You Are the Doctor!

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Supported by an AAI Teacher Summer Research Fellowship Award

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You Are the Doctor! (Teacher Guide)

I. Overview

A. Science concepts covered in this unit

Many times, a high school student's study of the immune system is little more than an extensive vocabulary lesson. In the activities described here, students are required to use more than just the vocabulary associated with the field. Students will need to use both the fundamental principles of immunology as well as critical thinking skills to solve a medical mystery. Because the students will be playing the role of medical "experts," they will come to know the facts--because they will need to use the facts.

B. General goals of the activities

In this series of activities, teams of students take on the roles of various medical professionals charged with diagnosing a particular patient. Each medical professional will initially perform their own "WebQuest," researching a specific condition, in order to become the expert in their "practice." They will prepare a pamphlet for use by their patients describing this condition. The Pediatric Oncologist will prepare a pamphlet on Acute Lymphocytic Leukemia (ALL). The Hematologist will research Infectious Mononucleosis (IM). The Rheumatologist will be responsible for writing the pamphlet on System Lupus Erythematosus (SLE). The Neurologist in the practice will research Multiple Sclerosis (MS).

Next, each team--or "practice"--will receive a cursory case history for a new patient with one of these immunological disorders. After reviewing the patient's chart, the practice will determine which tests they need to order. Upon receiving the results of these tests, the medical team will make a preliminary diagnosis and present their conclusions at a conference attended by the other physicians in their class.

C. Recommended placement for the materials within a biology course

These activities were designed for use during a first-year high school Biology course. Ideally, they would be employed in conjunction with a more traditional review of the structure and function of the human immune system. However, depending on the degree to which students are motivated to learn independently, these activities could be employed as the actual tools used for the teaching and learning of the structure and function of the human immune system.

D. What students will do and technical skills they will learn

This activity was designed--ultimately--to help students learn about the immune system while simulating the work of a team of physicians. It will work best with four students per group.

Students working individually will use information available on the internet to investigate the symptoms and treatments associated with one of four conditions associated with the immune system. Each student will summarize the information that they have obtained in the form of a pamphlet that could be distributed to their patients and their families.

They will then meet as a team--or "practice"--to discuss their individual findings. Next, they will review the information provided by a new patient and determine which additional information (i.e., tests) they need to order. Once they receive the results of these tests (provided by you!), they will meet together to reach a consensus as to what the disease is. Finally, they will present their conclusions as a team at a conference attended by the other physicians in their class. The students should be able to defend their conclusion with evidence during these five-minute presentations to the other physicians in the class.

To prevent premature conclusions, it is important that students complete their initial research independently and do not discuss their findings until their team meeting.

The symptoms that the patient is experiencing may be associated with several of the conditions researched by the student. However, the totality of the information in each case--including blood test results--point to one condition in particular.

E. Relevance to other science concepts and students' lives

Many students will not go on to become physicians. However, many will work in the allied health fields. These activities allow them to explore some of the skills and knowledge that allied health workers utilize in their positions.

More importantly, all of our students will be responsible for managing their own health care, as well as the health care of their children and other loved ones. It is essential that our students begin to understand how to obtain the biological and medical knowledge necessary to make informed decisions for themselves and their loved ones. The "WebQuest" practiced here allows them to practice the research skills they will need to expand and utilize in many areas of their personal lives.

II. Science Background

A. Explanation of content knowledge that may be unfamiliar to teachers

Acute Lymphocytic Leukemia (ALL): Acute leukemia results in the production and accumulation of large numbers of immature lymphocytes in the blood and bone marrow. White blood cell counts, normally between 5,000 and 10,000 cells/microliter, can be higher than 50,000. As a result, the bone marrow can't produce enough *normal* red blood cells, white blood cells or platelets. So, leukemia patients are often anemic, have difficulty fighting off infections, bruise and bleed easily. Most cases of leukemia occur in older adults. However, acute lymphocytic leukemia (ALL) accounts for 80% of all childhood leukemia cases. The peak incidence of ALL is in children between the ages of 2 and 5 years. ALL is slightly more common in males that females, and the incidence is higher among Americans of European descent that of African, Japanese, Chinese, and Korean descent. The disease is diagnosed using a combination of blood tests, bone marrow aspirates and biopsies. Lumbar punctures or spinal taps are also performed to determine the presence of leukemic cells in the CNS. The leukemia death rate for children in the US has decreased dramatically over the past thirty years, but it is still one of the leading causes of death for children under 15. The primary treatment for ALL is chemotherapy. Radiation therapy may be used in some cases. Bone marrow transplantation may be considered in the event of a relapse. Complete remission that lasts five years often indicates a cure.

Infectious Mononucleosis (IM): Mono is sometimes called the kissing disease. It is associated with the presence of the Epstein-Barr virus (EBV), which can be spread through contact with saliva (kissing, coughing, sneezing, sharing food + utensils). In the US, as many as 95% of people between the ages of 35 and 40 years of age have been infected with EBV. If someone is infected with EBV during his or her adolescent years, it causes IM 35-50% of the time. Most cases of IM (90%) are due to EBV infection--but most EBV infections do *not* result in IM. EBV infects the epithelial cells of the throat and salivary glands. B-cells (in the tonsils) may become infected and allow the virus to be spread to other areas of the body. The most common symptoms are fever, sore throat, and swollen lymph glands. Enlarged spleen and liver inflammation may also result. (90% of the unusual complication of a ruptured spleen occur in males.) Diagnosis is often based on the presence of these symptoms, as well as the age of the patient (the highest occurrence of IM is in those aged 15-25 years), and lab tests. Patients with IM often have an elevated WBC count (due mostly to T-cell responses), a differential of more than 50% lymphocytes, and an absolute lymphocyte count of more than 4500 cells per microliter. Decreased platelets and abnormal liver enzymes often occur. Testing for the presence of the virus itself is only used as a research tool. Clinically, EBV is tested for through a positive "Mono Spot" test and/or a positive Paul-Bunnell heterophile antibody test. The heterophile antibody is an IgM antibody produced by B-cells--but is not directed against EBV or EBV-infected cells specifically. Tests can be done against EBV-specific antibodies (antibodies to viral capsid antigen, EBV nuclear antigen, etc.)--but they are more expensive and time-

consuming. The symptoms of IM usually begin to decrease within three to four weeks--but patients may continue to feel fatigue for up to six months. Treatment mainly involves bed rest, fluid intake, and use of over-the-counter pain relievers. Antibiotics are ineffective against viral infections.

Systemic Lupus Erythematosus (SLE): SLE is a chronic, inflammatory, autoimmune disease. It occurs nine times more often in women than in men, and is seen more frequently in people of African-American, Indian, and Asian origin. It is often difficult to diagnose, because the symptoms may appear to indicate a variety of other conditions. In addition, different people will exhibit different combinations of symptoms. Common signs of lupus include a red rash on the face which worsens in sunlight, sensitivity to sunlight, swollen joints, arthritis, extreme fatigue, low blood (WBC + platelet) counts, trouble thinking/memory problems. Blood clots may form, due to the presence of anti-phospholipid antibodies, which target lipids involved in blood clotting. Inflammation of parts of the heart or the lining of the lung tissue may occur, resulting in chest pain. In more serious cases, kidney function may be affected, resulting in renal failure. The cause of autoimmune diseases is not yet known. Some researchers suspect that it begins after an infection by an antigen that is similar to self-proteins--which the body later attacks, mistaking them for the foreign invader. As indicated earlier, diagnosis is often difficult. There is no single test to diagnose lupus. However, blood tests often reveal lowered numbers of WBC's, RBC's, platelets, and blood complement levels. In addition, people with lupus may also test positive for antinuclear antibodies (ANA or FANA--immunofluorescent ANA), anti-double stranded anti-DNA antibodies, antiphospholipid antibodies. However, people with IM may test positive for ANA, also. Although some people with lupus do die from the disease, people with non-organ threatening disease usually live a normal lifespan. Although there is no cure for lupus, the individual symptoms may be treated. NSAIDS are used to treat the arthritic symptoms. Corticosteroid and other immunosuppressive therapies may be prescribed to control other symptoms of the disease.

Multiple Sclerosis (MS): Although a neurologic condition, MS, like lupus, is an inflammatory autoimmune disease. However, it is the CNS that is affected in MS. MS is more common in women than men, and more common in the white Americans than in African or Asian Americans. People of northern European descent may be genetically predisposed to MS. The most common symptoms of MS include fatigue, weakness or balance problems, numbness, vision loss, tremor and vertigo. Patients indicate that heat exacerbates these symptoms. Like lupus, not all patients have all of these symptoms--and the symptoms tend to come and go. Like lupus, MS it is often difficult to diagnose. This is because the signs and symptoms of MS are dependent on the location of the nerve lesions in the brain. MS results in the destruction of the myelin sheath surrounding the nerves of the CNS. The destruction is thought to be

caused by the body's immune system attacking the cells of the myelin sheath. This destruction leads to areas of demyelination or "plaques" or "lesions" in the brain and spinal cord. These plaques disrupt the transmission of information--and result in the symptoms seen in MS. The location of the lesions is associated with the specific symptoms that are exhibited. Currently, a diagnosis begins by *eliminating* other possibilities. Physicians must find evidence of lesions or plaques in at least two areas of the CNS. This is done (or confirmed) with a MRI of the brain. Evoked potential tests, which measure how quickly the brain responds to stimuli, may also be used. A spinal tap (or lumbar puncture) may be done. The cerebrospinal fluid may contain elevated levels of IgG antibodies (and a group of proteins called oligoclonal bands)--thought to be produced by the immune (B) cells activated within the CNS and attacking the myelin sheath. MS is not curable--but there are a number of therapies--both traditional and experimental that are currently employed. Corticosteroids can be used to decrease the visual symptoms. A variety of non-gamma interferons are used to treat MS. A number of other drugs (i.e., glatiramer acetate [perhaps acting as a myelin mimic], intravenous immunoglobulins, and chemotherapy agents) are utilized in different situations.

III. Student Outcomes + Learning Objectives

A. Learning Objectives

Upon completion of these activities, students should be able to:

1. apply an understanding of the workings of the immune system to diagnose a medical problem;
2. analyze data in the form of medical test results;
3. utilize the vocabulary of basic immunology in both written and oral contexts;

4. work in a team setting where success is dependent upon cooperation among "experts";
5. make a diagnosis using results from medical tests.

Besides what the students learn from their investigation, this activity should allow students to practice employing the following skills:

6. locating and evaluating web-based information;
7. note-taking skills;
8. investigative skills;
9. evaluating and interpreting evidence;
10. reaching a conclusion based on evidence.

B. How students will demonstrate specific knowledge and skills

Students working individually will be assigned one of the four conditions (ALL, IM, SER, MS) on which to become the team "expert." They will use information available on the internet to investigate the symptoms and treatments associated with one of four conditions associated with the immune system. Because of the vast amount of information available, specific websites--along with web addresses--have been identified for use by each "expert." This will enable students to simply click on the address--or, cut and paste the address into the web browser--rather than having to type in the specifics of each web address. Students will be provided with a summary sheet containing specific questions to help them organize their research as they work. Upon completion of the web-based research, each student will summarize the information that they have obtained in the form of a pamphlet that could be distributed to their patients and their families. [A potential rubric for scoring this pamphlet is provided.]

They will then meet as a team--or "practice"--to discuss their individual findings. Next, they will review the information provided on the chart of a new patient and determine which additional information (i.e., tests) they need to order. They will identify which tests they would like performed by completing the "Request for Tests" form. Once they receive the results of these tests, they will meet together to reach a consensus as to what the disease is. Finally, they will present their conclusions as a team at a conference attended by the other physicians in their class. The students should be able to defend their conclusion with evidence during these five-minute presentations to the other physicians in the class. [A potential rubric for scoring this presentation is provided.]

IV. Time Requirements

A. **Suggested time blocks** (for use in either single or double class periods)

Two to four single class periods will be needed for research and pamphlet preparation.

One period (or less) will be required for the initial meeting of the "practice" for the purpose of discussing the initial patient information and determining which tests should be requested.
An additional period will be required so that the practice may review the additional tests, make a diagnosis, and prepare their oral presentations.
Depending on the number of presentations (one per "practice"), one or two additional single class periods will be needed for the conference presentations.

V. Advance Preparation

A. List of equipment and materials [included as Appendices]

Student Instructions/ALL [word document]
Student Instructions/IM [word document]
Student Instructions/SER [word document]
Student Instructions/MS [word document]
Rubrics [word document]
Patient Chart/Beatriz, Isabelle [word document]
Patient Chart/Huang, Julia [word document]
Patient Chart/Hutchinson, Theo [word document]
Patient Chart/Leao, Donna [word document]
Patient Chart/Simondson, Nora [word document]
Patient Chart/Taylor, Miles [word document]
Test Results/Beatriz, Isabelle [word document]
Test Results/Huang, Julia [word document]
Test Results/Hutchinson, Theo [word document]
Test Results/Leao, Donna [word document]
Test Results/Simondson, Nora [word document]
Test Results/Taylor, Miles [word document]

B. Approximate preparation time

Teachers will need to allot between 1 and 2 hours to prepare the documents needed by the students [see below].

VI. Materials and Equipment

A. For each team of four students:

Part I:

4 computers with access to the internet and a printer
1 floppy disk/CD containing the "Student Instructions/ALL" + "Rubrics" folder
1 floppy disk/CD containing the "Student Instructions/IM" + "Rubrics" folder

1 floppy disk/CD containing the "Student Instructions/SER" + "Rubrics" folder
1 floppy disk/CD containing the "Student Instructions/MS" + "Rubrics" folder

Part II:

One "Patient Chart" (of the six different "Patient Charts" provided)--either in the form of a print-out or on disk
One "Request for Tests" form--either in the form of a print out or on disk
One "Conference Presentation Rubric"-- either in the form of a print out or on disk

B. Possible substitutes

1. If a server is available, the folders listed above could be loaded directly onto the server, allowing students to access the materials directly. This would avoid the time required to copy disks or burn CD's.
2. Instead of providing students with the documents on a floppy or CD, teachers could load the appropriate folders on the computers that the students will be using.

C. Explanation of equipment use

1. Students should be able to open the appropriate folder, click on the address of the website of interest, and be brought directly to the website listed. If this does NOT happen, students could be directed to type the address of the appropriate website into their browser. This will, however, often require a significant amount of additional time, and result in a number of technical problems--if only because of the limitations of keyboarding accuracy!

D. Precautions and safety

1. Several of the websites listed may include information for patients and their families concerning the sexual dysfunction associated with particular conditions or their treatments. If necessary, before beginning these activities, teachers should, therefore, review the websites to determine if any are inappropriate for their population.

VII. Student Prior Knowledge and Skills

A. Expected content knowledge

- Students should know that general composition of blood, and the function of the red blood cells, white blood cells, and platelets
- Students should be familiar with the general function of the immune system, including the difference between lymphocytes (B-cells, T-cells), and monocytes/macrophages.

- Students should understand the difference between antibodies and antigens

VIII. What is Expected From Students

A. Pamphlet

Each physician in the practice will be responsible for the development of the pamphlet describing the condition with which they have the most experience and training. The intended audience includes the patients, their friends and their families. The pamphlet topics are listed below:

- Pediatric Oncologist--Acute Lymphocytic Leukemia (ALL)
- Hematologist--Infectious Mononucleosis (IM)
- Rheumatologist--Systemic Lupus Erythematosus (SLE)
- Neurologist--Multiple Sclerosis (MS)

To prepare the pamphlet, each student will engage in web-based research. A summary sheet will help the students organize their research as they work--and a list of suggested websites for students to use is provided. The pamphlet that the student prepares should provide the required information in an understandable, clear, and concise manner. The pamphlet should address the following issues:

1. What is the common name of the disease?
2. Are there other name(s) for the disease?
3. What are some other types of diseases that are in the same category/group?
4. What are the signs and symptoms of this disease?
5. What are the causes of the disease? (Is it inherited? acquired?)
6. Can the disease be spread from one human to another?
7. If the disease *can* be spread from one person to another, how is it transmitted?
8. How is the disease diagnosed? (i.e., What tests should be ordered? What signs should you be looking for? What would be normal?)
9. What is the prevalence of the disease in the US? What is the prevalence of the disease in the world?
10. Among what groups of people is the disease most common? (Consider gender, ethnicity, age, etc.)
11. Is the disease lethal? (If yes, how often is it lethal?)
12. If the disease is lethal, what actually causes the victim to die?
13. What is the quality of life like following diagnosis?
14. How long does a patient usually survive after diagnosis?
15. How is the condition treated?
16. How is the immune system involved in this condition?
17. What is the focus of the current research on this disease?

[A potential rubric for scoring this pamphlet is provided.]

B. Conference Presentation

Once the web-based research has been completed, the practice will meet as a team. They will be provided with a chart containing information from a new patient. The four members of the practice will review the initial information provided by the patient and determine which tests they would like to order. Upon receiving the requested test results, the team will first make a preliminary diagnosis, and then a five-minute presentation of the case. The conference presentation should include the following:

- a concise, summative description of the patient, including the information that is relevant to the diagnosis;
- the diagnosis;
- an accurate, clear explanation providing evidence that supports the diagnosis and disproves a diagnosis of the three other conditions;
- one visual used during the presentation that enhances and clarifies the argument(s);
- a description of the appropriate course of treatment;
- participation by all members of the practice.

[A potential rubric for scoring this conference presentation is provided.]

IX. Anticipated Results

A. Beatriz, Isabelle

Diagnosis: Systemic Lupus Erythematosus (SER)

Evidence: Symptoms of lupus exhibited by patient include--swollen joints, fatigue, sensitivity to bright light, fever, previous rash on face, memory trouble. Test results--low RBC, Hgb, platelets, WBC with decreased lymphocytes, positive for presence of autoantibodies, complement level low

Other: Although symptoms exhibited by patient similar to IM, negative tests for EBV antigens, mono-spot test, and Paul-Bunnell heterophile antibody test rule that out

B. Huang, Julia

Diagnosis: Systemic Lupus Erythematosus (SER)

Evidence: Symptoms of lupus exhibited by patient include--swollen joints, fatigue, swollen lymph glands, sensitivity to bright light, fever, rash on face, memory trouble, weight loss, bruising. Test results--low RBC, Hgb, platelets, WBC with decreased lymphocytes, positive for presence of autoantibodies, complement level low

Other: Although symptoms exhibited by patient similar to IM, negative tests for EBV antigens, mono-spot test, and Paul-Bunnell heterophile antibody test rule that out

C. Hutchinson, Theo

Diagnosis: Acute Lymphocytic Leukemia (ALL).

Evidence: Symptoms of leukemia exhibited by patient include--fever, muscle and bone pain, fatigue, bruising, petechiae, swollen lymph glands, weight loss, sore throat, shortness of breath, pain in side which may be swollen spleen. Test results--high WBC, low RBC, Hgb, platelets, bone biopsy showing evidence of abnormal cell karyotype

Other: Although symptoms exhibited by patient similar to IM, WBC count very high, age of patient inconsistent with IM, negative tests for EBV antigens, mono-spot test, and Paul-Bunnell heterophile antibody test rule out IM.

D. Leao, Donna

Diagnosis: Acute Lymphocytic Leukemia (ALL).

Evidence: Symptoms of leukemia exhibited by patient include--fever, muscle and bone pain, fatigue, bruising, swollen lymph glands, weight loss, sore throat, shortness of breath, pain in side which may be swollen spleen. Test results--high WBC, low RBC, Hgb, platelets, bone biopsy showing evidence of abnormal cell karyotype

Other: Although symptoms exhibited by patient similar to IM, WBC count very high, age of patient inconsistent with IM, negative tests for EBV antigens, mono-spot test, and Paul-Bunnell heterophile antibody test rule out IM.

E. Simondson, Nora

Diagnosis: Multiple Sclerosis (MS).

Evidence: Symptoms of MS exhibited by patient include--vision problems, symptoms exacerbated in heat, fatigue, memory problems, tingling sensations in legs, loss of balance and muscle coordination. Test results--average WBC, RBC, Hgb, platelets, MRI lesions, decreased response time in evoked potentials, spinal tap results.

Other: Although symptoms exhibited by patient similar to lupus, average RBC, WBC, negative tests for autoantibodies, normal blood complement levels help to rule out lupus.

F. Taylor, Miles

Diagnosis: Infectious Mononucleosis (IM).

Evidence: Symptoms of mono exhibited by patient include--fever, sore throat, headaches, fatigue, swollen lymph glands, pain in side which may be swollen spleen, jaundice. Test results--modestly elevated WBC, high lymphocyte differential, low RBC, Hgb, platelets, increased bilirubin, positive tests for EBV antigens, mono-spot test, and Paul-Bunnell heterophile antibody test.

Other: Although symptoms exhibited by patient similar to lupus, rash may be allergic response to ampicillin; elevated WBC, negative tests for autoantibodies, normal blood complement levels help to rule out lupus.

X. Assessment

A. Pamphlet Rubric

Pamphlet Rubric--first page

Pamphlet Rubric--second page

Pamphlet Rubric--third page

B. Conference Presentation Rubric

Conference Presentation Rubric--first page

Conference Presentation Rubric--second page

XI. Appendices

A. Student Instructions/ALL

BIOLOGY Name_____

Unit V/Anatomy + Physiology Class_____

"You Are the Doctor!" Date_____

SETTING THE SCENE/Part I: You are a member of a small group practice of physicians that specializes in the diagnosis and treatment of conditions associated with the immune system. In your practice, there is one Pediatric Oncologist, one Hematologist, a Rheumatologist, and a Neurologist. Through your work with your patients, you realize that four of the conditions that you see and try to explain to your patients can be very confusing--and that the printed information you have to give them is often confusing, as well. As a result, your practice has decided to develop easy-to-read pamphlets describing these four conditions. Each physician in your practice will be responsible for the development of the pamphlet describing the condition with which they have the most experience and training. Your intended audience includes your patients, their friends and their families. The pamphlet topics are listed below:

- Pediatric Oncologist--Acute Lymphocytic Leukemia (ALL)
- Hematologist--Infectious Mononucleosis (IM)

- Rheumatologist--Systemic Lupus Erythematosus (SLE)
- Neurologist--Multiple Sclerosis (MS)

SETTING THE SCENE/Part II: Once your pamphlets have been completed, your practice will "meet" a new patient. The four members of the practice will review the initial information provided by the patient and determine which tests you need to order. Upon receiving the requested test results, your team will first make a preliminary diagnosis, and then a five-minute presentation of this case at a conference attended by the other physicians in your class!

YOUR GOALS: So, by the time you've completed these activities, you should be able to:

A. apply an understanding of the workings of the immune system to diagnose a medical problem;
B. analyze data in the form of medical test results;
C. understand and be able to utilize the vocabulary of basic immunology in both written and oral contexts;
D. work in a team setting where success is dependent upon cooperation among "experts";
E. make a diagnosis using results from medical tests.

You Are the Doctor/Part I

Preparing Your Pamphlet--ALL

In your practice, you are the **Pediatric Oncologist**. You specialize in the cancers of children. The pamphlet you will be preparing will describe the symptoms and treatments associated with **Acute Lymphocytic Leukemia (ALL).** To do that, you will need to do some web research. A summary sheet is attached that will help you organize your research as you work--and a list of suggested websites for you to visit are indicated below. But, raw information is not what your patients need right now. They need the information to be presented to them in an understandable, clear, and concise manner. And they need to be able to get this information in a way that is not confusing or difficult to follow. So, keep these goals in mind as you begin your research and design your pamphlet. [If *you* need more clarity on this, feel free to refer to the "Pamphlet Rubric" provided by your publisher!]

GENERAL RESOURCES

http://www.nlm.nih.gov/medlineplus/tutorials/leukemia.html

Start with this interactive tutorial describing ALL.

http://www.cancer.gov/cancer_information/cancer_type/leukemia/

Information from the National Cancer Institute (NCI)…

http://www.cancer.gov/cancerinfo/pdq/treatment/childALL/patient/
This is actually a link from the NCI website above. It is the PDQ provided for parents and families….

http://cancer.gov/cancerinfo/pdq/treatment/childALL/healthprofessional

This, too, is a link from the NCI website—but it contains information for health professionals…so it is pretty technical. For those who dare to try…!

http://www.emedicine.com/ped/topic2587.htm

More technical medical stuff about ALL….

http://www.leukemia.org/all_page?item_id=9346#_signsandsymptoms

The Leukemia Organization provides, among other things, background info for people living with leukemia….

http://www.patientcenters.com/leukemia/news/leukfaq.html

This material was written by Nancy Keene, whose daughter is an eight-year survivor of high-risk, ALL. Material at this site was adapted from Nancy's book, *Childhood Leukemia: A Guide for Families, Friends, and Caregivers*.

SPECIALIZED RESOURCES

1. If you need info about normal blood counts—and problematic counts…

http://www.nlm.nih.gov/medlineplus/ency/article/003642.htm

http://www.lymphomainfo.net/tests/bloodcounts.html

http://www.patientcenters.com/leukemia/news/BloodCounts.html

http://www.leukemia-lymphoma.org/all_mat_detail.adp?item_id=9452&sort_order=4&cat_id=

2. For info about bone marrow biopsies…

http://www.cancerguide.org/pathology.html

Use this sheet to summarize what you have learned about diseases associated with the immune system

1. What is the common name of the disease?
2. Are there other name(s) for the disease?
3. What are some other types of diseases that are in the same category/group?
4. What are the signs and symptoms of this disease?
5. What are the causes of the disease? (Is it inherited? acquired?)
6. Can the disease be spread from one human to another?
7. If the disease *can* be spread from one person to another, how is it transmitted?
8. How is the disease diagnosed? (i.e., What tests should be ordered? What signs should you be looking for? What would be normal?)
9. What is the prevalence of the disease in the US? What is the prevalence of the disease in the world?

10. Among what groups of people is the disease most common? (Consider gender, ethnicity, age, etc.)

11. Is the disease lethal? (If yes, how often is it lethal?)

12. If the disease is lethal, what actually causes the victim to die?

13. What is the quality of life like following diagnosis?

14. How long does a patient usually survive after diagnosis?

15. How is the condition treated?

16. How is the immune system involved in this condition?

17. What is the focus of the current research on this disease?

You Are the Doctor/Part II

Diagnosing the Patient!

1. Provide the other members of your "practice" with a copy of the pamphlet you prepared. They will each give you a copy of the three they produced. At home, review each pamphlet, and come to class with any questions you still need answered.

2. In class, spend about 15 minutes with the other members of your practice clarifying any questions that came up during the pamphlet reviews.

3. Next, obtain copies of the "Patient Chart" for the patient assigned to your practice. Each member of the practice should read through the information, looking for evidence (i.e., "symptoms") that seem to point in the direction of one of the four conditions you have researched.

4. What additional information would you like to have? What additional tests need to be performed? (Remember--we are in a health care crisis! The patient's health insurance company--if they *have* health insurance to begin with!!--will not pay for extravagant tests. In addition, you do not want to make patients submit to uncomfortable or painful tests if it is not necessary….Choose your test requests *wisely*….) As a team, complete and submit the attached "Request For Tests" form.

5. Reconvene the "practice" when the test results are available. What is your tentative diagnosis? Why? What evidence do you have in support of this diagnosis? What

evidence do you have that disproves a diagnosis of one of the remaining three conditions? What are some suggested treatments?

6. Once the "practice" has been able to answer these questions, prepare a short (4-5 minute) presentation of this case to be made at a conference attended by the other physicians in your class. Your conference presentation should include the following:

    - a concise, summative description of the patient, including the information that is relevant to your diagnosis;
    - your diagnosis;
    - an accurate, clear explanation providing evidence that supports your diagnosis and disproves a diagnosis of the three other conditions;
    - one visual used during the presentation that enhances and clarifies your argument(s);
    - a description of the appropriate course of treatment;
    - participation by all members of the practice.

    If *you* need more clarity on this presentation, feel free to refer to the "Conference Presentation Rubric" provided by the conference organizers!

B. **Student Instructions/IM**

BIOLOGY Name_____

Unit V/Anatomy + Physiology Class_____

"You Are the Doctor!" Date_____

SETTING THE SCENE/Part I: You are a member of a small group practice of physicians that specializes in the diagnosis and treatment of conditions associated with the immune system. In your practice, there is one Pediatric Oncologist, one Hematologist, a Rheumatologist, and a Neurologist. Through your work with your patients, you realize that four of the conditions that you see and try to explain to your patients can be very confusing--and that the printed information you have to give them is often confusing, as well. As a result, your practice has decided to develop easy-to-read pamphlets describing these four conditions. Each physician in your practice will be responsible for the development of the pamphlet describing the condition with which they have the most experience and training. Your intended audience includes your patients, their friends and their families. The pamphlet topics are listed below:

- Pediatric Oncologist--Acute Lymphocytic Leukemia (ALL)
- Hematologist--Infectious Mononucleosis (IM)
- Rheumatologist--Systemic Lupus Erythematosus (SLE)
- Neurologist--Multiple Sclerosis (MS)

SETTING THE SCENE/Part II: Once your pamphlets have been completed, your practice will "meet" a new patient. The four members of the practice will review the initial information provided by the patient and determine which tests you need to order. Upon receiving the requested test results, your team will first make a preliminary

diagnosis, and then a five-minute presentation of this case at a conference attended by the other physicians in your class!

YOUR GOALS: So, by the time you've completed these activities, you should be able to:

A. apply an understanding of the workings of the immune system to diagnose a medical problem;
B. analyze data in the form of medical test results;
C. understand and be able to utilize the vocabulary of basic immunology in both written and oral contexts;
D. work in a team setting where success is dependent upon cooperation among "experts";
E. make a diagnosis using results from medical tests.

You Are the Doctor/Part I

Preparing Your Pamphlet--IM

In your practice, you are the **Hematologist**. You specialize in the study of blood-related disorders. The pamphlet you will be preparing will describe the symptoms and treatments associated with **Infectious Mononucleosis (IM).** To do that, you will need to do some web research. A summary sheet is attached that will help you organize your research as you work--and a list of suggested websites for you to visit are indicated below. But, raw information is not what your patients need right now. They need the information to be presented to them in an understandable, clear, and concise manner. And they need to be able to get this information in a way that is not confusing or difficult to follow. So, keep these goals in mind as you begin your research and design your pamphlet. [If *you* need more clarity on this, feel free to refer to the "Pamphlet Rubric" provided by your publisher!]

GENERAL RESOURCES

http://www.nlm.nih.gov/medlineplus/tutorials/_instruct/instructions.html?ModuleURL=epsteinbarrandmono&LMModuleID=id299101&x=131&y=18

Start with the interactive tutorial describing IM.

http://www.nlm.nih.gov/medlineplus/infectiousmononucleosis.html

Information from the National Institutes of Health (NIH)--your tax dollars at work!

http://www.cdc.gov/ncidod/diseases/ebv.htm

This is part of the CDC--Center for Disease Control--website.

http://www.mayoclinic.com/invoke.cfm?id=DS00352

This is an easy-to-navigate, informative, website from the internationally renowned Mayo Clinic.

http://www.health.state.ny.us/nysdoh/communicable_diseases/en/infect.htm

Some general information about communicable diseases from the state of New York….

http://www.emedicine.com/emerg/topic319.htm

This site contains information for health professionals…so it is pretty technical. For those who dare to try…!

SPECIALIZED RESOURCES

1. If you need info about normal blood counts—and problematic counts…

http://www.nlm.nih.gov/medlineplus/ency/article/003642.htm

http://www.lymphomaininfo.net/tests/bloodcounts.html

http://www.patientcenters.com/leukemia/news/BloodCounts.html

http://www.leukemia-lymphoma.org/all_mat_detail.adp?item_id=9452&sort_order=4&cat_id=

2. For info about the mono test…

http://www.labtestsonline.org/understanding/analytes/mono/test.html

B. For links to information about antibody and immunofluorescence tests, try this site. It is a fairly simple site. But it does have some interesting images.

http://health.yahoo.com/health/encyclopedia/000591/0.html

Use this sheet to summarize what you have learned about diseases associated with the immune system

1. What is the common name of the disease?
2. Are there other name(s) for the disease?
3. What are some other types of diseases that are in the same category/group?
4. What are the signs and symptoms of this disease?
5. What are the causes of the disease? (Is it inherited? acquired?)
6. Can the disease be spread from one human to another?
7. If the disease *can* be spread from one person to another, how is it transmitted?
8. How is the disease diagnosed? (i.e., What tests should be ordered? What signs should you be looking for? What would be normal?)
9. What is the prevalence of the disease in the US? What is the prevalence of the disease in the world?
10. Among what groups of people is the disease most common? (Consider gender, ethnicity, age, etc.)
11. Is the disease lethal? (If yes, how often is it lethal?)
12. If the disease is lethal, what actually causes the victim to die?
13. What is the quality of life like following diagnosis?

14. How long does a patient usually survive after diagnosis?

15. How is the condition treated?

16. How is the immune system involved in this condition?

17. What is the focus of the current research on this disease?

You Are the Doctor/Part II

Diagnosing the Patient!

1. Provide the other members of your "practice" with a copy of the pamphlet you prepared. They will each give you a copy of the three they produced. At home, review each pamphlet, and come to class with any questions you still need answered.

2. In class, spend about 15 minutes with the other members of your practice clarifying any questions that came up during the pamphlet reviews.

3. Next, obtain copies of the "Patient Chart" for the patient assigned to your practice. Each member of the practice should read through the information, looking for evidence (i.e., "symptoms") that seem to point in the direction of one of the four conditions you have researched.

4. What additional information would you like to have? What additional tests need to be performed? (Remember--we are in a health care crisis! The patient's health insurance company--if they *have* health insurance to begin with!!--will not pay for extravagant tests. In addition, you do not want to make patients submit to uncomfortable or painful tests if it is not necessary….Choose your test requests *wisely*….) As a team, complete and submit the attached "Request For Tests" form.

5. Reconvene the "practice" when the test results are available. What is your tentative diagnosis? Why? What evidence do you have in support of this diagnosis? What evidence do you have that disproves a diagnosis of one of the remaining three conditions? What are some suggested treatments?

6. Once the "practice" has been able to answer these questions, prepare a short (4-5 minute) presentation of this case to be made at a conference attended by the other physicians in your class. Your conference presentation should include the following:

- a concise, summative description of the patient, including the information that is relevant to your diagnosis;
- your diagnosis;
- an accurate, clear explanation providing evidence that supports your diagnosis and disproves a diagnosis of the three other conditions;
- one visual used during the presentation that enhances and clarifies your argument(s);
- a description of the appropriate course of treatment;
- participation by all members of the practice.

If *you* need more clarity on this presentation, feel free to refer to the " Conference Presentation Rubric" provided by the conference organizers!

C. Student Instructions/MS

BIOLOGY Name_____

Unit V/Anatomy + Physiology Class_____

"You Are the Doctor!" Date_____

SETTING THE SCENE/Part I: You are a member of a small group practice of physicians that specializes in the diagnosis and treatment of conditions associated with the immune system. In your practice, there is one Pediatric Oncologist, one Hematologist, a Rheumatologist, and a Neurologist. Through your work with your patients, you realize that four of the conditions that you see and try to explain to your patients can be very confusing--and that the printed information you have to give them is often confusing, as well. As a result, your practice has decided to develop easy-to-read pamphlets describing these four conditions. Each physician in your practice will be responsible for the development of the pamphlet describing the condition with which they have the most experience and training. Your intended audience includes your patients, their friends and their families. The pamphlet topics are listed below:

- Pediatric Oncologist--Acute Lymphocytic Leukemia (ALL)
- Hematologist--Infectious Mononucleosis (IM)
- Rheumatologist--Systemic Lupus Erythematosus (SLE)
- Neurologist--Multiple Sclerosis (MS)

SETTING THE SCENE/Part II: Once your pamphlets have been completed, your practice will "meet" a new patient. The four members of the practice will review the initial information provided by the patient and determine which tests you need to order. Upon receiving the requested test results, your team will first make a preliminary diagnosis, and then a five-minute presentation of this case at a conference attended by the other physicians in your class!

YOUR GOALS: So, by the time you've completed these activities, you should be able to:

A. apply an understanding of the workings of the immune system to diagnose a medical problem;
B. analyze data in the form of medical test results;
C. understand and be able to utilize the vocabulary of basic immunology in both written and oral contexts;
D. work in a team setting where success is dependent upon cooperation among "experts";
E. make a diagnosis using results from medical tests.

You Are the Doctor/Part I

Preparing Your Pamphlet--MS

In your practice, you are the **Neurologist**. You specialize in the study of disorders of the nervous system. The pamphlet you will be preparing will describe the symptoms and treatments associated with **Multiple Sclerosis (MS).** To do that, you will need to do some web research. A summary sheet is attached that will help you organize your research as you work--and a list of suggested websites for you to visit are indicated below. But, raw information is not what your patients need right now. They need the information to be presented to them in an understandable, clear, and concise manner. And they need to be able to get this information in a way that is not confusing or difficult to follow. So, keep these goals in mind as you begin your research and design your pamphlet. [If *you* need more clarity on this, feel free to refer to the "Pamphlet Rubric" provided by your publisher!]

GENERAL RESOURCES

http://www.nlm.nih.gov/medlineplus/tutorials/multiplesclerosis.html

Start with the interactive tutorial describing MS.

http://www.nlm.nih.gov/medlineplus/multiplesclerosis.html

Information from the National Institutes of Health (NIH)--your tax dollars at work!

http://www.ninds.nih.gov/health_and_medical/pubs/multiple_sclerosis.htm

Even more from the NIH….

http://www.mayoclinic.com/invoke.cfm?id=DS00188

This is an easy-to-navigate, informative, website from the internationally renowned Mayo Clinic.

http://www.nationalmssociety.org/Brochures-Just%20the.asp

The National Multiple Sclerosis Society provides, among other things, background info for people living with MS. This provides a link to their FAQ ("Frequently Asked Questions") page.

http://www.msfacts.org/faqs.htm

This is a link to the FAQ page of a different organization that provides info to people living with MS….

http://www.understandingms.com/ms/multiple-sclerosis-intro.asp

Here, you will find webcasts with MS doctors. Transcripts are available.

http://medlib.med.utah.edu/kw/ms/

This website is designed for med students and other doctors in training, so it tends to be pretty technical….

http://www.emedicine.com/aaem/topic316.htm

This site also contains information for health professionals…so, again, it can be pretty technical. For those who dare to try…!

SPECIALIZED RESOURCES

1. If you need info about normal blood counts—and problematic counts…

http://www.nlm.nih.gov/medlineplus/ency/article/003642.htm

http://www.lymphomaininfo.net/tests/bloodcounts.html

http://www.patientcenters.com/leukemia/news/BloodCounts.html

http://www.leukemia-lymphoma.org/all_mat_detail.adp?item_id=9452&sort_order=4&cat_id=

Use this sheet to summarize what you have learned about diseases associated with the immune system

1. What is the common name of the disease?
2. Are there other name(s) for the disease?
3. What are some other types of diseases that are in the same category/group?
4. What are the signs and symptoms of this disease?
5. What are the causes of the disease? (Is it inherited? acquired?)
6. Can the disease be spread from one human to another?
7. If the disease *can* be spread from one person to another, how is it transmitted?
8. How is the disease diagnosed? (i.e., What tests should be ordered? What signs should you be looking for? What would be normal?)
9. What is the prevalence of the disease in the US? What is the prevalence of the disease in the world?
10. Among what groups of people is the disease most common? (Consider gender, ethnicity, age, etc.)
11. Is the disease lethal? (If yes, how often is it lethal?)
12. If the disease is lethal, what actually causes the victim to die?
13. What is the quality of life like following diagnosis?
14. How long does a patient usually survive after diagnosis?
15. How is the condition treated?
16. How is the immune system involved in this condition?

17. What is the focus of the current research on this disease?

You Are the Doctor/Part II

Diagnosing the Patient!

1. Provide the other members of your "practice" with a copy of the pamphlet you prepared. They will each give you a copy of the three they produced. At home, review each pamphlet, and come to class with any questions you still need answered.

2. In class, spend about 15 minutes with the other members of your practice clarifying any questions that came up during the pamphlet reviews.

3. Next, obtain copies of the "Patient Chart" for the patient assigned to your practice. Each member of the practice should read through the information, looking for evidence (i.e., "symptoms") that seem to point in the direction of one of the four conditions you have researched.

4. What additional information would you like to have? What additional tests need to be performed? (Remember--we are in a health care crisis! The patient's health insurance company--if they *have* health insurance to begin with!!--will not pay for extravagant tests. In addition, you do not want to make patients submit to uncomfortable or painful tests if it is not necessary….Choose your test requests *wisely*….) As a team, complete and submit the attached "Request For Tests" form.

5. Reconvene the "practice" when the test results are available. What is your tentative diagnosis? Why? What evidence do you have in support of this diagnosis? What evidence do you have that disproves a diagnosis of one of the remaining three conditions? What are some suggested treatments?

6. Once the "practice" has been able to answer these questions, prepare a short (4-5 minute) presentation of this case to be made at a conference attended by the other physicians in your class. Your conference presentation should include the following:

    - a concise, summative description of the patient, including the information that is relevant to your diagnosis;
    - your diagnosis;
    - an accurate, clear explanation providing evidence that supports your diagnosis and disproves a diagnosis of the three other conditions;

- one visual used during the presentation that enhances and clarifies your argument(s);
- a description of the appropriate course of treatment;
- participation by all members of the practice.

If *you* need more clarity on this presentation, feel free to refer to the " Conference Presentation Rubric" provided by the conference organizers!

D. Student Instructions/SLE

BIOLOGY Name_____

Unit V/Anatomy + Physiology Class_____

"You Are the Doctor!" Date_____

SETTING THE SCENE/Part I: You are a member of a small group practice of physicians that specializes in the diagnosis and treatment of conditions associated with the immune system. In your practice, there is one Pediatric Oncologist, one Hematologist, a Rheumatologist, and a Neurologist. Through your work with your patients, you realize that four of the conditions that you see and try to explain to your patients can be very confusing--and that the printed information you have to give them is often confusing, as well. As a result, your practice has decided to develop easy-to-read pamphlets describing these four conditions. Each physician in your practice will be responsible for the development of the pamphlet describing the condition with which they have the most experience and training. Your intended audience includes your patients, their friends and their families. The pamphlet topics are listed below:

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- Hematologist--Infectious Mononucleosis (IM)
- Rheumatologist--Systemic Lupus Erythematosus (SLE)
- Neurologist--Multiple Sclerosis (MS)

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D. work in a team setting where success is dependent upon cooperation among "experts";
E. make a diagnosis using results from medical tests.

You Are the Doctor/Part I

Preparing Your Pamphlet--SLE

In your practice, you are the **Rheumatologist**. You specialize in the study of arthritis and other diseases of the joints, muscles and bones. The pamphlet you will be preparing will describe the symptoms and treatments associated with **Systemic Lupus Erythematosus (SLE).** To do that, you will need to do some web research. A summary sheet is attached that will help you organize your research as you work--and a list of suggested websites for you to visit are indicated below. But, raw information is not what your patients need right now. They need the information to be presented to them in an understandable, clear, and concise manner. And they need to be able to get this information in a way that is not confusing or difficult to follow. So, keep these goals in mind as you begin your research and design your pamphlet. [If *you* need more clarity on this, feel free to refer to the "Pamphlet Rubric" provided by your publisher!]

GENERAL RESOURCES

http://www.nlm.nih.gov/medlineplus/tutorials/lupus.html

Start with the interactive tutorial describing Lupus.

http://www.nlm.nih.gov/medlineplus/ency/article/000435.htm

Information from the National Institutes of Health (NIH)--your tax dollars at work!

http://www.lupus.org/education/overview.html

The Lupus Foundation provides, among other things, background info for people living with lupus…

http://www.emedicine.com/aaem/topic293.htm

This site contains information for health professionals…so it can be pretty technical. For those who dare to try…!

http://www.niams.nih.gov/hi/topics/lupus/slehandout/index.htm

At this site, you will find some general information about lupus from the National Institute of Arthritis and Muscular Disease (NIAMS).

http://www.niams.nih.gov/hi/topics/lupus/shades/index.htm

This, too, is a link from NIAMS--with information especially for people living with lupus.

http://www.rheumatology.org/patients/factsheet/sle.html

A fact sheet from the American College of Rheumatologists.

http://www.acponline.org/journals/annals/15dec98/curlupus.htm

"New Approaches for Treatment of Systemic Lupus Erythematosus." This is a fairly complex article--but immunologically interesting…

SPECIALIZED RESOURCES

1. If you need info about normal blood counts—and problematic counts…

http://www.nlm.nih.gov/medlineplus/ency/article/003642.htm

http://www.lymphomaininfo.net/tests/bloodcounts.html

http://www.patientcenters.com/leukemia/news/BloodCounts.html

http://www.leukemia-lymphoma.org/all_mat_detail.adp?item_id=9452&sort_order=4&cat_id=

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5. What are the causes of the disease? (Is it inherited? acquired?)
6. Can the disease be spread from one human to another?
7. If the disease *can* be spread from one person to another, how is it transmitted?
8. How is the disease diagnosed? (i.e., What tests should be ordered? What signs should you be looking for? What would be normal?)
9. What is the prevalence of the disease in the US? What is the prevalence of the disease in the world?
10. Among what groups of people is the disease most common? (Consider gender, ethnicity, age, etc.)
11. Is the disease lethal? (If yes, how often is it lethal?)
12. If the disease is lethal, what actually causes the victim to die?
13. What is the quality of life like following diagnosis?
14. How long does a patient usually survive after diagnosis?
15. How is the condition treated?
16. How is the immune system involved in this condition?
17. What is the focus of the current research on this disease?

You Are the Doctor/Part II

Diagnosing the Patient!

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2. In class, spend about 15 minutes with the other members of your practice clarifying any questions that came up during the pamphlet reviews.

3. Next, obtain copies of the "Patient Chart" for the patient assigned to your practice. Each member of the practice should read through the information, looking for evidence (i.e., "symptoms") that seem to point in the direction of one of the four conditions you have researched.

4. What additional information would you like to have? What additional tests need to be performed? (Remember--we are in a health care crisis! The patient's health insurance company--if they *have* health insurance to begin with!!--will not pay for extravagant tests. In addition, you do not want to make patients submit to uncomfortable or painful tests if it is not necessary….Choose your test requests *wisely*….) As a team, complete and submit the attached "Request For Tests" form.

5. Reconvene the "practice" when the test results are available. What is your tentative diagnosis? Why? What evidence do you have in support of this diagnosis? What evidence do you have that disproves a diagnosis of one of the remaining three conditions? What are some suggested treatments?

6. Once the "practice" has been able to answer these questions, prepare a short (4-5 minute) presentation of this case to be made at a conference attended by the other physicians in your class. Your conference presentation should include the following:

    - a concise, summative description of the patient, including the information that is relevant to your diagnosis;
    - your diagnosis;
    - an accurate, clear explanation providing evidence that supports your diagnosis and disproves a diagnosis of the three other conditions;
    - one visual used during the presentation that enhances and clarifies your argument(s);
    - a description of the appropriate course of treatment;
    - participation by all members of the practice.

If *you* need more clarity on this presentation, feel free to refer to the " Conference Presentation Rubric" provided by the conference organizers!

F. Patient Chart/Beatriz, Isabelle

Patient Chart

1. **Name:** Isabelle Beatriz
2. **Sex:** female
3. **Age:** 21
4. **Race:** African-American + Hispanic
5. **Home:** Detroit, MI; currently in college at the University of Massachusetts/Amherst
6. **Number of Children:** none
7. **Initial complaint:** swollen hands and wrists
8. **When did the symptoms first appear?** earlier in the month
9. **Have other family members showed similar symptoms?** no
10. **Have any friends experienced similar symptoms?** no
11. **Have you traveled outside the country in the last 6 months?** Toronto, Ontario CANADA, week of December 25, 2002
12. **Have you taken any medications (over-the-counter or prescription) recently?** nothing
13. **How do you feel today?** swollen hands and wrists; exhaustion

14. Specific Complaints:

Symptom	Comments
Appetite loss?	No
Breathing difficulty or shortness of breath?	No
Bright lights--discomfort looking into?	Headaches when in bright light
Bruising?	Same as always; patient indicates that she bruises easily
Chest pain?	No
Chills?	No
Cough?	No
Depression or trouble thinking?	Patient indicates that she feels as though her memory is worsening
Diarrhea?	No
Fatigue?	Yes--lately, all the time
Fever?	Yes--on and off for the last few weeks
Glands swollen?	No
Headaches?	Headaches when in bright light
Jaundice?	No
Joint or muscle or bone pain?	Swollen joints in hands and wrists
Memory problems?	Patient indicates that she feels as though her memory is worsening
Muscle coordination or balance problems?	No
Nausea or vomiting?	No
Numbness or tingling sensations?	No
Petechiae?	No
Rash?	Not currently. Patient indicates that she had a bumpy rash on her nose and cheeks earlier in the month
Side or abdominal pain?	No
Skin lesions?	No--with exception of rash indicated above
Sore throat?	No
Prolonged thirst?	No
Weight loss?	Yes

Request For Tests

Patient Name: _____

Doctors' Names: _____

Blood Tests

TEST	RESULTS	REQUESTED?
Red Blood Cell (RBC) Count		
Hemoglobin (Hgb) Concentration		
Hematocrit (Packed Cell Volume or PCV)		
White Blood Cell (WBC) Count		
WBC Differential Values: Segmented neutrophils Band neutrophils Basophils Eosinophils Lymphocytes Monocytes		
Absolute Neutrophil Count (ANC)		
Lymphocyte Count		
Platelet Count		
Bilirubin (total)		

Other

TEST	RESULTS	REQUESTED?
Bone biopsy		
Other--please indicate:		

F. Patient Chart/Huang Julia

Patient Chart

1. **Name:** Julia Huang
2. **Sex:** female
3. **Age:** 17
4. **Race:** Chinese-American
5. **Home:** Boston, MA
6. **Number of Children:** none
7. **Initial complaint:** red rash on face
8. **When did the symptoms first appear?** ca. 1 week ago
9. **Have other family members showed similar symptoms?** no
10. **Have any friends experienced similar symptoms?** no
11. **Have you traveled outside the country in the last 6 months?** Toronto, Ontario CANADA, week of December 25, 2002
12. **Have you taken any medications (over-the-counter or prescription) recently?** Tylenol only
13. **How do you feel today?** Joint aches, low-grade fever, fatigue

14. Specific Complaints:

Symptom	Comments
Appetite loss?	Yes, sometimes
Breathing difficulty or shortness of breath?	Sometimes
Bright lights--discomfort looking into?	Sometimes
Bruising?	No more than usual
Chest pain?	Sometimes when breathing
Chills?	Sometimes with fever
Cough?	No
Depression or trouble thinking?	Patient indicates no; mother says patient is oddly inattentive recently and sometimes can't concentrate or loses her words
Diarrhea?	No
Fatigue?	Yes--lately, all the time
Fever?	Yes (less than 100 degrees)
Glands swollen?	Patient responds negatively; physician appreciates some swelling
Headaches?	No
Jaundice?	No
Joint or muscle or bone pain?	Swollen joints in hands; muscle aches
Memory problems?	Patient indicates no; mother says patient is oddly inattentive recently and sometimes can't concentrate or loses her words
Muscle coordination or balance problems?	No
Nausea or vomiting?	Sometimes
Numbness or tingling sensations?	No
Petechiae?	No
Rash?	Yes--reddish rash on face; worsens when in sun
Side or abdominal pain?	No
Skin lesions?	No--with exception of rash indicated above
Sore throat?	No
Prolonged thirst?	No
Weight loss?	Maybe

Request For Tests

Patient Name: _____

Doctors' Names: _____

Blood Tests

TEST	RESULTS	REQUESTED?
Red Blood Cell (RBC) Count		
Hemoglobin (Hgb) Concentration		
Hematocrit (Packed Cell Volume or PCV)		
White Blood Cell (WBC) Count		
WBC Differential Values: Segmented neutrophils Band neutrophils Basophils Eosinophils Lymphocytes Monocytes		
Absolute Neutrophil Count (ANC)		
Lymphocyte Count		
Platelet Count		
Bilirubin (total)		

Other

TEST	RESULTS	REQUESTED?
Bone biopsy		
Other--please indicate:		

G. Patient Chart/Hutchinson, Theo

Patient Chart

1. **Name:** Theo Hutchinson
2. **Sex:** male
3. **Age:** 5
4. **Race:** Caucasian
5. **Home:** Rochester, MA
6. **Number of Children:** none
7. **Initial complaint:** constant fatigue, fever, sore throat
8. **When did the symptoms first appear?** 3-4 weeks ago
9. **Have other family members showed similar symptoms?** no
10. **Have any friends experienced similar symptoms?** no
11. **Have you traveled outside the country in the last 6 months?** Toronto, Ontario CANADA, week of December 25, 2002
12. **Have you taken any medications (over-the-counter or prescription) recently?** children's tylenol + amoxicillin for sore throat
13. **How do you feel today?** fatigue, fever, sore throat, pale
14. **Specific Complaints:**

Symptom	Comments
Appetite loss?	Yes
Breathing difficulty or shortness of breath?	Yes--seems to tire quickly
Bright lights--discomfort looking into?	No
Bruising?	Yes--but, Mom reminds us that he is 5!
Chest pain?	No
Chills?	Sometimes--with fever
Cough?	No
Depression or trouble thinking?	No
Diarrhea?	No
Fatigue?	Yes
Fever?	Yes--today 100 degrees (has been febrile on and off for past 3 weeks)
Glands swollen?	Yes
Headaches?	No
Jaundice?	No
Joint or muscle or bone pain?	Theo says he hurts "inside [his] arms and legs"
Memory problems?	No
Muscle coordination or balance problems?	No
Nausea or vomiting?	No
Numbness or tingling sensations?	No
Petechiae?	Yes--eyes
Rash?	No
Side or abdominal pain?	He has complained about a pain in his side--but not today
Skin lesions?	Yes--cuts and bruises--but he's 5!
Sore throat?	Yes
Prolonged thirst?	No
Weight loss?	Possibly

Request For Tests

Patient Name: _____

Doctors' Names: _____

Blood Tests

TEST	RESULTS	REQUESTED?
Red Blood Cell (RBC) Count		
Hemoglobin (Hgb) Concentration		
Hematocrit (Packed Cell Volume or PCV)		
White Blood Cell (WBC) Count		
WBC Differential Values: Segmented neutrophils Band neutrophils Basophils Eosinophils Lymphocytes Monocytes		
Absolute Neutrophil Count (ANC)		
Lymphocyte Count		
Platelet Count		
Bilirubin (total)		

Other

TEST	RESULTS	REQUESTED?
Bone biopsy		
Other--please indicate:		

H. Patient Chart/Leao, Donna

<u>Patient Chart</u>

1. **Name:** Donna Leao
2. **Sex:** female
3. **Age:** 9
4. **Race:** Caucasian
5. **Home:** Taunton, MA
6. **Number of Children:** none
7. **Initial complaint:** on-going fever
8. **When did the symptoms first appear?** 2 weeks ago
9. **Have other family members showed similar symptoms?** no
10. **Have any friends experienced similar symptoms?** no
11. **Have you traveled outside the country in the last 6 months?** Toronto, Ontario CANADA, week of December 25, 2002
12. **Have you taken any medications (over-the-counter or prescription) recently?** children's tylenol
13. **How do you feel today?** fatigue, fever, sore throat

14. **Specific Complaints:**

Symptom	Comments

Appetite loss?	Maybe
Breathing difficulty or shortness of breath?	Patient says no, bu Mom states that patient seems to tire quickly
Bright lights--discomfort looking into?	No
Bruising?	Yes--arms and legs
Chest pain?	No
Chills?	Today--due to fever?
Cough?	No
Depression or trouble thinking?	No
Diarrhea?	No
Fatigue?	Yes
Fever?	Yes--today 101 degrees (has been febrile on and off for past 2 weeks)
Glands swollen?	Yes
Headaches?	No
Jaundice?	No
Joint or muscle or bone pain?	Patient states that, today, yes
Memory problems?	No
Muscle coordination or balance problems?	No
Nausea or vomiting?	No
Numbness or tingling sensations?	No
Petechiae?	No
Rash?	No
Side or abdominal pain?	Physician appreciates some tenderness
Skin lesions?	Bruises only
Sore throat?	Yes
Prolonged thirst?	No
Weight loss?	Yes--since last visit to doctor 3 months ago

Request For Tests

Patient Name: _____

Doctors' Names: _____

Blood Tests

TEST	RESULTS	REQUESTED?
Red Blood Cell (RBC) Count		
Hemoglobin (Hgb) Concentration		
Hematocrit (Packed Cell Volume or PCV)		
White Blood Cell (WBC) Count		
WBC Differential Values: Segmented neutrophils Band neutrophils Basophils Eosinophils Lymphocytes Monocytes		
Absolute Neutrophil Count (ANC)		
Lymphocyte Count		
Platelet Count		
Bilirubin (total)		

Other

TEST	RESULTS	REQUESTED?
Bone biopsy		
Other--please indicate:		

I. Patient Chart/Simondson, Nora

<u>Patient Chart</u>

1. **Name:** Nora Simondson
2. **Sex:** female
3. **Age:** 37
4. **Race:** Caucasian
5. **Home:** Abington, MA (recently relocated from Sweden)
6. **Number of Children:** two
7. **Initial complaint:** blurred, hazy vision
8. **When did the symptoms first appear?** about six months ago--but worsened while in the Caribbean on vacation, recently
9. **Have other family members showed similar symptoms?** no
10. **Have any friends experienced similar symptoms?** no
11. **Have you traveled outside the country in the last 6 months?** Caribbean, week of December 25, 2002
12. **Have you taken any medications (over-the-counter or prescription) recently?** nothing
13. **How do you feel today?** tired, but vision seems OK today

14. Specific Complaints:

Symptom	Comments
Appetite loss?	No
Breathing difficulty or	No

shortness of breath?	
Bright lights--discomfort looking into?	No
Bruising?	No
Chest pain?	No
Chills?	No
Cough?	No
Depression or trouble thinking?	Patient indicates that she feels as though she can't concentrate well. Sometimes she says she loses her train of thought.
Diarrhea?	No
Fatigue?	Yes--lately, all the time
Fever?	No
Glands swollen?	No
Headaches?	No
Jaundice?	No
Joint or muscle or bone pain?	No
Memory problems?	Patient indicates that she feels as though she can't concentrate well. Sometimes she says she loses her train of thought.
Muscle coordination or balance problems?	Patient indicates that she feels dizzy at unexpected times. She also states that she is dropping things more than usual.
Nausea or vomiting?	No
Numbness or tingling sensations?	Yes--"pins and needles" in right thigh from time to time
Petechiae?	No
Rash?	No
Side or abdominal pain?	No
Skin lesions?	No
Sore throat?	No
Prolonged thirst?	No
Weight loss?	No

Request For Tests

Patient Name: _____

Doctors' Names: _____

Blood Tests

TEST	RESULTS	REQUESTED?
Red Blood Cell (RBC) Count		
Hemoglobin (Hgb) Concentration		
Hematocrit (Packed Cell Volume or PCV)		
White Blood Cell (WBC) Count		
WBC Differential Values: Segmented neutrophils Band neutrophils Basophils Eosinophils Lymphocytes Monocytes		
Absolute Neutrophil Count (ANC)		
Lymphocyte Count		
Platelet Count		
Bilirubin (total)		

Other

TEST	RESULTS	REQUESTED?
Bone biopsy		
Other--please indicate:		

J. Patient Chart/Taylor, Miles

Patient Chart

1. Name: Miles Taylor

2. **Sex:** male
3. **Age:** 15
4. **Race:** African-American
5. **Home:** Brockton, MA
6. **Number of Children:** none
7. **Initial complaint:** fever, sore throat, fatigue
8. **When did the symptoms first appear?** 2-3 weeks ago
9. **Have other family members showed similar symptoms?** Younger sister had sore throat a month ago
10. **Have any friends experienced similar symptoms?** no
11. **Have you traveled outside the country in the last 6 months?** Toronto, Ontario CANADA, week of December 25, 2002
12. **Have you taken any medications (over-the-counter or prescription) recently?** Tylenol + sister's ampicillin or amoxicillin (patient unsure which antibiotic consumed)
13. **How do you feel today?** Sore throat, exhaustion, low fever

14. Specific Complaints:

Symptom	Comments
Appetite loss?	Yes
Breathing difficulty or shortness of breath?	Not really
Bright lights--discomfort	No

looking into?	
Bruising?	No
Chest pain?	No
Chills?	Sometimes--with fever
Cough?	No
Depression or trouble thinking?	No
Diarrhea?	No
Fatigue?	Yes
Fever?	Yes (100-102 degrees)
Glands swollen?	Yes
Headaches?	Yes--on and off
Jaundice?	Patient responds negatively; physician notes some yellow cast in sclera
Joint or muscle or bone pain?	Yes--aches throughout
Memory problems?	No
Muscle coordination or balance problems?	No
Nausea or vomiting?	No
Numbness or tingling sensations?	No
Petechiae?	Patient responds negatively; physician notes petechiae on roof of mouth
Rash?	Yes--reddish rash on chest + neck
Side or abdominal pain?	Patient responds negatively; physician appreciates some tenderness
Skin lesions?	No--with exception of rash indicated above
Sore throat?	Yes--patient indicates that it was worse earlier in the week, but appears to be improving
Prolonged thirst?	No
Weight loss?	Not appreciable

Request For Tests

Patient Name: _____

Doctors' Names: _____

Blood Tests

TEST	RESULTS	REQUESTED?
Red Blood Cell (RBC) Count		
Hemoglobin (Hgb) Concentration		
Hematocrit (Packed Cell Volume or PCV)		
White Blood Cell (WBC) Count		
WBC Differential Values: Segmented neutrophils Band neutrophils Basophils Eosinophils Lymphocytes Monocytes		
Absolute Neutrophil Count (ANC)		
Lymphocyte Count		
Platelet Count		
Bilirubin (total)		

Other

TEST	RESULTS	REQUESTED?
Bone biopsy		
Other--please indicate:		

K. Test Results/Beatriz, Isabelle

Request For Tests

Patient Name: Isabelle Beatriz

Doctors' Names: _____

Blood Tests

TEST	RESULTS	REQUESTED?
Red Blood Cell (RBC) Count	3.9 million cells per microliter	
Hemoglobin (Hgb) Concentration	11.5 grams per deciliter	
Hematocrit (Packed Cell Volume or PCV)	.35 or 35%	
White Blood Cell (WBC) Count	3,600 cells per microliter	
WBC Differential Values: Segmented neutrophils Band neutrophils Basophils Eosinophils Lymphocytes Monocytes	 50% 2% 1% 3% 40% 4%	
Absolute Neutrophil Count (ANC)	.52 x 3,600 = 1872 cells per microliter	
Lymphocyte Count	.4 x 3,500 = 1440 cells per microliter	
Platelet Count	85,000 platelets per microliter	
Bilirubin (total)	1.0 mg/dl	

Other

TEST	RESULTS	REQUESTED?
Bone biopsy	Karyotype--**normal**; no hyperdiploidy	
Other--please indicate:	MRI--**no** MS lesions observed	

	Lumbar puncture/Spinal Tap-- **no** indication of leukemic cells; **no** presence of IgG antibodies, breakdown products of myelin, or proteins [oligoclonal bands] Evoked potentials--response time **normal** "mono spot" test--**negative** Paul-Bunnell heterophile antibody test--**not elevated; negative** Antibodies to EBV-associated antigens [i.e., viral capsid antigen, early antigen, EBV nuclear antigen (EBNA)]--**negative** Autoantibody tests [i.e., anti-nuclear antibody, antiphospholipid antibody, anti-ds anti DNA test, anti-Smith test]--**positive** Blood complement values--**low** Lupus erythematosus cell test--results not available; not used today	

L. Test Results/Huang, Julia

Request For Tests

Patient Name: _____Julia Huang_____

Doctors' Names: _____

Blood Tests

TEST	RESULTS	REQUESTED?
Red Blood Cell (RBC) Count	4.0 million cells per microliter	
Hemoglobin (Hgb) Concentration	11.5 grams per deciliter	
Hematocrit (Packed Cell Volume or PCV)	.35 or 35%	
White Blood Cell (WBC) Count	3,500 cells per microliter	
WBC Differential Values: Segmented neutrophils Band neutrophils Basophils Eosinophils Lymphocytes Monocytes	 50% 2% 1% 3% 40% 4%	
Absolute Neutrophil Count (ANC)	.52 x 3,500 = 1820 cells per microliter	
Lymphocyte Count	.4 x 3,500 = 1400 cells per microliter	
Platelet Count	90,000 platelets per microliter	
Bilirubin (total)	1.0 mg/dl	

Other

TEST	RESULTS	REQUESTED?
Bone biopsy	Karyotype--**normal**; no hyperdiploidy	

Other--please indicate:	MRI--**no** MS lesions observed Lumbar puncture/Spinal Tap-- **no** indication of leukemic cells; **no** presence of IgG antibodies, breakdown products of myelin, or proteins [oligoclonal bands] Evoked potentials--response time **normal** "mono spot" test--**negative** Paul-Bunnell heterophile antibody test--**not elevated; negative** Antibodies to EBV-associated antigens [i.e., viral capsid antigen, early antigen, EBV nuclear antigen (EBNA)]--**negative** Autoantibody tests [i.e., anti-nuclear antibody, antiphospholipid antibody, anti-ds anti DNA test, anti-Smith test]--**positive** Blood complement values--**low** Lupus erythematosus cell test--results not available; not used today	

M. Test Results/Hutchinson, Theo

Request For Tests

Patient Name: _____Theo Hutchinson_____

Doctors' Names: _____

Blood Tests

TEST	RESULTS	REQUESTED?
Red Blood Cell (RBC) Count	2.5 million cells per microliter	
Hemoglobin (Hgb) Concentration	9.0 grams per deciliter	
Hematocrit (Packed Cell Volume or PCV)	.27 or 27%	
White Blood Cell (WBC) Count	40,000 cells per microliter	
WBC Differential Values: Segmented neutrophils Band neutrophils Basophils Eosinophils Lymphocytes Monocytes	 40% 2% 1% 3% 50% 4%	
Absolute Neutrophil Count (ANC)		
Lymphocyte Count		
Platelet Count	85,000 platelets per microliter	
Bilirubin (total)	1.0 mg/dl	

Other

TEST	RESULTS	REQUESTED?
Bone biopsy	Karyotype-- **hyperdiploidy,** more than 50 chromosomes/cell DNA index--more than 1.16	

Other--please indicate:	MRI--**no** MS lesions observed Lumbar puncture/Spinal Tap-- **no** indication of leukemic cells; **no** presence of IgG antibodies, breakdown products of myelin, or proteins [oligoclonal bands] Evoked potentials--response time **normal** "mono spot" test--**negative** Paul-Bunnell heterophile antibody test--**not elevated; negative** Antibodies to EBV-associated antigens [i.e., viral capsid antigen, early antigen, EBV nuclear antigen (EBNA)]--**negative** Autoantibody tests [i.e., anti-nuclear antibody, antiphospholipid antibody, anti-ds anti DNA test, anti-Smith test]--**negative** Blood complement values--**normal** Lupus erythematosus cell test--results not available; not used today	

N. Test Results/Leao, Donna

Request For Tests

Patient Name: _____Donna Leao_____

Doctors' Names: _____

Blood Tests

TEST	RESULTS	REQUESTED?
Red Blood Cell (RBC) Count	2.5 million cells per microliter	
Hemoglobin (Hgb) Concentration	8.0 grams per deciliter	
Hematocrit (Packed Cell Volume or PCV)	.24 or 24%	
White Blood Cell (WBC) Count	50,000 cells per microliter	
WBC Differential Values: Segmented neutrophils Band neutrophils Basophils Eosinophils Lymphocytes Monocytes	 40% 2% 1% 3% 50% 4%	
Absolute Neutrophil Count (ANC)		
Lymphocyte Count		
Platelet Count	90,000 platelets per microliter	
Bilirubin (total)	1.0 mg/dl	

Other

TEST	RESULTS	REQUESTED?
Bone biopsy	Karyotype-- **hyperdiploidy,** more than 50 chromosomes/cell DNA index--more than 1.16	
Other--please indicate:	MRI--**no** MS lesions observed Lumbar puncture/Spinal Tap-- **no** indication of leukemic cells; **no**	

	presence of IgG antibodies, breakdown products of myelin, or proteins [oligoclonal bands] Evoked potentials--response time **normal** "mono spot" test--**negative** Paul-Bunnell heterophile antibody test--**not elevated; negative** Antibodies to EBV-associated antigens [i.e., viral capsid antigen, early antigen, EBV nuclear antigen (EBNA)]--**negative** Autoantibody tests [i.e., anti-nuclear antibody, antiphospholipid antibody, anti-ds anti DNA test, anti-Smith test]--**negative** Blood complement values--**normal** Lupus erythematosus cell test--results not available; not used today	

O. Test Results/Simondson, Nora

Request For Tests

Patient Name: _____Nora Simondson_____

Doctors' Names: _____

Blood Tests

TEST	RESULTS	REQUESTED?
Red Blood Cell (RBC) Count	4.8 million cells per microliter	

Hemoglobin (Hgb) Concentration	13.6 grams per deciliter	
Hematocrit (Packed Cell Volume or PCV)	.41 or 41%	
White Blood Cell (WBC) Count	7,000 cells per microliter	
WBC Differential Values: Segmented neutrophils Band neutrophils Basophils Eosinophils Lymphocytes Monocytes	 50% 2% 1% 2% 41% 4%	
Absolute Neutrophil Count (ANC)	.52 x 3,600 = 1872 cells per microliter	
Lymphocyte Count	.41 x 7,000 = 2870 cells per microliter	
Platelet Count	250,000 platelets per microliter	
Bilirubin (total)	1.0 mg/dl	

Other

TEST	RESULTS	REQUESTED?
Bone biopsy	Karyotype--**normal**; no hyperdiploidy	
Other--please indicate:	MRI--MS **lesions observed** Lumbar puncture/Spinal Tap-- **increased** presence of IgG antibodies, breakdown products of myelin, and proteins [oligoclonal bands]; **no** indication of	

	leukemic cells Evoked potentials--**response time lower** than normal "mono spot" test--**negative** Paul-Bunnell heterophile antibody test--**not elevated; negative** Antibodies to EBV-associated antigens [i.e., viral capsid antigen, early antigen, EBV nuclear antigen (EBNA)]--**negative** Autoantibody tests [i.e., anti-nuclear antibody, antiphospholipid antibody, anti-ds anti DNA test, anti-Smith test]--**negative** Blood complement values--**normal** Lupus erythematosus cell test--results not available; not used today	

P. Test Results/Taylor, Miles

Request For Tests

Patient Name: Miles Taylor

Doctors' Names: _____

Blood Tests

TEST	RESULTS	REQUESTED?
Red Blood Cell (RBC) Count	4.0 million cells per microliter	

Hemoglobin (Hgb) Concentration	13 grams per deciliter	
Hematocrit (Packed Cell Volume or PCV)	.40 or 40%	
White Blood Cell (WBC) Count	20,000 cells per microliter	
WBC Differential Values: Segmented neutrophils Band neutrophils Basophils Eosinophils Lymphocytes Monocytes	 37% 2% 1% 2% 53% 5%	
Absolute Neutrophil Count (ANC)	.39 x 20,000 = 7800 cells per microliter	
Lymphocyte Count	.53 x 20,000 = 10,600 cells per microliter	
Platelet Count	100,000 platelets per microliter	
Bilirubin (total)	2.5 mg/dl	

Other

TEST	RESULTS	REQUESTED?
Bone biopsy	Karyotype--**normal**; no hyperdiploidy	
Other--please indicate:	MRI--**no** MS lesions observed Lumbar puncture/Spinal Tap-- **no** indication of leukemic cells; **no** presence of IgG antibodies, breakdown products of myelin, or proteins	

	[oligoclonal bands] Evoked potentials--**response time normal** "mono spot" test--**positive** Paul-Bunnell heterophile antibody test--**elevated, positive** Antibodies to EBV-associated antigens [i.e., viral capsid antigen, early antigen, EBV nuclear antigen (EBNA)]--**positive** Autoantibody tests [i.e., antiphospholipid antibody, anti-ds anti DNA test, anti-Smith test]--**negative** **BUT,** anti-nuclear antibody [an autoantibody] was **positive first time, negative second time**	