

Diagnostic and Prognostic Usefulness of Enumeration of Band Cells

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Enumeration of the specific number of band cells in peripheral circulation can be used as a diagnostic and prognostic indicator. An increase in the number of band cells (left shift) often indicates a systemic inflammatory process. This frequently results from infectious causes (bacterial, fungal, viral, protozoal), or immune-mediated diseases (immune-mediated hemolytic anemia). A left shift may be accompanied by leukocytosis and neutrophilia (inflammatory leukogram) and may also manifest with toxic changes within both the band cells and mature segmented neutrophils, such as cytoplasmic basophilia and vacuolization. A degenerative left shift is

indicated when the absolute number of immature neutrophils is greater than the number of segmented neutrophils on an inflammatory leukogram. This degenerative left shift indicates severe inflammation and is usually due to bacterial infection. Degenerative left shift can also be seen in conjunction with neutropenia caused by increased consumption of recently released and circulating mature segmented cells, decreased production, immune-mediated destruction, or can be multi-factorial. The degree of severity of any left shift correlates to the severity of the underlying illness. A degenerative left shift from any cause is a particularly grave prognosis.

Degenerative Left Shift

Condition when the absolute number of immature neutrophils is greater than the number of segmented neutrophils on an inflammatory leukogram or left shift in conjunction with neutropenia.

Enumerating Band Cell Count

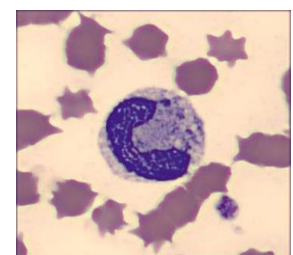
A single hemogram is unlikely to provide detailed information. Serial determination of the total leukocyte count and band cell count provides more valuable information. Dynamic changes occur in both the total leukocyte count and left shift data from onset of infection to recovery. Left shift does not occur in the extremely early or late phases of infection. It generally takes

three to four days from initial acute insult before the bone marrow response is evident. Similarly, response is usually evident three to four days following treatment for the initial insult.

The degree of a left shift can be evaluated with some automated analyzers or can be estimated with the differential blood smear. The number of band cells seen on the smear is multiplied by the total leukocyte count to obtain the estimated absolute value of band cells. However, identifying band cells on a blood smear is somewhat subjective and different individuals may apply different criteria to the identification. In addition, band cells that have toxic changes can appear similar to the monocyte in peripheral blood, especially in the canine. This potentially introduces significant inaccuracy into the count.

Summary

The total leukocyte count in conjunction with the band cell count can provide valuable diagnostic information to the clinician. Serial determinations will allow for evaluation of patient response to bacterial or other significant bone marrow insult. Ideally, such evaluations should be performed with automated analyzers to minimize errors created with subjective evaluations using a blood smear.



Neutrophilic band cell with toxic changes

1. [Honda T, Uehara T, Matsumoto G, Arai S, Sugano M](#). Neutrophil left shift and white blood cell count as markers of bacterial infection. *Clin Chim Acta*. 2016 Jun 1;457:46-53. doi: 10.1016/j.cca.2016.03.017. Epub 2016 Mar 28.
2. Left shift <http://eclinpath.com/hematology/morphologic-features/white-blood-cells/left-shift/>
3. Top 5 Leukogram Patterns. Sarah Schmidt, DVM, DACVP (Clinical Pathology), Ashland, Massachusetts <https://www.cliniciansbrief.com/article/top-5-leukogram-patterns>