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SCIENTIFIC METHOD IN ACTION

Aspirin and Heart Disease

In the 1980s the medical profession conducted a study to determine if one aspirin per day reduced the risk of heart disease. There were two groups in the study. It was a double-blind study, meaning members of each group did not know if they were getting the real aspirin, or a placebo (a sugar pill). Members of Group A received the placebo, and members of Group B were given the real aspirin. After two years of research, members of Group B had fewer heart attacks and heart disease.

1. What is the question or problem being investigated?

2. What is the hypothesis? (The hypothesis is always written in the form of a statement, never as a question!)

3. What are the variables? (independent variable and dependent variable)
    a. Independent variable:

    b. Dependent variable:

4. What is the control group?

5. What is the conclusion of the experiment?

The Strange Case of Beriberi Disease

In 1887 a strange nerve disease attacked the people in the Dutch East Indies. The disease was beriberi. Symptoms of the disease included weakness and loss of appetite; victims often died of heart failure. Scientists thought the disease might be caused by bacteria. They injected chickens with bacteria from the blood of patients with beriberi. The injected chickens became sick. However, so did a group of chickens that were not injected with bacteria.

One of the scientists, Dr. Eijkman, noticed something. Before the experiment, all the chickens had eaten whole-grain rice, but during the experiment, the chickens were fed polished rice. Dr. Eijkman researched this interesting case. He found that polished rice lacked thiamine, a vitamin necessary for good health.

6. State the problem being investigated in the first paragraph.

7. What was the hypothesis in the first paragraph?

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8. How was the hypothesis tested?

9. Should the hypothesis be supported or rejected based on the experiment?

   Why?

10. If you were Dr. Eijkman, how might you redesign this experiment, considering the new information about what kind of rice was fed to the chickens?

How Penicillin Was Discovered

In 1928, Sir Alexander Fleming was studying Staphylococcus bacteria growing in culture dishes. He noticed that a mold called *Penicillium* was also growing in some of the dishes. A clear area existed around the mold because all the bacteria that had grown in this area had died. In the culture dishes without the mold, no clear areas were present.

Fleming hypothesized that the mold must be producing a chemical that killed the bacteria. He decided to isolate this substance and test it to see if it would kill bacteria. Fleming transferred the mold to a nutrient broth solution. This solution contained all the materials the mold needed to grow. After the mold grew, he removed it from the nutrient broth. Fleming then added the nutrient broth in which the mold had grown to a culture of bacteria. He observed that the bacteria died.

11. Identify the problem being investigated.

12. What was Fleming's hypothesis?

13. How was the hypothesis tested?

14. Should the hypothesis be supported or rejected based on the experiment?

15. This experiment led to the development of what major medical advancement?