

# Monocytes

## Interpretive Summary

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**Description:** Monocytes are white blood cells that are responsible for phagocytosis, antigen presentation, and production of cytokines.

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### Decreased Monocytes

#### Common Causes

- Normal
- Bone marrow disease (along with other cytopenias)

#### Related Findings

- Bone marrow disease
  - Leukopenia, neutropenia, anemia, thrombocytopenia
  - Abnormal bone marrow aspirate cytology or bone marrow histopathology

### Increased Monocytes

#### Common Causes

- Inflammatory response (local or systemic; chronic or acute)
  - Infections: bacterial, rickettsial, fungal, protozoal
  - Immune-mediated disease
  - Tissue necrosis
  - Neoplasia
- Corticosteroid-induced: endogenous or exogenous glucocorticoids

#### Uncommon Causes

- Inflammatory response
  - Infections: parasitic, viral
- Chronic or acute monocytic/ myelomonocytic leukemia
- Recovery from neutropenia

#### Related Findings

- Inflammatory response
  - Infectious
    - Increased neutrophils, toxic neutrophils and/or band neutrophils
    - Positive culture of urine, CSF, joint fluid, blood, tissue, body cavity effusion, other
    - Evidence of infection on abdominal or thoracic imaging
    - Positive serology or PCR results
    - Septic effusion on fluid analysis and cytology
    - Suppurative inflammation +/- bacteria/fungal organisms on cytology or histopathology
  - Immune-mediated disease
    - Increased neutrophils and monocytes
    - Nonregenerative or regenerative anemia, thrombocytopenia
    - Inflammation found on fluid analysis and cytology of joint fluid, CSF, or body cavity effusion
    - Positive Coombs, ANA titer, or Rheumatoid Factor

- Tissue necrosis
  - Increased neutrophils and monocytes, toxic neutrophils and/or band neutrophils
  - Necrotic mass on abdominal or thoracic radiographs, or abdominal ultrasound
  - Evidence of necrosis on cytology or histopathology of a mass or organ
- Neoplasia
  - Enlarged lymph nodes or mass on abdominal radiographs, abdominal ultrasound, or thoracic radiographs
  - Neoplastic cells on cytology or histopathology
- Corticosteroid-induced
  - Neutrophilia, lymphopenia, monocytosis, eosinopenia, possible thrombocytosis
  - Increased ALP, possible mild increases in GGT, ALT, cholesterol, and glucose
  - Supportive endocrine testing (abnormal urine cortisol: creatinine ratio, ACTH stimulation test, and/or low dose dexamethasone suppression tests)

## Additional Information

### Physiology

- Monocytes are the largest cells (typically 15-20  $\mu\text{m}$  in diameter) present in normal peripheral blood.
- They have abundant blue-gray cytoplasm, often with multiple, variably-sized clear vacuoles. Their nuclei may be oval, kidney bean-shaped, or convoluted. The nuclear chromatin is finely granular to lacy, with only a few clumped areas.
- Monocytes arise in the bone marrow, circulate, then differentiate into tissue macrophages after they leave the peripheral blood vasculature. They do not recirculate.
- Their main functions include phagocytosis of infectious agents and particulate matter, production of mediators that promote blood cell production (hemopoiesis), and release of inflammatory mediators.
- They produce cytokines important for immunoregulation and present foreign substances to immunocompetent lymphocytes.
- Monocytes also differentiate into many types of tissue macrophages (e.g. Kupffer cells in the liver).

### Diagnostic Methodology

- The monocyte percentage (or relative monocyte count) is the number of monocytes (typically per 100 to 200 white blood cells) and is reported as a percentage.
- Morphology evaluation can provide valuable clues as to potential cause of monocyte elevations (inflammation, infection, neoplasia, etc...)

### References

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