SKILL BUILDER THREE

CONFLICTING VIEWPOINTS

Passage I

How are white blood cells formed?

Human blood contains many different types of cells, including red blood cells (RBCs) and several types of white blood cells (WBCs). Most of these blood cells are formed in the bone marrow. There are numerous theories regarding the formation of the different types of white blood cells. In particular, scientists and physicians have questioned whether all white blood cells arise from one single parent cell known as a universal stem cell, or if each type of white blood cell has its own individual family with separate parent stem cells.

Scientist 1

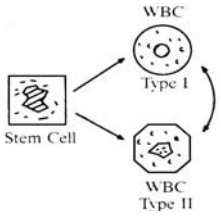
Small samples of circulating blood and bone marrow can be taken from normal healthy persons and carefully examined with a microscope. Using this method, Scientist 1 was able to visually identify all the stages of growth of these cells, from the most primitive stem cell through the fully mature adult white cell. Based on these observations, Scientist 1 concluded that each type of white blood cell has its own separate family, each with a separate stem cell. According to this theory, one type of white blood cell could never turn into any other type of white blood cell and once a white blood cell is formed it cannot change.

Scientist 2

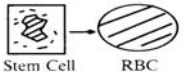
Using many different techniques including centrifugation, filtration, and chemical gradients, Scientist 2 was able to prepare pure samples of each of the different types of white blood cell from the blood and marrow of volunteers. These pure samples were then each placed in separate test tubes with special nutrients and allowed to grow. When samples from these tubes were examined with a microscope, some contained two or more different types of white blood cells. From this evidence, Scientist 2 concluded that white blood cells have the ability to develop or change into the other different types. All white blood cells therefore, develop from a common ancestor or single universal stem cell which can give rise to all the white cells found in the blood. Additionally, some cells can change into cells of different types.

1. Which of the following diagrams best describes the conclusion of Scientist 2?

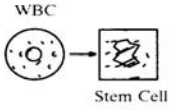
A.



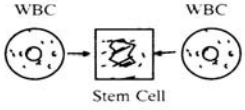
B.



C.



D.



WBC = White Blood Cell
RBC = Red Blood Cell