum Amyloid A does not appear in the urine of cats with severe azotemia but serum concentration is increased in cats with acute and chronic kidney diseases and influenced by a variety of inflammatory conditions. The caudal vena cava diameter in cats decreases during blood donation but assessment should be performed by a single observer as interobserver

variability seems to be high. New generation pulse oximeter perform best at the standard probe position tongue in anesthetized dogs and cats. The base of the tail is an alternative probe position compared to the tongue using a reflectance pulse oximeter probe in anesthetized dogs.

Selected Publications

1. Nixdorff J, Zablotzki Y, Hartmann K, Dörfelt R. Comparison of Transmittance and Reflectance Pulse Oximetry in Anesthetized Dogs. *Frontiers in Veterinary Science* 2021, 8, 265.
2. Sängler F, Dorsch R, Hartmann K, Doerfelt R. Ultrasonographic assessment of the caudal vena cava diameter in cats during blood donation. *J Fel Med Surg* 2021, (in press). <https://doi.org/10.1177/1098612X211028838>.
3. Ulrich S, Gottschalk C, Straubinger R, Schwaiger K, Dörfelt R. Acceleration of the identification of sepsis-inducing bacteria in cultures of dog and cat blood. *J Small Anim Pract.* 2019; 61: 42-45.
4. Hamacher L, Dörfelt R, Wess G. Cardiac Troponine concentration in critically ill dogs. *J Vet Intern Med.* 2015; 29: 164-170.
5. Müller M, Dörfelt R, Wess G. Association of nucleated red blood cells with mortality in critically ill dogs. *Vet Rec.* 2014; 175: 508.
6. Dörfelt R, Ambrisko TD, Moens Y. Influence of fentanyl on intra-abdominal pressure during laparoscopy in dogs. *Vet Anaesth Analg.* 2012; 39: 390-397.