

S-100B Protein, Serum

FOR MANAGEMENT OF PATIENTS WITH ACQUIRED BRAIN INJURY

Test Highlights

- S-100B is released into the peripheral circulation immediately after primary brain trauma.
- The predicative power of elevated serum S-100B is higher than that of traditional clinical indicators.
- Serum S-100B concentrations reflect brain injury severity and improve prediction of outcome.

Disease Overview

- Acquired brain injury (ABI) is a broad term that describes a variety of insults that occur to the brain. Common causes of ABI include trauma, stroke, brain tumors, infection, poisoning, hypoxia, ischemia, and substance abuse.
- ABI is one of the most common causes of disability and death in adults. The brain damage can be focal or diffuse, and the associated symptoms can be quite varied and may not appear until days or weeks following the injury.
- Although individuals with ABI may have difficulty controlling, coordinating, and communicating their thoughts and actions, they usually retain their intellectual abilities.
- The severity of the head injury, which affects prognosis, is usually classified by conscious level as enumerated by the Glasgow Coma Scale (GCS), with lower scores associated with more severe injury.

Epidemiology

According to the Center for Disease Control and Prevention, of the 1.4 million people in the United States who sustain a brain injury each year, 50,000 die, 235,000 are hospitalized, and 1.1 million are treated and released from an emergency department.

Pathophysiology

- S-100B is a member of the S-100 family of calcium-binding proteins involved in signal transduction. S-100B is found in glial cells of the nervous system, melanocytes, adipocytes, and chondrocytes. It can be present as a monomer but is most often present as a homodimer (S-100BB) or a heterodimer with S-100A1 (S-100AB).
- S-100B is released into the peripheral circulation in a variety of central nervous system disorders and can be considered as a surrogate marker of CNS injury. Its mechanism of release is uncertain, but it is likely due to release by damaged cells and/or secretion due to glial cell activation.

Indications for Ordering

- Predicting outcome in patients with acquired brain injury.
- Monitoring patients with acquired brain injury for ongoing brain damage.

Interpretation

- A reference interval study was conducted by ARUP using serum samples collected from 150 healthy volunteers (75 males, 75 females, age 19–60 years). Non-parametric analysis revealed an upper limit of 96 ng/L at the 97.5th percentile.
- Serum S-100B concentrations increase immediately after the primary brain trauma and decline rapidly over the next hours due to the short (30 minutes) half-life of S-100B.
- The predicative power of elevated serum S-100B is higher than that of GCS score or CT findings.
- In patients with mild brain injury, there appears to be a relationship between initial serum S-100B concentration and measures of disability and post-concussion symptoms.
- In patients with severe brain injury, a serum S-100B concentration of >2.0 $\mu\text{g/L}$ (>200 ng/L) is associated with a high risk for subsequent disability or death.
- Serial measurements of serum S-100B can be used to monitor brain injury patients for secondary insults and continuing damage.

Limitations

- S-100B is not specific for brain injury. Increased serum concentrations are found in patients with melanoma, liver and renal injury, inflammation, and infection.
- Due to the short half-life and rapid decrease of serum S-100B, knowledge of the time of injury is important for accurate interpretation and outcome prediction.

Methodology

S-100B is measured using a commercially available two-site, one-step enzyme linked immunosorbent assay (CanAg S100, CanAg Diagnostics AB, Sweden). This assay utilizes monoclonal antibodies to S-100B and will detect both S-100BB and S-100AB. It shows no cross-reactivity to other S-100 proteins.

References

1. Raabe A, et al. Serum S-100B protein as a molecular marker in severe traumatic brain injury. *Restor Neurol Neurosci* 2003;21:159–69.
2. Townend W, Ingebrigtsen T. Head injury outcome prediction: a role for protein S-100B? *Injury* 2006; 37:1098–108.
3. Korfiat S, et al. Serum S-100B protein monitoring in patients with severe traumatic brain injury. *Intensive Care Med* 2007;33:255–60.

Test Information

2001766 S-100B Protein, Serum

For specific collection, transport, and testing information, refer to the ARUP Web site at www.aruplab.com.

For information on test selection, ordering, and interpretation, refer to ARUP Consult® at www.arupconsult.com.