vmrd Veterinary Medical Research & Development

Using Serum Amyloid A (SAA) testing to monitor patients

Author: Dr. Siddra Hines, DVM, PhD, DACVIM-LA

MAR 2020

RELATED ANIMALS

The dynamic nature of SAA makes it an ideal marker for monitoring progression or resolution of illness, including response to treatment.[1-6]

It is rapidly responsive to clinical changes and directly reflects the inflammatory status of the horse. Point-of-care testing with numerical results that can be compared and tracked over time facilitates this process.

SAA may continue to increase for up to 4 days following an acute inflammatory insult, even in the face of treatment (Chart 1). It is necessary to consider this when monitoring treatment response. Depending on the timing of initial examination, SAA may not yet have peaked when the horse is evaluated. This could result in a similar or possibly higher value being obtained later if follow up testing is not planned carefully. If SAA does not decrease appropriately, it likely indicates that the chosen treatment is not efficacious, and alternatives should be considered.[6]

Chart 1. Representative curve for a typical SAA response to a strong acute inflammatory insult that resolves, showing how values change over time. This illustrates how timing of testing relative to the horse's disease timeline influences results observed at a single point.

Ideally, patients should be tested during the initial exam and then be retested in 24-48 hours in case SAA increases further (Chart 1). Identifying the peak value will help with interpretation of subsequent results. Different peak values could indicate different disease processes, and higher values will take more time to return to normal. To evaluate efficacy of antimicrobials or other treatments, follow up testing should be performed 3-4 days after the start of treatment, or 1-2 days after peak [SAA] has been identified. If treatment is effective and inflammation/infection is resolving,

SAA should begin to decline (Chart 1).[6] Follow up assessments can be performed every 24-48 hours if desired to document continued clinical improvement. If at any time the SAA stops decreasing or starts to increase, treatment failure or additional complications should be considered.[6] At a minimum, it is advisable to test SAA before discontinuing therapy and/or prior to discharge (if hospitalized) to verify that the horse has returned to normal.

EFFECTIVE POST-OPERATIVE MONITORING TOOL

Monitoring is also useful for early identification of complications post-operatively or with significant medical conditions.[1-5,7-11] Surgery itself will also cause an increase but understanding the pattern and degree of this increase allows SAA to still be used as a very effective post-operative monitoring tool. For post-operative monitoring, SAA can be re-evaluated every 24-48 hours, depending on budget and patient proximity. SAA should peak at 2-4 days post-op (depending on procedure) and then gradually decline (Chart 1).[7,12] If post-operative values remain high, or spike again later during recovery, complications are highly likely.[3,7-11] As early identification can be difficult, this type of monitoring can be invaluable, providing a trigger for more in-depth exploration of possible causes.

It is important to remember that SAA measured at one specific time does not necessarily reflect the overall peak as animals may be transitioning from local to systemic inflammation or between chronic and acute states (Chart 2).[6] This underscores the particular value of SAA for monitoring patients. It mirrors clinical condition much more closely than other diagnostic tools such as WBC count or fibrinogen[1,13,14], and unlike body temperature should not be affected by NSAID therapy.[13] SAA does not answer all clinical questions but adds immediate objective input to help guide clinical decision-making.

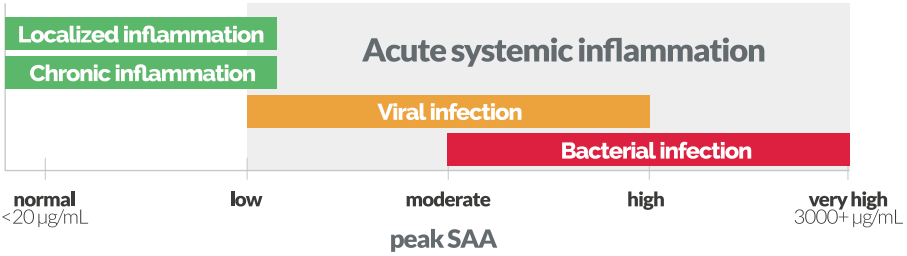

Chart 2. Acute systemic inflammation chart

REFERENCES

1. Belgrave RL, Dickey MM, Arheart KL. Assessment of serum amyloid A testing of horses and its clinical application in a specialized equine practice. J Am Vet Med Assoc 2013;243(1):113-119.

2. Nolen-Walston R. How to interpret serum amyloid A concentrations, in Proceedings. Am Assoc Equine Pract 2015;61:130-137.

3. Jacobsen S, Andersen PH. The acute phase protein serum amyloid A (SAA) as a marker of inflammation in horses. Equine Vet Educ 2007;19(1):38-46.

4. Radcliffe RM, Buchanan BR, Cook VL, et al. The clinical value of whole blood point-of-care biomarkers in large animal emergency and critical care medicine. J Vet Emerg Crit Care 2015;25(1):138-151.

5. Westerman TL, Tornquist SJ, Foster CM, et al. Evaluation of serum amyloid A and haptoglobin concentrations as prognostic indicators for horses with inflammatory disease examined at a tertiary care hospital. Am J Vet Res 2015;76(10):882-888.

6. Pepys MB, Baltz ML, Tennet GA. Serum amyloid A protein (SAA) in horses: objective measurement of the acute phase

response. Equine Vet J 1989;21(2):106-109.

7. Jacobsen S, Jensen JC, Frei S, et al. Use of serum amyloid A and other acute phase reactants to monitor the inflammatory response after castration in horses: a field study. Equine Vet J 2005;37(6):552-556.

8. Westerman TL, Foster CM, Tornquist SJ, et al. Evaluation of serum amyloid A and haptoglobin concentrations as prognostic indicators for horses with colic. J Am Vet Med Assoc 2016;248(8):935-940.

9. Daniel AJ, Leise BS, Burgess BA, et al. Concentrations of serum amyloid A and plasma fibrinogen in horses undergoing emergency abdominal surgery. J Vet Emerg Crit Care 2016;26(3):344-351.

10. De Cozar M, Sherlock C, Knowles E, et al. Serum amyloid A and plasma fibrinogen concentrations in horses following emergency exploratory celiotomy. Equine Vet J 2020;52(1):59-66.

11. Aitken MR, Stefanovski D, Southwood LL. Serum amyloid A concentration in postoperative colic horses and its association with postoperative complications. Vet Surg 2018; 1–9.
https://doi.org/10.1111/vsu.13133

12. Jacobsen S, Nielsen JV, Kjelgaard-Hansen M, et al. Acute phase response to surgery of varying intensity in horses: A preliminary study. Vet Surg 2009;38:762-769.

13. Hooijberg EH, van der Hoven R, Tichy A, et al. Diagnostic and predictive capability of routine laboratory tests for the diagnosis and staging of equine inflammatory disease. J Vet Intern Med 2014;38:1587-1593.

14. Hultén C, Demmers S. Serum amyloid A (SAA) as an aid in the management of infectious disease in the foal: comparison with total leucocyte count, neutrophil count and fibrinogen. Equine Vet J 2002;34(7):693-698.