### Quantitative Buffy Coat Analysis

**A Pictorial Review and Reference Guide**

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**A History of Buffy Coat Analysis**

The buffy coat has long interested pathologists, as a “plug” that dominated the femoral bone of the ancients. In 1933, in a paper entitled “Macroscopic Examination of the Blood,” Wintrobe[1] was perhaps the first to suggest that quantitative examination of the buffy coat is a tool that could provide useful information. He stated that its color and thickness were good guides for estimating the packed cell volume and reticulocyte counts. Subsequently Bessis[2] described a way of separating the buffy coat into three layers. His work was amplified by Davidson[3] and by Zucker and Cassen[4].

Wardlaw, Levine and Massey in 1977 developed the technique of expanding the buffy coat by using a high precision plastic float moving in a precision–bore capillary tube. Their work was reported in 1983 in a paper entitled “Quantitative Buffy Coat Analysis.” The GBC™ Centrifugal Hematology System, manufactured by Drucker Diagnostics, Inc., was developed based upon their work.

**The Significance of Absolute Counts**

Absolute leukocyte counts, which are obtained by simple multiplication, provide a more accurate and more readily comparable picture than the total white blood cell count with the percentage leukocyte differential count. Although the information is similar in both cases, presenting it in this statistical percentage format may mask abnormalities in the absolute counts.

The importance of the absolute counts is apparent when it is realized that the various leukocyte cell populations are separate entities and under separate control mechanisms, increases in one may not be paralleled by increases in another. Thus, using the absolute counts as indicators of a particular process offers a more sensitive means than conventional data presentation and also enhances the user’s awareness of the pathophysiology.

**INCREASE IN LYMPHOCYTES/MONOCYTES**

**| Condition | Absolute Count |
---|---|
1. Acute bacterial infection, especially coccal | >7.2 × 10⁹/L |
3. Toxins, acidosis, uremia. | |
5. Primary hematopoietic disorder and lymphomas. | |
6. Many acute and chronic infections. | |
7. Overwhelming infection. | |
8. Trauma and surgery. | |
9. Drug reactions; diuretics, oral hypoglycemics, aminopyrine, phenothiazines, sulfonamides, antithyroids, gold. | |
10. Idiopathic aplastic anemia. | |
11. Hypoplasia. | |

**DECREASE IN LYMPHOCYTES/MONOCYTES**

**| Condition | Absolute Count |
---|---|
1. Acute infections. | <1.7 × 10⁹/L |
2. Certain malignancies. | |
3. Cigarette tobacco disease. | |
5. Cachexia or debilitated state. | |
6. Anaphylaxis and early stages of reaction to antigens. | |
7. Acute viral infections. | |
8. Early myocardial infarction. | |
9. Increased thrombopoiesis (ESR) | |
10. Myelodysplasia | |

**EXPECTED NORMAL HEMATOLOGICAL VALUES**

- **WBCs**
  - Total: 4.3-10.0 × 10⁹/L
  - Granulocytes: 52-72%
  - Lymphocytes/Mono: 15-25% | 4.3-10.0 × 10⁹/L
  - Platelets: 140-400 × 10⁹/L
  - Hematocrit: 37-46%

**Note:**
- The QBC system is designed to provide immediate data which can be used as a guide in many circumstances.
- The data is not complete, however, when clinically indicated or when samples show values outside of the appropriate ranges, the results should be augmented or confirmed by an additional analysis, including a manual count.
- See package insert and operator’s manual for technical assistance, call 800-258-4460.

**References**