**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Berlin Patient**

Read the following abstract and the resource that follows. After reading both, complete the questions and chart on the next page.

**Original Article**

Long-Term Control of HIV by CCR5 Delta32/Delta32 Stem-Cell Transplantation

Gero Hütter, M.D., Daniel Nowak, M.D., Maximilian Mossner, B.S., Susanne Ganepola, M.D., Arne Müßig, M.D., Kristina Allers, Ph.D., Thomas Schneider, M.D., Ph.D., Jörg Hofmann, Ph.D., Claudia Kücherer, M.D., Olga Blau, M.D., Igor W. Blau, M.D., Wolf K. Hofmann, M.D., and Eckhard Thiel, M.D.

N Engl J Med 2009; 360:692-698, February 12, 2009; DOI: 10.1056/NEJMoa0802905

**Abstract**

Infection with the human immunodeficiency virus type 1 (HIV-1) requires the presence of a CD4 receptor and a chemokine receptor, principally chemokine receptor 5 (CCR5). Homozygosity for a 32-bp deletion in the CCR5 allele provides resistance against HIV-1 acquisition. We transplanted stem cells from a donor who was homozygous for CCR5 delta32 in a patient with acute myeloid leukemia and HIV-1 infection. The patient remained without viral rebound 20 months after transplantation and discontinuation of antiretroviral therapy. This outcome demonstrates the critical role CCR5 plays in maintaining HIV-1 infection.

====================================================================================

**Useful resource to explore**:

<http://defeathiv.org/berlin/>

**Case Analysis Sheet**

1. ***Recognize potential issues and major topics in this case.*** What is the case about? Highlight terms or phrases that seem to be important to understanding the case.

2. ***What specific questions do you have about these topics?*** Fill in the table below. To do this, first, by yourself, then with the people at your table, make a list of what you already know that is related to the case in the *What Do I Know* column. List questions you would like to learn more about in *What Do I Need to Know*? Column.

|  |  |
| --- | --- |
| ***What Do I Know*** | ***What Do I Need to Know?*** |
|  |  |

3. Put a check mark by 1-3 questions or issues in the *What Do I Need to Know?* Column that you think are the most important to explore.

Modified from M. Waterman and E. Stanley, 2008, *Biological Inquiry,* Benjamin Cummings

Permission to reproduce for educational purposes only.

Once you have identified your question to research, you will develop a claim backed by evidence and reasoning. Use the following template to help guide your argument.

**Claim-Evidence-Reasoning**

|  |
| --- |
| **Questions asked** |
|  |
| **Observations** *(phenomena, data, measurements)* | **Inferences** (*generalization, patterns, laws, data displays, model-based predictions)* | **Scientific Explanations** *(hypotheses, models, theories)* |
|  |  |  |
| **Claim** *(Your claim should answer the question)* |
|  |
| **Explanation** *(Link the observations, inferences and scientific explanation to support your claim.)* |
|  |
| **Limitations and error analysis** *(What additional evidence would you need to make your claim stronger?)* |
|  |

Adapted from *BSCS Middle School Science* Copyright © 2012 BSCS adapted from McNeill, K. L. and J. Krajcik (2008). *J. Res. Sci. Teach.* 45(1): 53-78 for use in the AP Biology Leadership Academy. Anderson CW (2003) Teaching science for motivation and understanding. Retrieved <https://www.msu.edu/~andya/TEScience/Assets/Files/TSMU.pdf>.

Permission granted for personal education use. All other rights reserved.

Refer to the following rubrics to assess your progress.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **5** | **4** | **3** | **2** | **1** |
| **Question** | Is narrowly focused and is answerable | Language is more general focused. It is answerable. | Is answerable but not focused enough | Is answerable but not clear or focused. It may have a variety of different answers. | Is too broad and impractical. |
| **Claim** | Clearly stated and specific | Is stated in a more general way. | Is stated but it may be ambiguous or overreaching | Not as clearly stated.  | Doesn’t make sense or it doesn’t answer the question. |
| **Evidence****(2X)** | Contains accurate data and summarizes trends. Inferences are drawn clearly from research. Known scientific explanations are tied to both the inferences and research. | All data is present and summarized. There may be some minor errors. All variables are accounted for.Inferences are drawn clearly from data. Known scientific explanations are tied to either the inferences and observations | All data is present and summaries are adequateInferences are drawn clearly from observations and research. Known scientific explanations may be incorrect, missing or difficult to tie in. | Errors in reporting research with poor or missing summaries. All variables are accounted for. Inferences are present but may not be clearly stated. Known scientific explanations  | Inaccurate and/or missing information. No summaries or inferences may be present. If present, they are inappropriate. Scientific explanations are missing or incorrect. |
| **Reasoning****(2X)** | Develops a methodical, powerful, and thorough plan for supporting the evidence. The approach and answers are explicitly detailed and reasonable throughout (whether or not the knowledge used is sophisticated or accurate). Claims are justified with compelling evidence and argument: counter-arguments, questionable data, and implicit premises are explored. | Develops fully a methodical plan for supporting the claim. The approach taken is appropriate, well-thought out, and based on reasonable data and strategies. Evidence and argument for most claims are provided, and the quality of the argument is high. All important reasoning is explicit and logical, though one or two implicit premises may not have been considered. Even when there is limited knowledge, all the reasons are logical and appropriate. | Grasps the problem adequately and develops an acceptable plan for solving it. All important variables have been considered, though the arguments may be incomplete. The problem-solving plan may be inefficient: the final write-up of the research and analysis may have gaps or illogical organization of steps. Some arguments along the way may not be reasonable ones, but the work provides evidence that this was recognized. | Provides a barely adequate plan for solving the problem, and/or fails to consider certain critical aspects of the problem in the overall strategy. Even when work is thorough, the reasoning may not be sound, suggesting that the student is working with limited understanding of the meaning of the research and the logic of supporting a point. There is a semblance of sequential steps and organization of data into a meaningful result, but no clear overall strategy of supporting and explaining the evidence | The student has failed to come up with any clear, appropriate, and/or reasonable strategy for explaining or compiling the research. There is a semblance of proof or logic only: randomness or inappropriate or unsupported arguments comprise the reasoning. |
| **Limitation** | Cites specific types of evidence that would strengthen the claim. Explains clearly how to obtain that evidence and how it would impact the claim. | Cites at least one type of evidence that would strengthen the claim. Explains generally how to obtain that evidence and how it would impact the claim. | Cites at least one type of evidence that would strengthen the claim. Explains generally how that evidence would impact the claim. | Cites at least one type of evidence that would strengthen the claim. Is unclear as to how to obtain the evidence or the impact it would make on the claim. | Speaks in generalities of how to strengthen the claim. |

Modified from a rubric used by the Olathe East High School Science Department, Olathe, KS, which was modified from a rubric used by the Colorado Spring School District Science Department.

Retrieved from <http://gilsonscience.weebly.com/uploads/2/1/1/4/21140528/lab_rubric.pdf>