

# Blood/Hemoglobin

## Interpretive Summary

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**Description:** Blood/hemoglobin on the reagent strip is most often an indicator of hematuria (RBC in the urine).

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### Decreased Blood/Hemoglobin

#### Common Causes

- Normal
- False negative
  - High urine specific gravity
  - Ascorbic acid, captopril, or formaldehyde in the urine
  - Nitrite from bacterial infections

### Increased Blood/Hemoglobin

#### Common Causes

- Hematuria
  - Urinary tract infection or inflammation (cystitis, pyelonephritis, nephritis, prostatitis)
  - Iatrogenic (due to traumatic cystocentesis or catheterization, or manual expression)
  - Urinary calculi
  - Genital tract infection or inflammation (if voided sample is collected)
  - Neoplasia

#### Uncommon Causes

- Hematuria
  - Coagulation or platelet disorder
  - Trauma
  - Estrus (if voided sample is collected)
  - Idiopathic renal hematuria
- Hemoglobinuria
  - Immune-mediated hemolytic anemia
  - Severe hypophosphatemia
  - Heat stroke
  - Transfusion reaction
  - DIC, vasculitis
  - Heartworm disease
  - Hemangiosarcoma
  - Splenic torsion
- Lysis of erythrocytes after entering urine
- Myoglobinuria
  - Muscle trauma
  - Hyperthermia
  - Infectious disease – toxoplasmosis, neosporosis, leptospirosis
- Methemoglobinuria
  - Ibuprofen toxicity
- False positives
  - Bleach
  - Microbial or leukocyte peroxidase

## Related Findings

- Urinary tract infection or inflammation
  - Red blood cells on urine sediment exam
  - Pyuria, +/- bacteriuria
  - Alkaline urine pH
  - Struvite crystalluria
  - Positive urine culture
  - Casts (pyelonephritis or nephritis)
  - Increased BUN and creatinine (pyelonephritis or nephritis)
  - Leukocytosis (pyelonephritis)
  - Dilated renal pelvices on abdominal ultrasound (pyelonephritis)
  - Decreased urine specific gravity (pyelonephritis or nephritis)
  - Positive serology or PCR for leptospirosis, Lyme, rickettsial infection, FIP (nephritis)
  - Increased +/- abnormal transitional epithelial cells on urinalysis (prostatitis)
  - Enlarged, bright, and/or cystic prostate on abdominal ultrasound (prostatitis)
- Calculi
  - Red blood cells on urine sediment exam
  - Pyuria, +/- bacteriuria
  - Crystalluria
  - Calculi found on abdominal radiographs, abdominal ultrasound, and/or contrast studies of the urinary tract
- Neoplasia
  - Red blood cells on urine sediment exam
  - Pyuria, +/- bacteriuria
  - Abnormal transitional epithelial cells on urinalysis
  - Mass found on abdominal ultrasound and/or with cystoscopy, urethroscopy, vaginoscopy
  - Histopathology/cytology consistent with neoplasia
  - Positive bladder tumor analyte (dogs only)

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## Additional Information

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### Diagnostic Methodology

- The reagent strip method utilizes the peroxidase activity of heme to catalyze the oxidation of a chromagen or *o*-toluidine to effect a color change.
- Erythrocytes, free hemoglobin, methemoglobin, or myoglobin may be a source of heme.
- RBCs should be confirmed with sediment exam to help differentiate between hematuria and pigmenturia (erythrocytes may lyse in very alkaline or dilute urine).

### References

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- Osborne CA, Stevens JB. *Urinalysis: A Clinical Guide to Compassionate Patient Care*. Shawnee Mission, KS: Bayer Corporation; 1999.
- Stockham SL, Scott MA. *Fundamentals of Veterinary Clinical Pathology*, 2nd ed. Ames, IA: Blackwell; 2008.

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