Laboratory Exercise # 17: Blood Lab

Purpose:
The purpose of this laboratory exercise is to familiarize the student with the important functions of blood cells and demonstrate to them the use of antigen-antibody reactions for typing of red blood cells.

Introduction:

When discussing the function of blood, an immediate response seems to be its transport of oxygen, but another all important function of the blood, fighting infection, will be investigated in this laboratory exercise.

The white blood cells, those without the ability of carrying the pigmented chemical hemoglobin, are responsible for fighting infections. They differ from red blood cells in that they are usually larger, have a nucleus, and without staining appear white in color. White blood cells can be divided into two groups, granulocytes and agranulocytes. Granulocytes can be found in three different configurations: neutrophils, eosinophils, and basophils. The difference between these cells becomes apparent when the cells are stained.

Neutrophils have a multi-lobed nucleus and are the first WBC on the site of an infection. They have the ability to phagocytose a foreign particle or microbe. Eosinophils have a bilobed nucleus and their granules take up the eosin stain and become red in color. Not much is known about the function of eosinophils, but they are known to increase in number when there is a parasitic worm infection and in some allergies. A basophils’ nucleus is almost totally obscured by the cytoplasmic granules within the cell. Those granules take up the basic stain and become colored dark bluish purple. Basophils have the ability to enter tissues and release their histamine containing granules.

There are two types of agranulocytes: monocytes and lymphocytes. Monocytes are the largest of the white blood cells with a kidney-shaped nucleus. They have phagocytic capabilities and can be found either in the blood or permanently stationed in tissue (such as the alveoli of the lungs) and are then called macrophages. Lymphocytes are the second type of agranulocyte and contain a large round nucleus that just about takes up the entire cell; very little cytoplasm is noticeable when observing these cells. These cells have one of two functions: production of antibodies or cell mediated immunity.
The recognition of self from non-self is an important function of the immune system. The recognition of cellular markers that are common to our cells make it possible for the immune system to realize what is foreign. Cellular markers or antigens number in the hundreds and are found on the surface of our cells. During this laboratory exercise the student will be studying the antigens on the red blood cell called the ABO system. This ABO system is necessary to understand because of its importance in the process of blood transfusion.

Antigens on the red blood cells, also called agglutinogens need to match exactly between recipient and donor in order that a blood transfusion can be successful. Each person carries within their plasma (liquid portion of the blood) antibodies against any antigens not found on their red blood cells. These antibodies are called agglutinins. If the agglutinogens do not match exactly then the agglutinins can connect to the red blood cells marking them for destruction by the immune system.

Materials:
- Wright stained smears of blood - normal and abnormal
- ABO typing sera - Anti-A, Anti-B, Anti-D
- Plastic blood typing trays or blood typing cards
- Glass slides
- Lancets
- Alcohol pads
- Toothpicks
- Absorbent towels
- Band aids

Procedure:

1. Each student will be observing Wright stained blood smears in order to identify the cellular components of the blood. After observing the smear make a sketch of each type of cell you observed on the data sheet.

2. After completing the observation of a normal blood smear observe an abnormal blood smear. Your observations of this smear should also be recorded on the data sheet along with the name and description of the abnormality.

3. Blood typing: the student is required to type their own blood. The instructor will demonstrate the procedure.

4. Complete the ABO typing chart and record the blood types of each unknown check cell and your blood type on the data sheet.
Data:
1. Sketch each white blood cell observed on the Wright stained blood smear. Coloring the sketches the proper color will aid in your learning of the different cell types.

2. Observe the abnormal smear and describe three ways this smear looks different from a standard Wright stained smear.

3. Record results of blood typing:

My blood type is: ___________________________
Questions:

1. Complete the following chart:

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<th>Anti A</th>
<th>Anti B</th>
<th>Interpretation</th>
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<th>B cells</th>
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</table>

2. ____________ is considered the universal donor because

______________________________________________________.

3. A patient is considered the Universal recipient if he/she has ________ type blood.

4. If a patient is blood typed as A⁻ and the blood bank is out of that type of blood what other type of blood may be given to the patient?

5. If a patient is O⁺ why may they only receive only type O blood?