

Detect and Monitor Inflammation and Infection in Horses Using the Equine SAA TurboReader™ Assay



What is Serum Amyloid A (SAA)?

Serum Amyloid A (SAA, 12 kDa) is a major acute phase plasma protein that is associated with high density lipoproteins (HDL) in plasma [1]. It is a major component of the animal's immune defense, called the inflammatory response, for fighting off foreign pathogens and invaders. Like other acute phase proteins, normal physiological concentrations of SAA in healthy horses is extremely low (<<15 mg/l) [2].

Why use SAA as a diagnostic marker?

Sensitive Diagnostics:

Early detection of inflammation before the presence of clinical systems. The SAA concentration in the blood starts increasing already 6-12 hours after the inflammatory process has started or tissue damage has been done [3].

Reliable Diagnostics:

Measurement of SAA is specific and is not affected by environmental facts such as stress. The SAA concentration in the blood only increases due to the presence of an inflammatory stimulus, such as infection or trauma [5].

Quantifiable Diagnostics:

Measurement of SAA is a quantitative result that is directly proportional to the intensity or severity of inflammation or trauma. Elevated serum values always indicates pathology. Under inflammatory conditions, the SAA serum levels can increase more than 1000x, providing a large diagnostic window for measurement [4].

Fast Diagnostics:

Measurement of SAA occurs in real-time, meaning if the underlying inflammatory disease is treated successfully, the SAA concentration in the blood will drop significantly within hours (24-48 hrs). Thus, repeated SAA measurements after therapy treatment or surgery will indicate if ongoing antibiotic treatment is working or if there are complications with postoperative recovery [6].

When systemic inflammation or infection is present, the SAA concentration in the blood can increase more than 1000 times its normal levels. This increase in the blood will be detectable within approximately 6-12 hours after the onset of inflammatory conditions, with the SAA blood concentration peaking around 24-48 hours [3]. Similarly, SAA has a short half-life (approximately 20-24 hrs.), which means once inflammatory conditions have subsided, the SAA concentration in the blood will return quickly to its normal physiological conditions within 48-96 hours [4]. SAA is seen as a sensitive marker for systemic inflammation and infection in horses due to its early and rapid increase in the blood before clinical symptoms, such as fever and increase leukocyte count, present itself [5].

The Equine SAA TurboReader™ Assay

The **TurboReader™** is a compact, user-friendly diagnostic reader which together with single-use reagent cuvettes performs one analysis within minutes. The system can be operated with minimal training and performs tests on serum or plasma. Automatic tests results are provided on a touch screen color display with the precision and accuracy comparable to a routine clinical chemistry analyzer found in the central laboratory. **The Equine SAA TurboReader™ Assay** is packed together in a diagnostic kit consisting of ready-to-use cuvettes and has the following assay specifications:

- **Requires 5 µl sample** **serum or Li-heparin plasma**
- **One-step procedure** **30-second handling**
- **Automatic analysis** **9.5 min analysis time**
- **Measures between** **10-600 mg/l SAA**
- **Clinical inflammatory cut-off** **30 mg/l**

How to use the Feline SAA TurboReader™ Assay in clinical practice?

1 Detection:

Detect and quantify the presence of systemic inflammation (infection or trauma) in horses. Any SAA value of >30 mg/l indicates presence of infection. The higher the serum SAA concentration, the greater intensity and severity of the inflammation. The SAA value does not indicate what is causing the systemic inflammation, only that it is present. Thus, a clinical exam must always be conducted and the overall clinical picture must be taken into account when considering treatment options.

TurboReader™ SAA
> 30 mg/l



YES,
INFECTION PRESENT

TurboReader™ SAA
< 30 mg/l



NO,
INFECTION NOT PRESENT



EQUINE INFLAMMATION DIAGNOSTICS

2 Monitoring:

Monitor the efficacy of treatment in real-time and select the best antibiotic treatment. Since the half-life of SAA is around 20-24 hours, the serum SAA levels increase and decrease rapidly in the blood. This means if antibiotic treatment is effective, the SAA serum levels should decrease rapidly within the first 24-48 hours. If not, other treatment options should be considered. Similarly, serum SAA levels should decrease during post-operative recovery. If not, this indicates possible postsurgical complications in the animal.



TurboReader™ SAA



YES, ANTIBIOTIC TREATMENT IS EFFECTIVE



or ≈

TurboReader™ SAA



NO, ANTIBIOTIC TREATMENT IS NOT EFFECTIVE

3 Screening:

The TurboReader™ SAA assay is a screening tool, which allows veterinarians to get ahead of the game. Find inflammation in horses when clinical signs are not present. Animals that are considered at higher risk of developing infections, such as young foals or animals that have just been transported, run the TurboReader™ SAA to rule out presence of infection.

Classification of Clinical and Subclinical Inflammation[7]:

1 Gastrointestinal infections: colic, enteritis

- SAA concentrations are higher in colic cases attributed to inflammatory causes such as enteritis or colitis [8].
- Horses with abdominal pain had higher SAA serum concentrations in cases with enteritis than strangulated obstructions [9].

2 Respiratory infections: infectious vs. noninfectious respiratory disease [10]

- SAA concentrations are significantly increased in horses with infectious upper respiratory infections [equine influenza virus (EIV), equine herpesvirus-4 (EHV-4), *Streptococcus equi* subspecies *equi* (*S. equi ss equi*)] than horses with inflammatory airway disease (IAD) or healthy horses.
- SAA concentrations were higher in bacterial respiratory diseases (*S. equi ss equi*) than viral (EIV/EHV-4).
- SAA concentrations were increased in cases of IAD compared to healthy horses, but lower than infectious respiratory diseases.
- SAA was found to be sensitive and specific marker for ruling in/out infectious respiratory disease in horses.

3 Joint infections: joint infections vs. noninfectious joint infections [11]

- SAA concentrations were higher in horses with joint infections compared to horses that had nonseptic intrasynovial pathology (NSISP) and healthy horses.

- SAA levels were similar in NSISP and healthy horses.
- SAA was found to be sensitive and specific marker for ruling in/out joint infections in horses.

4 Allergy: allergy-related equine asthma [10,12]

- SAA concentrations in horses with heaves are elevated compared to healthy horses.
- Mean serum SAA concentrations in heaves-affected horses was 15.75 mg/l vs. 3.22 mg/l for healthy horses.

5 Severe Trauma: surgery recovery [13]

- Repeated measurements on horses requiring surgical treatment on injuries penetrating the synovial structure, found that the SAA concentrations dropped by 70% between 48-96 hrs. after surgery. A 99% drop was observed by day 6.
- The SAA concentration did not drop in horses who still had infection of the synovial structure after surgery. In these cases, a second surgery was required to clear the infection.

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