

The Role of Biomarkers in Septic Peritonitis Patients

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February 2020

OBJECTIVES

1. Analyze the current status of veterinary medicine biomarkers and find out if there is a consensus supporting biomarkers use and if they are subject to some regulatory standards.
2. Evaluate how biomarkers can aid clinicians, besides analyzing lactate and procalcitonin as prognostic or diagnostic biomarkers in septic peritonitis patients. And understand whether they are necessary or not for septic peritonitis management.

INTRODUCTION

Biomarkers are characteristics of the body that can be objectively measured and can serve as indicators of normal biological processes, pathological processes or pharmacologic response to a therapeutic intervention.

Biomarkers are broadly used in human medicine; however, the situation is not the same regarding the publications of reviews of biomarkers for veterinary use. Septic peritonitis condition is a complex and severe inflammatory process caused by the presence of infectious agents in the peritoneal cavity; it is associated with high mortality, over 71%.

Its diagnosis is made by cytology or by a positive culture of the effusion. Although cytologic accuracy is acceptable (over 87%), diagnosis can be challenging when concurrent antibiotic therapy is done, or there is a localized infection. Despite, bacterial isolation is not timely in terms of patient management.

Due to high mortality rates of septic effusions, challenging diagnosis and the necessity for early recognition, an alternative method to manage septic peritonitis would be beneficial.

CURRENT STATUS OF VETERINARY MEDICINE BIOMARKERS

1969	1999	2009	2018
First appearance of the term biomarker in a study run by <i>Figueroa ME, Rawls WE.</i>	Reevaluation of the term biomarker and creation of BEST glossary by Food and Drug Administration (FDA) and National Institutes of Health (NIH).	First international conference dedicated to biomarkers in veterinary medicine, in Nottingham: 1. Translational research for both veterinary and human medicine. 2. The creation of the Veterinary Biomarker Society.	Biomarkers approved by FDA: - 55 pharmacogenomic - 175 proteins Veterinary Biomarker Society has not been formed

BEST glossary is where FDA and NIH published their results after the reevaluation of biomarker term. This glossary aimed to guarantee effective communication and efficient use of biomarkers through different working groups. It contains the definition of term biomarker, its categories and the validation and qualification schemes that biomarkers have to go through.

LACTATE AS A BIOMARKER FOR SEPTIC PERITONITIS PATIENTS

Lactate is a natural metabolite of anaerobic cell metabolism released into the blood. Its production can be increased in severe abdominal sepsis due to anaerobic microenvironment and bacterial population.

- Lactate measured in peritoneal effusion has reported being the most accurate measure. Moreover, a value greater than 2.5 mmol/L has a reliable sensitivity and specificity to discern septic peritonitis patients.
- Blood to fluid ratio has reported acceptable values for most of the scientists. Because dogs with septic effusions have higher lactate concentration in the peritoneal fluid than in blood, it has been established that a difference more numerous than -2.0 mmol/L is suggestive of septic peritonitis with excellent sensitivity and specificity for segregating septic effusion dogs.

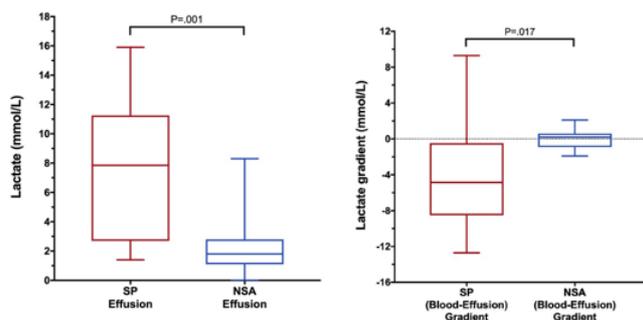


Figure 1 – 2: Martiny P, Goggs R. Biomarker guided diagnosis of septic peritonitis in dogs. *Front Vet Sci.* 2019;6(JUN):1-13doi:10.3389/fvets.2019.00208

PROCALCITONIN AS A BIOMARKER FOR SEPTIC PERITONITIS PATIENTS

Procalcitonin concentration increases quickly in response to sepsis stimulus. Its high values on blood not only allow clinicians to discern septic effusions but also to predict possible sepsis-related complications; since patients with sepsis difficulties, have higher concentration values of procalcitonin.

A crucial drawback is that any feasibility device is already entirely available; despite ELISA tests.

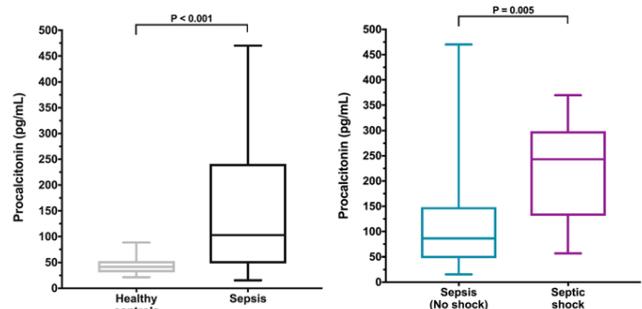


Figure 3 – 4: Troia R, Giunti M, Goggs R. Plasma procalcitonin concentrations predict organ dysfunction and outcome in dogs with sepsis. *BMC Vet Res.* 2018;14(1):1-9. doi:10.1186/s12917-018-1427-y

CONCLUSIONS

A consortium supporting the use of biomarkers in veterinary medicine would improve the current situation.

Biomarkers can aid clinicians as they can give an **early prognostic** and can assist clinicians to start a treatment.

Early diagnosis of septic peritonitis is essential for the appropriate management, as it allows rapid administration of antibiotics resulting in **improved outcomes**.

Lactate concentration in the peritoneal fluid and the **blood to peritoneal fluid relation** can serve as **diagnostic biomarkers** for septic peritonitis.

Peritoneal fluid lactate greater than 2.5 mmol/L is a **diagnostic biomarker** for septic peritonitis.

Blood to peritoneal fluid relation greater than -2 mmol/L is a **diagnostic biomarker** for septic peritonitis patients.

Procalcitonin concentrations on blood can be used as **prognostic biomarkers** for septic effusions patients, that have already been diagnosed. Its high values are correlated with **sepsis-related complications**.