Hemoglobin

- Intraoperative ICG-VA with FLOW800 and multimodal fusion neuro-navigation for the resection of arteriovenous malformation with reduced blood loss
- Restrictive Versus A Liberal Transfusion Strategy in Patients With Spontaneous Intracerebral Hemorrhage: A Secondary Analysis of TRAIN Randomized Clinical Trial
- Poor Correlation Between Inflammatory and Brain Injury Biomarkers After Neonatal Intraventricular Hemorrhage: A Pilot Study
- Liberal vs restrictive transfusion strategy for acute brain injury: A meta-analysis with trial sequential analysis of randomized clinical trials
- The Role of Preoperative Immunonutritional Scores in Predicting Complications After Subthalamic Nucleus Deep Brain Stimulation in Parkinson's Disease
- Cerebrospinal fluid analysis and changes over time in patients with subarachnoid hemorrhage: a prospective observational study
- Liberal Versus Restrictive Transfusion in Acute Brain Injury: A Systematic Review and Meta-Analysis
- Transcranial Photobiomodulation Improves Cognitive Function, Post-Concussion, and PTSD Symptoms in Mild Traumatic Brain Injury

Hemoglobin is the protein molecule within red blood cells that carries oxygen from the lungs to tissues throughout the body. It is responsible for the red color of blood and is crucial for oxygen transport. MCHC provides information about the concentration of hemoglobin within each red blood cell.

Abbreviated Hb or Hgb, is the iron-containing oxygen-transport metalloprotein in the red blood cells of all vertebrates (with the exception of the fish family Channichthyidae) as well as the tissues of some invertebrates. Hemoglobin in the blood carries oxygen from the respiratory organs (lungs or gills) to the rest of the body (i.e. the tissues). There it releases the oxygen to permit aerobic respiration to provide energy to power the functions of the organism in the process called metabolism.

Among preterm neonates with Posthemorrhagic hydrocephalus following severe IVH, elevated CSF hemoglobin, ferritin, and iron were associated with more severe early ventricular enlargement (FOHR > 0.6 vs ≤ 0.6 at first ventricular tap) [1)].

Prospective observational cohort studies

Acute ischemic lesions seen on brain magnetic resonance imaging (MRI) are associated with poor spontaneous intracerebral hemorrhage prognosis, but drivers for these lesions are unknown. Rapid hemoglobin decrements occur in the initial days after ICH and may impair brain oxygen delivery. Poyraz et al. investigated whether acute hemoglobin decrements after ICH are associated with MRI ischemic lesions and poor long-term ICH outcomes.

Consecutive patients with acute spontaneous intracerebral hemorrhage enrolled into a single-center prospective cohort study were assessed. Change in hemoglobin levels from admission to brain MRI was defined as the exposure variable. The presence of MRI ischemic lesions on diffusion-weighted imaging was the primary radiographic outcome. Poor 6-month modified Rankin Scale score (4-6) was assessed as our clinical outcome. Separate regression models assessed relationships between exposure and outcomes adjusting for relevant confounders. These relationships were also assessed in a separate prospective single-center cohort of patients with ICH receiving minimally invasive hematoma evacuation.

Of 190 patients analyzed in our primary cohort, the mean age was 66.7 years, the baseline hemoglobin level was 13.4 g/dL, and 32% had MRI ischemic lesions. Greater hemoglobin decrements were associated with MRI ischemic lesions (adjusted odds ratio [OR] 0.77 for every 1 g/dL change, 95% confidence interval [CI] 0.60-0.99) and with poor 6-month outcomes (adjusted OR 0.73, 95% CI 0.55-0.98) after adjusting for demographics, ICH and medical disease severity, and antithrombotic use. In our separate cohort of 172 surgical patients with ICH, greater hemoglobin concentration decrements similarly associated with MRI ischemic lesions (adjusted OR 0.74, 95% CI 0.56-0.97) and poor 6-month outcomes (adjusted OR 0.69, 95% CI 0.48-0.98).

Greater hemoglobin decrements after acute ICH are associated with ischemic lesions on brain MRI and poor long-term outcomes. Further work is required to clarify drivers for these relationships and whether anemia treatment and prevention can be used to improve ICH outcomes [2].

This study's design enables researchers to establish associations between hemoglobin changes and outcomes in ICH, but it does not determine causality, as it is observational. Further experimental or interventional studies would be required to clarify causal mechanisms or assess the efficacy of anemia treatment in improving outcomes.

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Mahaney KB, Buddhala C, Paturu M, Morales DM, Smyser CD, Limbrick DD, Gummidipundi SE, Han SS, Strahle JM. Elevated cerebrospinal fluid iron and ferritin associated with early severe ventriculomegaly in preterm posthemorrhagic hydrocephalus. J Neurosurg Pediatr. 2022 May 27;30(2):169-176. doi: 10.3171/2022.4.PEDS21463. PMID: 35916101.

2)
Poyraz FC, Rossitto CP, Ridha M, Simonetto M, Kumar A, Hess E, White E, Mao E, Sieh L, Ghoshal S, Agarwal S, Park S, Claassen J, Connolly ES, Mocco J, Kellner CP, Roh DJ. Hemoglobin Decrements are Associated with Ischemic Brain Lesions and Poor Outcomes in Patients with Intracerebral Hemorrhage. Neurocrit Care. 2025 Jan 22. doi: 10.1007/s12028-024-02206-9. Epub ahead of print. PMID: 39843877.