

**Student Handout**  
**Challenging the Immune System: Summary Table**

Name: \_\_\_\_\_

*Directions:* meet in jig saw teaching groups and teach your group about the disorder researched while working through your case study. Be sure to fill out this summary table when the other members are teaching you about each disorder. Your teacher may collect this as a formal assessment of your understanding.

<b>Disorder:</b>	<b>HIV/AIDS</b>	<b>Leukemia</b>	<b>Lymphoma</b>	<b>Sickle Cell Anemia</b>
Symptoms				
Causes (genetic vs. environmental)				
Diagnosis				

<b>Disorder:</b>	<b>HIV/AIDS</b>		<b>Lymphoma</b>	<b>Sickle Cell Anemia</b>
Cells involved				
Types/variations of the disorder				
Treatment options				

**Teacher Handout with Answers**

Name: \_\_\_\_\_

**Challenging the Immune System: Summary Table**

*Most answers will include variation depending on the type of research and sources students used.*

Disorder:	HIV/AIDS	Leukemia	Lymphoma	Sickle Cell Disease
Symptoms	<p>Rapid weight loss, dry cough, recurring fever, profuse night sweats, profound and unexplained fatigue, swollen lymph glands in the armpits, groin, or neck, diarrhea that lasts for more than a week, white spots/unusual blemishes on the tongue, mouth, or throat, pneumonia, red, brown, pink, or purplish blotches on or under the skin, memory loss, depression, and other neurological disorders</p>	<p>Weakness , feeling tired , weight loss , fever, night sweats, enlarged lymph nodes (felt as lumps under the skin) , pain or a sense of "fullness" in the belly, excess bruising, bleeding, frequent or severe nosebleeds, and bleeding gums.</p>	<p>Sometimes no symptoms besides lumps under or near skin and cough or trouble breathing. Other symptoms include: night sweats, weight loss, fever, itching, tiredness, and poor appetite.</p> <p>Symptoms depend on location in body; there may be swollen tender areas or personality changes if in brain.</p>	<p>Sickle cell causes anemia. The sickle cells also block the flow of blood through vessels, resulting in lung tissue damage that causes acute chest syndrome, pain episodes, and stroke. It also causes damage to the spleen, kidneys and liver. The damage to the spleen makes patient easily overwhelmed by bacterial infections.</p>
Causes (genetic vs. environmental)	<p><i>HIV</i> (human immunodeficiency virus). This is the virus that causes AIDS. HIV is different from most other viruses because it attacks the immune system. HIV finds and destroys a type of white blood cell (T cells or CD4 cells) that the immune system must have to fight disease.</p> <p>HIV is transmitted in 3 main ways:</p> <ul style="list-style-type: none"> <li>• Having sex with someone infected with HIV</li> <li>• Sharing needles/syringes with someone infected.</li> <li>• Being exposed (fetus or infant) to HIV before or during birth or through breast feeding</li> </ul>	<p>No single known cause for all of the different types of leukemia. Being a cancer, it results from somatic mutations in the DNA which disrupts the regulation of cell death, differentiation or division. These mutations may occur spontaneously or as a result of exposure to radiation or carcinogenic substances; they are likely to be influenced by genetic factors</p>	<p>Non-Hodgkin: linked with a many risk factors; most times the causes are unknown. DNA mutations are usually acquired after birth as a result of exposure to radiation, cancer-causing chemicals, or infections, but often these mutations occur for no apparent reason.</p> <p>Hodgkin: not known with certainty. Linked with: infection by Epstein-Barr virus; leading to DNA changes in B lymphocytes → development of the Reed-Sternberg cell and Hodgkin disease.</p>	<p>Sickle cell disease is caused by a mutation in the hemoglobin-Beta gene found on chromosome 11. Hemoglobin transports oxygen from the lungs to other parts of the body. Red blood cells with normal hemoglobin (hemoglobin-A) are smooth and round and glide through blood vessels.</p> <p>In people with sickle cell disease, abnormal hemoglobin molecules - hemoglobin S - stick to one another and form long, rod-like structures. These structures cause red blood cells to become stiff, assuming a sickle shape. Their shape causes these red blood cells to pile up, causing blockages and damaging vital organs and tissue.</p>

Disorder:	HIV/AIDS	Leukemia	Lymphoma	Sickle Cell Anemia
Diagnosis	<p>When infected, the body starts to produce antibodies. HIV tests look for these antibodies rather than the virus itself. There are many different kinds of HIV tests, including rapid tests and home test kits.</p>	<p><b>Blood tests-</b> to look for abnormal amounts of white blood. <b>Full blood count-</b> to establish the numbers of different blood cells. <b>Differential blood count-</b> % of immature leukemic "blast" cells. Acute leukemia [ALL] or [AML]: too many leukocytes too few erythrocytes/or too few platelets.</p>	<p>Non-Hodgkin: Biopsy of lymphoma; samples and fluids looked at under a microscope to study appearance, size, and shape of the cells and how the cells are arranged. Blood tests to note high levels of lactate dehydrogenase. MRI, ultrasound, PET scan, etc. to look for lymphoma.</p> <p>Hodgkin: biopsy of lymph node; pathology observations to look for Reed-Sternberg cells</p>	<p>Blood tests- checks for hemoglobin S. Next, a sample of blood is examined under a microscope to check for large numbers of sickled RBC.</p> <p>In more than 40 states, testing for the defective sickle cell gene is routinely performed on newborns.</p> <p>Sickle cell disease can also be detected in an unborn baby via amniocentesis and gene testing.</p>
Cells involved	<p>HIV finds and destroys a type of white blood cell (T cells or CD4 cells) that the immune system must have to fight disease.</p>	<p>Low levels of neutrophils, excess numbers of lymphocytes, shortage of blood platelets</p> <p><i>acute:</i> increase of immature blood cells</p> <p><i>chronic:</i> excessive build up of relatively mature, but still abnormal, white blood cells</p>	<p>Starts in lymphoid tissue (lymph or lymphatic tissue). Most lymphomas (85%) start in the B cells. There are also many subtypes and stages of development of B and T cells.</p> <p>Hodgkin: The cancer cells are called <i>Reed-Sternberg cells</i>. They are usually an abnormal type of B lymphocyte. They are much larger than normal lymphocytes and also look different from the cells of NH lymphomas and other cancers.</p>	<p>The abnormal hemoglobin causes the red blood cells (erythrocytes) to become C-shaped and stiff.</p>

<p>Types/variations of the disorder</p>	<p>People with <i>HIV</i> have what is called HIV infection. Some of these people will develop AIDS as a result of their HIV infection.</p> <p><i>AIDS</i> (acquired immunodeficiency syndrome). AIDS= final stage of HIV infection. Can take years for a person infected with HIV to reach this stage. Virus has weakened the immune system to the point at which the body has a difficult time fighting infection.</p>	<p>Acute lymphocytic leukemia (ALL), Acute myeloid (myelogenous) leukemia (AML), Childhood Leukemia , Chronic lymphocytic leukemia (CLL), Chronic myelogenous leukemia (CML)</p>	<p>Non-Hodgkin:</p> <ol style="list-style-type: none"> <li>1. Diffuse large B-cell lymphoma</li> <li>2. Follicular lymphoma</li> </ol> <p>Hodgkin:</p> <ol style="list-style-type: none"> <li>1. Classic HD Nodular sclerosis, mixed cellularity, lymphocyte-rich, or lymphocyte-depleted</li> <li>2. Nodular lymphocyte predominant HD</li> </ol>	<p>A baby born with sickle cell disease inherits a gene for the disorder from both parents.</p> <p>With only one copy of the defective gene (from either parent), a person will not typically get the full blown disease, but can pass the defective gene on to children.</p>
<p>Treatment options</p>	<p>A panel of leading AIDS specialists has developed recommendations for the use of anti-retroviral medications in people with HIV. This aggressive approach is known as highly active anti-retroviral therapy (HAART).</p> <p>None of these drugs can cure HIV/AIDS, many have side effects that can be severe, and most are expensive.</p> <p>The treatment guidelines also emphasize the importance of quality of life.</p>	<p>Most forms of leukemia are treated with pharmaceutical medications. Some are also treated with radiation therapy. In some cases, a bone marrow transplant is useful. Bone marrow from healthy, genetically compatible sibling donors.</p>	<p>The 2 main methods of treating Hodgkin disease are chemotherapy (the use of cancer-killing drugs) and radiation therapy (the use of high-energy rays or particles). High-dose chemotherapy with stem cell transplants is also an option.</p> <p>There has been much progress in treating non-Hodgkin lymphoma. The treatment options for people with lymphoma depend on the type of lymphoma and its stage, as well as the other prognostic factors of the lymphoma: surgery, radiation, chemotherapy, immunotherapy, and bone marrow/peripheral blood stem cell transplants.</p>	<p>Treatments include antibiotics, pain management and blood transfusions. A new drug, hydroxyurea, which is an anti-tumor drug, appears to stimulate the production of fetal hemoglobin, a type of hemoglobin usually found only in newborns. Fetal hemoglobin helps prevent the "sickling" of red blood cells.</p> <p>The only cure for sickle cell disease is bone marrow transplantation. However only about 18 percent of children with sickle cell disease have a healthy, matched sibling donor.</p> <p>Researchers are experimenting with gene therapy.</p>