

Mean Corpuscular Hemoglobin (MCH)

Interpretive Summary

Description: Mean corpuscular hemoglobin (MCH) is the calculated concentration of hemoglobin per red blood cell irrespective of red blood cell size. The MCH usually parallels the mean corpuscular hemoglobin concentration (MCHC) value.

Decreased MCH

Common Causes

- Reticulocytosis
 - Regenerative anemias
 - Hemolysis
 - Hemorrhage
- Decreased hemoglobin production
 - Iron deficiency

Uncommon Causes

- Reticulocytosis
 - Idiopathic
- Decreased hemoglobin production
 - Possible copper or vitamin B6 (pyridoxine) deficiency

Related Findings

- Hemolysis
 - Increased reticulocytes
 - Increased leukocytes, +/- decreased platelets
 - Increased serum bilirubin, bilirubinuria, +/- hemoglobinuria
 - Spherocytosis (in dogs), autoagglutination, +/- positive Coombs test (IMHA)
 - Positive serology, PCR, or antigen testing for infectious causes
 - Blood parasites visualized on blood smear
 - Gastrointestinal metallic foreign body found on abdominal radiographs
- Blood Loss
 - Increased reticulocytes
 - Decreased total protein and/or albumin
 - Pleural or peritoneal effusion and/or pulmonary hemorrhage on radiographs or ultrasound
 - Positive fecal ova and parasite screen, positive fecal occult blood
 - +/- Decreased serum iron concentration, normal total iron binding capacity, and decreased serum ferritin (if chronic blood loss)
 - Increased PT and/or PTT, decreased platelets, prolonged buccal mucosal bleeding time, or low von Willebrand factor level
- Iron deficiency
 - Decreased total protein and/or albumin
 - Increased BUN and positive fecal occult blood
 - Positive fecal ova and parasite screen
 - Gastric or intestinal mass on abdominal radiographs or ultrasound
 - Bone marrow aspirate or biopsy consistent with low iron stores
 - +/- Decreased serum iron concentration, normal total iron binding capacity, and decreased serum ferritin (if chronic)

Increased MCH

Common Causes

- Interfering substance or a test error
- In-vivo or in-vitro hemolysis
- Lipemia

Uncommon Causes

- Treatment with hemoglobin products (e.g. Oxyglobin)
- Heinz bodies

Related Findings

- In-vivo or in-vitro hemolysis
 - Anemia
 - Increased bilirubin, bilirubinuria, or hemoglobinuria

Additional Information

Physiology

- Hemoglobin is a large globular protein that is composed of two alpha chains and two beta chains for a total of four iron-containing heme groups bound to four globulin chains.
- Hemoglobin gives blood its characteristic red color and (as oxyhemoglobin) is responsible for oxygen transport by the red blood cells.
- Hemoglobin measurements are the most direct indication of oxygen transport capacity of blood in a patient.
- Neither changes in red blood cell size nor in vitro hemolysis will alter the hemoglobin concentration, although both HCT and PCV may be affected.
- Hemoglobin is not normally found in body fluids other than blood.

Diagnostic Methodology

- The Mean Corpuscular Hemoglobin (MCH) value is determined by the equation: $MCH = (HGB/RBC) \times 10$.
- The MCH is expressed as picograms (pg) of hemoglobin (per average red cell).
- The MCH may be affected by cell size (MCV).
- MCHC corrects for cell volume and should be used for classification of anemia if different from the MCH value.
- A true increase in MCH is not possible as cells cannot contain an increased amount of hemoglobin.

References

- Latimer KS, Mahaffey EA, Prasse KW, eds. *Duncan and Prasse's Veterinary Laboratory Medicine: Clinical Pathology*, 4th ed. Ames, IA: Blackwell; 2003.
- Stockham SL, Scott MA. *Fundamentals of Veterinary Clinical Pathology*, 2nd ed. Ames, IA: Blackwell; 2008.

Last updated 11/1/2013