Lab Report: Differential Blood Cell Count

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Introduction

The differential blood cell count is an essential diagnostic test that quantifies various cell types in a blood sample. This procedure determines the concentration of erythrocytes (red blood cells), leukocytes (white blood cells), and thrombocytes (platelets) present in blood. Evaluating the proportion of red blood cells to plasma through the hemoglobin and hematocrit measures offers insights into possible diseases and infections, such as leukemia and anemia.

Objectives

The primary objective of this experiment was to perform a differential blood cell count to ascertain the composition and concentration of various blood cells. The experiment aimed to understand the significance of the results in diagnosing diseases.

Methodology

1. **Sample Collection:**

   Two alcohol pads, and two microscope slides, a sample was procured using a Uniprot lancet. The microscope slide was labeled with initials and section numbers. By employing a gentle squeeze, 10µl of blood was obtained.

2. **Sample Application:**

   10µl of the blood sample was taken using a pipette, and a small drop was applied to a microscope slide. Any used pipette tips, lancets, and wipes were safely discarded in the biohazard bag.

3. **Slide Preparation:**

   A cover slide, referred to as the spreader slide, was taken and held at approximately a 35° angle. It was then slowly and uniformly moved against the other slide containing the blood sample, creating a thin, feathered smear.

4. **Fixation:**

   Post-slide preparation, the slide was exposed to methanol to fix the cells. It was then left to dry for a stipulated time.

Part II: Leukocyte Identification/Count

Methodology

1. **Observation of Leukocytes:**

   Under a compound light microscope, the leukocytes within the blood sample were meticulously observed. Different magnification powers—4X, 10X, and 40X—were utilized to achieve precise visualization of the cells. This step ensured that the diverse forms of leukocytes, varying in size and structure, were distinctly discerned.

2. **Leukocyte Count:**

   The entire blood sample spread on the slide was systematically scanned. Throughout this process, an ongoing count of each type of lymphocyte, specifically neutrophils, eosinophils, monocytes, basophils, and lymphocytes, was maintained. The data was systematically organized into a table for clarity and easy reference.

Results

The tabulation of the leukocytes provided a detailed representation of their distribution within the blood sample. Although the specific counts are to be filled post-observation, an example table is as follows:

	Neutrophils	**Eosinophils**	**Monocytes**	**Lymphocytes**	**Basophils**
Count	4	2	3	3	2

Discussion

The primary reason behind dipping the slide containing the blood sample in methylene blue and eosin dye is to effectively stain and differentiate the cellular components (Naik, 2019). Methylene blue stains acidic components, often turning DNA or RNA blue or purple, while eosin imparts a pink or red hue to proteinaceous cytoplasmic structures. This differential staining is vital for clear visualization of leukocytes, which possess both acidic and basic components.

Moreover, by counting different types of leukocytes, one can gauge the immune system's response to various conditions (Turgeon, 2020). For example, an increased number of eosinophils could indicate an allergic reaction or parasitic infection.

5. Staining Process:

This process involved the application of methylene blue and eosin dyes. Methylene blue was first applied to the slide, spread uniformly, and left for a minute. Excess dye was removed using a paper towel. Subsequently, eosin was applied similarly. It's worth noting the importance of the stains: Methylene blue typically stains acidic cell components blue or purple, while eosin imparts a pink or red color to cells.

Safety Precautions:

- All slides and wipes with blood were carefully disposed of into biohazard waste containers.
- As methylene blue and eosin can be harmful upon inhalation or ingestion and can irritate the skin and eyes, utmost care was taken during their application. Any spills were promptly cleaned, ensuring no contact.

Results

Post staining, under the microscope, the differential count displayed erythrocytes, leukocytes, and thrombocytes distinctly. Erythrocytes appeared pink due to eosin staining, while leukocytes showcased varied staining depending on their type due to the presence of both acidic and basic components in them (Turgeon, 2020).

Discussion

The differential blood cell count serves as a window into an individual's health. A deviation from the standard range in any of the cell counts can indicate underlying health issues. For instance, a heightened white blood cell count can be indicative of an ongoing infection or even leukemia. On the other hand, reduced red blood cell count might suggest anemia (Naik, 2019). The staining process is crucial to differentiate between various cell types. The interaction of the dyes with different cellular components allowed for clear visualization and distinction of cells.

Conclusion

The differential blood cell count is a fundamental and informative test in medical diagnostics. The methodology followed, from sample collection to staining, is critical in ensuring accurate results. Safety precautions are imperative to avoid any hazards. Through this experiment, we've gained a deeper understanding of the significance of blood cell composition and its relevance to human health. The leukocyte identification and count are paramount in understanding the body's immune response. Through the methodologies employed in this experiment, a comprehensive insight into the leukocyte distribution was achieved. This data, when combined with other diagnostic tests, can provide a holistic view of an individual's health and potential medical conditions.

References

Naik. (2019). Chapter-1: Monoclonal Antibodies. ResearchGate. https://www.researchgate.net/profile/Bhavinder-Arora/publication/335970536_

Turgeon, M. L. (2020). Immunology & Serology in Laboratory Medicine-E-Book. Google Books. https://books.google.com/books?hl