Investigation 3.4

3.4A: Sore Throat
3.4B: Role of Blood
Investigation

3.4A: Sore Throat

1. Introduction:

Sore throats cause almost a quarter million patient visits to their doctors each year. Even doctors come down with a sore throat from time to time. A sore throat is often the first sign of a cold. A virus causes most sore throats and they last about ten days with or without supportive care (bed rest, salt water gargles, antihistamines, cough syrup, and anti-inflammatory medicines. But other illnesses also cause sore throats; so, if your patient has a temperature of 101 F. or higher, you need to see them.

2. Chief Complaint:

Ronald, a thirteen year old boy, is brought to see you by his Mother. Ronald has a sore throat that started four days ago. Ronald reports the right side of his throat hurts more than the left side. He complains of losing his voice, smelling his own bad breath, and not feeling hungry. He also reports experiencing headaches and alternating feelings of chills and fever.

His Mother tells you that he has experienced similar throat infections at least nine times over the past three years. As a result he has missed many days of school, which has caused Ronald great concern because it affected his grades. Mom also states this is the third time this year Ronald has had a similar infection. Mom further reports that Ronald snores loudly only when he has throat infections. Ronald had a physician caring for this condition, but they have moved recently and would like you to take over his care. Ronald enjoys playing soccer and playing video games. He makes good grades in school except when he doesn’t feel well from his throat infections.

3. Review of Systems:

Ronald’s Mother again says that Ronald has had at least nine throat infections over the past three years. Ronald occasionally has a nosebleed, especially in warm weather months. His Mother denies any episodes of uncontrollable bleeding. Ronald has no surgical history. Ronald has experienced an allergic reaction to sulfa-based antibiotics, but has no other known allergies.

4. Examination:

Ht = 66 in. Wt = 140 lbs. Respirations: 18/min Pulse: 76

Blood Pressure is 98/60. Temperature = 102.4°F.

Head and Neck:

Eyes: erythema and glassy appearance
Ears: erythema of tympanic membrane

Mouth: Enlargement of both tonsils and erythema of the tonsillar bed and surrounding tissues. A small amount of yellowish purulent discharge with an abscess is noted on the right tonsil. Teeth are aligned normally. The Uvula appears swollen and erythematous.

Neck: Enlargement of lymph nodes on both sides of the neck

Heart: Heart sounds normal

Lungs: Breath sounds normal all quadrants

Abdomen: Bowel sounds active.


5. Differential Diagnosis:

<table>
<thead>
<tr>
<th></th>
<th>Acute/chronic</th>
<th>Sore throat</th>
<th>Fever</th>
<th>Enlarged Tonsils</th>
<th>Enlarged lymph nodes</th>
<th>Purulent Discharge</th>
<th>Ear Ache</th>
<th>Pos. C&amp;S</th>
<th>Fatigue</th>
<th>Rash Neck &amp; Chest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial Tonsillitis</td>
<td>A</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Strept Throat</td>
<td>A</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Mononucleosis</td>
<td>AC</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Lymphoma</td>
<td>C</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Tooth Abscess</td>
<td>AC</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Carcinoma</td>
<td>C</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Diptheria</td>
<td>A</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Scarlet Fever</td>
<td>A</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Viral Tonsillitis</td>
<td>A</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Review of medical records:

Because the patient had a physician treating this condition over the past three years, you want to examine the old records. If you confirm that Ronald has experienced Tonsillitis nine times in three years, you may want to recommend he undergo surgical removal of his tonsils. If not you would recommend a more conservative approach to solving this medical investigation. While waiting for the medical records to arrive you must treat his current condition.
6. Medical Tests

Summary of Available Tests to Consider and how they can help your medical investigation:

<table>
<thead>
<tr>
<th>Test</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete Blood Count (CBC)</td>
<td>High WBC count suggests infection; Low WBC count suggests immune response suppression</td>
</tr>
<tr>
<td>Culture &amp; Sensitivity (C&amp;S) of throat</td>
<td>Test which germs grow &amp; which antibiotics will control them</td>
</tr>
<tr>
<td>Magnetic Resonance Imaging (MRI) of Neck</td>
<td>Provides a layer by layer view of the entire throat area</td>
</tr>
<tr>
<td>Prescription for Antibiotic</td>
<td>Kills or blocks reproduction of certain bacteria</td>
</tr>
<tr>
<td>Ultrasound of Neck</td>
<td>Uses sound to visualize the structures of the throat</td>
</tr>
<tr>
<td>X-Ray of Neck</td>
<td>Shows the boney structures of mouth &amp; neck</td>
</tr>
</tbody>
</table>

Which test(s) would be most appropriate at this time? (check any that apply)

- [ ] X-rays of the head and neck
- [ ] MRI of the head and neck
- [ ] Culture and Sensitivity
- [ ] CBC blood test
- [ ] Ultrasound of neck

7. Treatment Options:

Which treatment would be most appropriate while waiting for test results:

- [ ] Emergency Surgery to remove the infected and swollen tonsil.
- [ ] Radiation therapy to knock out whatever is causing the tonsils to enlarge.
- [ ] Prescription for a broad spectrum Antibiotic that works on several potential causes of infection including your first choice from your differential list.
- [ ] Prescriptions for all antibiotics that work on the four most common organisms causing infections.
- [ ] No prescriptions until all tests come back with results on the organism
8. Test results:
After two days your test results come back from the lab and indicate Ronald’s tonsillitis is caused by a bacterial infection of the staph aureus organism. The sensitivity report indicates the organism is sensitive to the antibiotic you prescribed. This means your treatment should be effective. What would you do if the C&S report indicated the antibiotic you chose was NOT effective?

When Ronald’s medical records arrive from the other physician one week later you find chart notations for at least nine episodes of tonsillitis over the past three years. The American Medical Association criteria for tonsillectomy, surgical removal of the tonsils, is as follows:

A. 7 episodes of tonsillitis in 1 year, or
B. 5 episodes per year for consecutive 2 years, or
C. 3 episodes per year for consecutive 3 years

9. Treatment Options: The following chart list some of the treatments used to treat the problems listed in your differential diagnosis.

<table>
<thead>
<tr>
<th>Pathology</th>
<th>Cause</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strept Infection</td>
<td>Streptococcus bacteria</td>
<td>Penicillin, amoxicillin, cephalaxin</td>
</tr>
<tr>
<td>Mononucleosis</td>
<td>Epstein-Barr virus (EBV)</td>
<td>Virus; no specific treatment</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>Helicobactor Pylori</td>
<td>Chemotherapy, radiation</td>
</tr>
<tr>
<td>Carcinoma</td>
<td>Genetic mutations</td>
<td>Chemotherapy, radiation</td>
</tr>
<tr>
<td>Abscess</td>
<td>Staph aureus bacteria</td>
<td>Cephalexin, Nafcillin, Vancomycin</td>
</tr>
<tr>
<td>Diptheria</td>
<td>Corynebacterium</td>
<td>Antitoxin, Penicillin, Erythromycin</td>
</tr>
<tr>
<td>Scarlet Fever</td>
<td>Streptococcus bacteria</td>
<td>Penicillin, Amoxicillin, Cephalexin</td>
</tr>
</tbody>
</table>

Which treatment might you prescribe first? ______________________________________

Based on Ronald’s history, what else might you recommend for a long term solution for Ronald’s recurring condition?_______________________________________________________________
Additional food for thought:

You probably recognized that Ronald had an infection probably from his symptoms of fever and chills. Your body maintains its **internal** temperature remarkably constant, unlike some animals like reptiles that we call “cold blooded.” But why would temperature control prove so important to humans? We mentioned briefly before that the cells in our body carry out all sorts of chemical reactions that allow us to move about, heal ourselves, remember things, think, speak, and grow. These chemical reactions that would require high temperatures if we tried to carry them out in a laboratory test tube, take place inside our bodies at a lower temperature because of the **enzymes** coded in our human genes and manufactured inside our cells. You might think of these enzymes as fingers or molds that can hold other molecules close together in a way that allows them to chemically bond or in other cases break apart to form new molecules at our body’s normal temperature. These chemical reactions constitute the core of what it means to be alive. Our amazing human enzymes have evolved to work most efficiently at 98.7 degrees Fahrenheit, our normal body (core) temperature.

Germs or viruses that invade our body commonly create protein molecules called **pyrogens**. These **pyrogens** mix with our blood and travel about our body in order to disrupt our temperature control system that has its headquarters inside our brain. The control center, when disrupted, mistakenly believes our body has gotten too cold so it orders up chills and shivering to increase our internal temperature, thus we develop a fever. Similarly when we treat the fever or resolve the infection, we often experience sweating as the temperature control system gets back to working correctly and sets about to bring our body temperature back down to 98.7. You might reason that germs and viruses go to the trouble of confusing our temperature controls to gain some advantage for themselves, and physicians would agree with you. The advantages might prove varied and numerous in specific infections. Indeed, we probably do not fully understand all of them. We do believe in general that our ability to defend ourselves against **pathogenic** germs and viruses suffers when the higher temperature of a fever moves our enzymes away from their most efficient, normal zone of operation.

Notice that we used the term **pathogenic** germs and viruses. Pathogenic means the ones that harm us. You may have the impression that all germs and viruses harm us, but science is learning right now more and more about how non-pathogenic germs and viruses actually play vital roles inside our body. We now believe a healthy adult human has more than 5 pounds of germs inside them contributing to their wellbeing in a variety of ways that we are only beginning to fully understand. A whole new branch of medical science is emerging around the role bacteria play inside our intestines, bacteria that clearly help us digest our food, but also may regulate many other human functions even to include our mood. Watch for new information about this fascinating area of medical research in the future that is unraveling the dependence of our body on germs and viruses that help us out.
Investigation 3.4A
Sore Throat Worksheet 3.4A

Patient Name: __________________________ Age: _____ Gender: M  F
Vital Signs: Ht:______in   Wt:_____lbs   BP:_____/_____mmHg  Pulse:____ b/m
CC:  

HxCC: (List important information from patient in history of chief complaint)
1. _________________________________________________________________
2. _________________________________________________________________
3. _________________________________________________________________
4. _________________________________________________________________
5. _________________________________________________________________
6. _________________________________________________________________
7. _________________________________________________________________
8. _________________________________________________________________
9. _________________________________________________________________
10. _________________________________________________________________

ROS: (List all positive findings from Review of Systems)- list addition positives on back)
1. _________________________________________________________________
2. _________________________________________________________________
3. _________________________________________________________________
4. _________________________________________________________________
Positive Examination Findings:

1. _______________________________________________________________
2. _______________________________________________________________
3. _______________________________________________________________
4. _______________________________________________________________
5. _______________________________________________________________
6. _______________________________________________________________

DDX: (List your five most likely diagnoses from the Diagnosis Grid – Place a Star next to your “most likely culprit.”)

1. _______________________________________________________________
2. _______________________________________________________________
3. _______________________________________________________________
4. _______________________________________________________________
5. _______________________________________________________________

DDX-2: List the disorders from your DDX list you ruled out immediately because their symptoms did not fit this patient’s history and physical exam findings:

1. _______________________________________________________________
2. _______________________________________________________________
3. _______________________________________________________________
Place an ‘X’ on the line next to any test you would consider them to help your investigation of this patient’s medical problem. Write NA for any test listed that is probably not appropriate to your evaluation of this condition:

_____ X-rays
_____ Complete Blood Count (CBC)
_____ MRI of the head and neck
_____ Ultrasound Study
_____ Culture and Sensitivity

Lab Test Results:

<table>
<thead>
<tr>
<th>Lab Test</th>
<th>Normal</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBC - RBC</td>
<td>4.7 to 6.1 million red blood cells/ul (microliter)</td>
<td>5.4 million red blood cells/mcL (microliter)</td>
</tr>
<tr>
<td>CBC - WBC</td>
<td>4,500-10,000 white blood cells per microliter (mcL)</td>
<td>12,000 white blood cells per microliter (mcL)</td>
</tr>
<tr>
<td>Culture &amp; Sensitivity</td>
<td>Light diverse bacterial growth</td>
<td>Staph Aureus – sensitive to cefazolin</td>
</tr>
</tbody>
</table>

Lab Test Summary: Record any positive lab test findings:

1. __________________________________________
2. __________________________________________
3. __________________________________________

What might cause the WBC count to exceed the normal range? _____________

1. __________________________________________
2. __________________________________________
3. __________________________________________
Diagnosis. (Hint: It is listed on the DDX list)

______________________________________________________________________

Treatment Recommendations (Select type of treatment(s) you would recommend)

1. _______________________________________________________________________
2. _______________________________________________________________________
3. _______________________________________________________________________

Check the appropriate box to indicate how this medical condition spreads from one person to another (more than one method of spreading may exist):

<table>
<thead>
<tr>
<th>Method of spreading</th>
<th>yes</th>
<th>no</th>
</tr>
</thead>
<tbody>
<tr>
<td>Through the air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skin to skin contact with another person</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Touching contaminated object</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sharing a glass</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact with contaminated blood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drinking contaminated water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact with contaminated urine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cannot be spread to others</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Write a paragraph about an experience you had when you got a sore throat. Did you visit your doctor? Were any tests performed to find the cause? What treatment was recommended for you? (Continue on back of page if needed)
Reflections

1. What was your patient’s chief complaint? __________________________

2. Would you consider Ronald’s complaint to be:
   (circle) Acute  or  Chronic
   Why? ________________________________________________________

3. How would you classify Ronald’s condition (circle your answer)?
   Possible Emergency     or    Probably Non-Emergency

4. Which DDx possibilities did you rule out right away?
   a. ____________________________________________________________
   b. ____________________________________________________________
   c. ____________________________________________________________
   d. ____________________________________________________________

5. Was this an injury or illness? (Circle your answer)

6. Was this injury or illness preventable? How or why not? ______________
   __________________________________________________________________
   __________________________________________________________________
   __________________________________________________________________
   __________________________________________________________________
   __________________________________________________________________
   __________________________________________________________________
   __________________________________________________________________
   __________________________________________________________________

7. What is the normal range for red blood cells (rbc)? ________________

8. What is the normal range for white blood cells (wbc)? ________________

9. What test would you order to determine their RBC and WBC count?
   __________________________________________________________________
10. What test is useful to determine which ‘bug’ is causing an infection?  
__________________________________________________________

11. Why might you recommend a tonsillectomy for this patient?  
__________________________________________________________

12. What was your Final Diagnosis?  
__________________________________________________________

13. Why do you think Ronald developed a fever with his throat infection?  
__________________________________________________________
__________________________________________________________
__________________________________________________________

14. What is a “Pyrogen”?  
__________________________________________________________

15. Does our body temperature influence the way pathogenic organism grow in our bodies? How?  
__________________________________________________________
__________________________________________________________
__________________________________________________________
Investigation

3.4B: The Role of Blood

Now that we have used an examination of Ronald’s blood to help us solve this investigation, let’s look more deeply into what a laboratory can learn from a blood sample.

In addition to our examination findings, we asked our nurse to take a sample of blood from Ronald’s arm. That blood sample was sent to a laboratory that specializes in analyzing blood. Technicians at the lab can look at the blood under a microscope and estimate the numbers of each of the types of blood cells in the specimen to gain information about how Ronald’s body is reacting to his illness. Today, we also have the ability to analyze blood using computerized banks of sensors. How does that work, you ask?

By looking at the blood of thousands of ‘normal’ people, we have been able to learn what ‘normal blood’ looks like. We then compare ‘normal’ blood to the blood samples received from sick patients and see how they are different.

What types of cells are found in blood? First, there are three basic parts to blood:

1. Plasma
2. White Blood Cells & Platelets
3. Red Blood Cells

Each of the parts has a basic responsibility in our bodies. Blood can be separated into the three basic parts by spinning the samples in a centrifuge. Why do you think the blood parts separate by the process of spinning?

_________________________________

Look at the blood specimen in the tube at the right.
Notice there are three separate layers after blood is spun in a centrifuge.

So, what is the job of each?

Let’s start with plasma, the top layer after spinning. Plasma is the liquid part of your blood. It acts as a delivery agent, allowing the solid parts of your blood (white cells, platelets, and red blood cells) to suspend within it as it travels to all parts of your body. Plasma is about 90% water and salts, but the other 10% is protein. The protein adds density to the plasma and helps the cellular blood parts stay suspended. Plasma is yellowish in color. When we give patients additional plasma with a plasma transfusion, we must match the patient’s and the plasma donor’s blood type to avoid an allergic response. Since the proteins play a key role along with platelets in stopping the bleeding from an injury to a blood vessel, we might give our patient plasma if they have a blood clotting abnormality.

Platelets and white blood cells remain together in the middle band as you can see in the picture. Why do you think they stay together during the spinning process?

---

**Platelets** are the reason you don’t bleed to death when you get a paper cut. Platelets clump together to form a blood clot when platelets sense they have come into contact with a break in a blood vessel. We can give a platelet transfusion to a patient having a very low platelet count in their blood to prevent bleeding.
Unlike plasma and red blood cells, platelets do not have a blood type, so they can be transfused freely regardless of blood type. **Hemophilia** is a disease where certain blood **clotting** proteins are missing from the plasma; these patients have to be very careful and also receive treatment so they don’t bleed to death.

**White blood cells** provide our bodies with its natural defense against infection or exposure to **toxins** or **allergens**. There are five types of white blood cells found in our blood, but they work together to protect us.

**Monocytes** are the largest white cells. They are immediate fighters of infection.

**Lymphocytes** are our main ‘immunity’ cells. They recognize and provide a sustained attack on foreign substances such as bacteria and allergens.

**Neutrophils** are the most abundant white cell, usually between 40-70 percent of all white cells in your blood. They represent your body’s first line of defense against infection.
**Eosinophils** send signals to other white cells telling them to attack. Our blood level of eosinophils goes up when we have an infection or allergy attack.

![Image of Eosinophil]

**Basophils** have two important jobs: first, they prevent blood from clotting too quickly. If our blood started clotting too much whenever we cut ourselves, we would have blood clots flowing through our bodies. It wouldn’t take long for a blood clot to move to our lungs and block the flow of blood. We wouldn’t survive long in that condition. Basophils also promote the flow of blood into the area needing help by enlarging the size of the small arteries in the region of the body. If you have an infection in your foot, your basophils will send more blood there, bringing along all of the white cells needed to fight the infection.

![Image of Basophil]

Red blood cells carry **oxygen** to every cell in our body, is the **red blood cell**. Also called **erythrocytes**, they make up about half of the total blood **volume** and are the most common blood cell.
Erythrocytes utilize **hemoglobin** to pick up oxygen in the lungs and deliver it to tissues throughout the body, releasing it as the cells pass through the **capillaries**. The hemoglobin inside the erythrocytes give these blood cells their red color and their easier to remember name “red blood cells”. As the red blood cells give up their oxygen they pick up **carbon dioxide** (a waste product of chemical energy production in the cells) from the tissues and return it to the lungs, where it is released when you **exhale**. Before you give a patient a blood transfusion you should know their blood type to avoid an allergic reaction, and indeed hospitals do several tests on blood for a transfusion to make sure you can safely administer it to a specific patient.

Sometimes children are born with abnormal hemoglobin in their red blood cells. Look at the picture above to see the shape of a normal red blood cell. In children born with **Sickle Cell Anemia**, some of their red blood cells under certain situations of stress no longer remain round because of their abnormal hemoglobin. If under stress their red cells become elongated they will not pass through capillaries easily and the patient will develop severe pain from lack of oxygen delivery to specific organs or regions of the body. (Look up an image of a sickled red blood cell)
Red Blood Cells of Sickle Cell Anemia patient

Can you see why they call it “Sickle Cell” Anemia?

How does losing a lot of red blood cells when you sustain a major cut affect the body?
Directions: Use the information you learned about blood to answer the following questions.

1. What are the three major components of blood?
   a. ________________________________
   b. ________________________________
   c. ________________________________

2. What do we call the process by which we stop bleeding when we get a cut?
   __________________________________

3. Which component of blood contains clotting factors?
   __________________________________

4. What is the name of the disease where clotting factors are absent?
   __________________________________

5. What is the liquid part of blood called?
   __________________________________

6. List the five types of white blood cells.
   a. ________________________________
   b. ________________________________
   c. ________________________________
   d. ________________________________
   e. ________________________________

7. Why is it important that we have white blood cells?
   __________________________________
   __________________________________
8. Which white blood cells signal the other cells to attack?
___________________________________

9. Which white blood cells are immediately dispatched to fight infection; they are the largest of the white blood cells?
___________________________________

10. Which white blood cells prevent blood clots from forming too quickly?
___________________________________

11. Which white blood cells provide our main source of ‘immunity’?
___________________________________

12. Which white blood cells promote blood flow to the injured area of your body?
___________________________________

13. Which component of blood does NOT need to be tested for blood type before transfusing into a patient?
___________________________________

14. What is the other name for red blood cells?
___________________________________

15. What component of the red blood cell carries oxygen and carbon dioxide?
___________________________________

16. Where do red blood cells exchange oxygen for carbon dioxide?
___________________________________
Investigation 3.4B1 – Reflections
Blood Worksheet, page 3

Dr: _______________________

P: ___ Date: ________________

17. About what percent of your blood is made up of platelets and white blood cells?

____________________%

18. In which genetic disease are the red blood cells misshaped such that it is difficult for them to carry oxygen?

_________________________________________________________________________

19. Write a paragraph about Sickle Cell Anemia. Research information on the internet and provide evidence from your resources to back up your statements.

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________
Art Project: 1. Draw a picture that demonstrates all of the components of blood. 2. Then, draw two red blood cells side by side. The first should be a normal red blood cell and the second a sickled red blood cell. Label every cell in each drawing.

Draw all of the components of blood in the box below:

Draw normal red blood cells on the left and sickled red blood cells on the right:
Blood Typing Game

Directions:

1. Open your web browser and find this web site: https://www.nobelprize.org/educational/medicine/bloodtypinggame/
2. Click on “Play the Blood Typing Game”
3. Click on “Proceed”
4. Click on either “Quick Game” option
5. Select “Main Menu” (located in upper right of screen)
6. Use the Tutorials to learn about blood transfusions and answer the questions below.
7. Play the game to test your knowledge about blood transfusions. If your patient has a poor result, perhaps you should consider reviewing the tutorial material before playing again.

Answer the following questions related to your participation in the game:

1. Did you understand before playing this game the importance of matching the blood types of the donor and recipient of the blood transfusion?   Yes   No

2. In what year and by whom were human blood types discovered?
   Year:_______ Name:__________________________________

3. In what year and by whom were Rh antibodies discovered?
   Year:_______ Name:__________________________________

4. List the blood types: ______________________________________

5. List the Rh factors: __________________________

6. List the four basic components of blood:
   a. ______________________________________
   b. ______________________________________
   c. ______________________________________
   d. ______________________________________
7. Which blood type is considered the ‘universal donor’? _________________

8. Which blood type is considered the ‘universal recipient’? ________________

9. Describe the significance of ‘agglutination’ if it occurs when testing for blood type.
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________

10. Describe what can happen should a patient be given a transfusion containing the wrong blood type. (from tutorial #3)
    ___________________________________________________________________
    ___________________________________________________________________
    ___________________________________________________________________
    ___________________________________________________________________
    ___________________________________________________________________

11. Describe how the blood transfusion process today differs from how it was performed perhaps thirty years ago. (from tutorial #3)
    ___________________________________________________________________
    ___________________________________________________________________
    ___________________________________________________________________
    ___________________________________________________________________
Extra Credit Assignments:

1. Research three blood diseases and write about them.
2. Describe how a person’s blood type is determined.
3. Describe how seeing blood makes you feel.