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Reference Article: Kartal, A.G., Yilman, S., Yaka, E., et al. Diagnostic value of S100B protein in the differential diagnosis of acute vertigo in the emergency department. AEM July 2014, Vol 21, No. 7, 736-741.

Objective: To determine the diagnostic value of S100B protein in the differential diagnosis of acute vertigo in the ED

Background: Vertigo is a common complaint in the ED and determining whether the cause is central or peripheral is important due to treatment differences and underlying morbidity and mortality associated with each. Vertigo presents with a variety of signs & symptoms, which can be difficult to distinguish between central versus peripheral cause. Furthermore, the utility of computed tomography (CT) is limited due to low diagnostic value. MRI is the gold standard testing modality, which is expensive & often times of limited access in the Emergency Department. MRI allows for the differentiation between central and peripheral vertigo by allowing visualization of the posterior fossa/cerebellum. There are neurologic proteins, which are released into the extracellular space during a neurological insult. Specifically, this study looks at the S100B protein, which is a calcium binding protein that is involved in neurodevelopment, differentiation of cells, and tissue reconstruction. The S100B protein has been shown to be elevated during stroke, subarachnoid hemorrhage, and head trauma. The goal of this study was to determine whether S100B protein could be used as a predictor of brain MRI changes.

Methods: This prospective, observational study was conducted January 1, 2011 to December 30, 2011 at an academic tertiary care hospital emergency department in Kocaeli, Turkey with 40,000 visits annually. Adults with a chief complaint of vertigo and presenting within the first 6 hours of onset were allowed to participate in the study. Patient's previously diagnosed with vertigo, known structural head disease, and those that presented with focal neurological findings were excluded from the study. Eligible patients had blood samples drawn, including a sample for the S100B protein level. Levels were measured at a central laboratory within the hospital and were determined with electrochemiluminescence immunoassay S100B protein kit. Patients then underwent an MRI of the brain unless there were contraindications to the study such as metal implants including pacemakers. Relevant MRI findings included acute ischemia, hematoma and intracranial masses found in the studies. Patients who had MRI findings relevant to vertigo were placed into the MRI positive group, and the others were assigned the MRI negative group.

Results/Discussion: The most common pathology found on MRI was acute ischemia of the posterior circulation. Median S100B levels were found to be significantly different between MRI positive (27pg/mL) and MRI negative groups (60.94pg/mL) ($p=0.04$). During multivariate analysis, the complaint of "he/she is spinning", systolic BP, and S100B levels were found to be independent predictors of having a positive finding on MRI. At a cut-off S100B protein level of 30 pg/dL, the sensitivity was 84%, specificity 51%, PPV 51% and NPV 84%. These results suggest that S100B protein is not sensitive enough to exclude getting an MRI for patients with acute onset of vertigo in the emergency department. Even though there was a significant difference between the S100B protein levels in the MRI positive and MRI negative groups, the sensitivity is not high enough to allow for these patients to be ruled-out from a central cause of vertigo. Indeed, an MRI is still warranted as a diagnostic tool to rule out central causes of vertigo.

Limitations: Small number of patients due to limited funding. There were also restrictive selection criteria for including patients. Only true vertigo patients without obvious neurological findings were included in the study, i.e. those with stable clinical condition. In addition, the S100B protein has a short half-life and blood samples needed to be analyzed within the first 6 hours following the onset of the symptoms. The authors recommend a combination of serum markers and clinical findings to provide a more effective selection for determining the group of subjects who should undergo MRI.