

Memorandum

Date: October 2017
From: Dr. Carolyn O'Hara, Provincial Medical Director, AHS Laboratory Services
RE: C – Reactive Protein (CRP) Substitution for Erythrocyte Sedimentation Rate (ESR)

C-Reactive Protein (CRP) and Erythrocyte Sedimentation Rate (ESR) are commonly requested laboratory tests used to evaluate inflammation and infection.

CRP testing is the direct and reliably reproducible measurement of the level of a single inflammatory protein and is useful for the non-specific screening of inflammatory conditions and infectious disease processes. ESR is a more indirect and less specific measurement of inflammation, reflecting the concentration of several proteins including albumin, fibrinogen, and immunoglobulins in the blood. There may be clinical use for a specific indications.

The use of CRP as the best single indicator of inflammation and infection is being actively promoted for the following reasons:

- CRP shows a rapid response to infection and inflammation, increasing within an hour of stimulus, and returning rapidly to normal following resolution/therapy.
- CRP has a distinct reference range without variation for age or gender and correlates well with the severity of inflammation.
- CRP is unaffected by conditions such as pregnancy, anemia and plasma protein variations.
- CRP testing requires a small volume of serum, which is convenient in pediatric and difficult collections.
- CRP testing is automated, analytically reproducible and not time dependent for results.

CRP levels are elevated within 24 hours of an inflammatory/infectious process, whereas ESR is normal. CRP level begin increasing within 4 – 6 hours of acute inflammatory stimulus, and has a half-life of 5 – 7 hours, making it a more sensitive test for active inflammation, and a better indicator of response to therapy.

The ESR depends on the slower production of plasma proteins, e.g. globulins, which promote RBC aggregation and mass, leading to an increased sedimentation rate. The half-life of these large plasma proteins varies from days to week, resulting in a lag between the clinical inflammation and the ESR. These multiple factors lend further variability in ESR measurements, whereas CRP methods on automated analyzers are standardized according to international certified reference material. Therefore, quality control for CRP measurement can be more strictly controlled.

Acknowledgement:

I would like to acknowledge Dr. Simon Anthony (Tony) Morris, MS, FRCP for his work on this topic in the Laboratory Report, Volume 3, Number 1, April 2013.