

Neutrophils

Interpretive Summary

Description: Segmented neutrophils are the most abundant type of white blood cell (WBC). They respond quickly to inflammation and stress, are capable of phagocytosis, and have antimicrobial properties.

Decreased Neutrophils

Common Causes

- Decreased bone marrow production
 - Infection
 - Parvovirus in dogs and cats
 - Feline leukemia virus
 - Toxoplasmosis
 - Rickettsial disease
 - Neoplasia
- Increased tissue demand
 - Sepsis
 - Viral infections
 - Sequestration: collection of cells within an organ system or body compartment: abscess, pyometra, peritonitis, pneumonia, necrotic tumor, etc...
- Toxicity
 - Estrogens
 - Chemotherapy
 - Chloramphenicol, sulfas
 - Idiosyncratic drug reactions, toxicities

Uncommon Causes

- Decreased bone marrow production
 - Immune-mediated destruction within the bone marrow
 - Bone marrow fibrosis, aplasia, or necrosis
 - Cyclic hematopoiesis: grey collies
 - Idiopathic
- Peripheral destruction by immune or other mechanisms

Related Findings

- Decreased bone marrow production
 - Decreases in all three cell lines (red blood cells, white blood cells and platelets) or two of three cell lines may suggest a bone marrow disorder
 - Infection
 - Positive serology or PCR tests for infectious organisms
 - WBC morphologic abnormalities such as toxicity, reactive lymphocytes
 - Neoplasia
 - Nonregenerative anemia, thrombocytopenia, and/or leukopenia
 - Atypical or unclassified cells found on blood smear evaluation
 - Neoplastic cells on bone marrow aspirate cytology or biopsy
- Increased tissue demand
 - Sepsis
 - Toxic neutrophils and/or band neutrophils
 - Increased PT and PTT, decreased platelets and fibrinogen (due to DIC)
 - Positive culture of urine, CSF, joint fluid, blood, tissue, body cavity effusion, other

- Pleural effusion or pneumonia on thoracic radiographs
- Peritoneal effusion, prostatic abscess/prostatitis, pyometra, or necrotic mass on thoracic or abdominal radiographs, or abdominal ultrasound
- Thickened heart valve on echocardiogram
- Septic effusion on fluid analysis and cytology
- Suppurative inflammation +/- bacteria on cytology or histopathology

Increased Neutrophils

Common Causes

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

Uncommon Causes

- Inflammatory response
 - Infections: parasitic, rickettsial, viral
- Chronic or acute neutrophilic leukemia
- Epinephrine-induced physiologic neutrophilia

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

- Segmented neutrophils are the mature neutrophils that form the largest portion of the WBC count in domestic animals.
- Neutrophils are only in the peripheral blood for approximately ten hours before exiting the vascular system, either from normal cell death or in response to chemotactic factors..
- Neutrophils are quickly activated and increase in number in response to a myriad of stimuli, such as infecting agents (viral, bacterial, fungal, parasitic, etc), foreign substances, tissue damage, necrosis, and cancers.
- Neutrophils exist in two main pools in the peripheral blood: those freely floating in circulation (circulating neutrophil pool or CNP) and those adhered to the endothelium (marginated neutrophil pool or MNP); only the neutrophils in the CNP are measured on a CBC.
- Neutrophils can be recruited from the MNP within minutes (e.g. in response to stress) and will then increase the neutrophil count

Diagnostic Methodology

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

References

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