Engineering

Testing UV-Protective Fabrics

FIGURE 20: UV-protective clothing protects the wearer from skin damage due to radiation from the sun.

When our body is exposed to moderate levels of radiation from sunlight, it may respond by tanning or burning. The exposure activates the production and release of a brown pigment called melanin. This pigment acts like a natural sunscreen by helping block *ultraviolet* (*UV*) light, an invisible type of radiation present in sunlight. Recall that UV light is a mutagen that can damage skin tissues. Prolonged exposure to UV light can lead to skin cancer caused by mutations in the DNA of skin cells. The most common type of damage is the formation of thymine dimers, or pairs of thymine bases bonded together in DNA. These mutations interfere with both replication and translation.

UV-protective clothing is designed to protect people from UV light. In this activity, you will work with your classmates to develop a testing system that could be used to identify fabrics that can be used for UV-protective clothing. The system should be easy to use and cost less than one hundred dollars. The testing system should also allow the user to test up to 100 pieces of fabric in an eight hour work day. Finally, the system should be lightweight and portable, so that one person can carry it.

MATERIALS

- fabric (3 types)
- plates, paper
- UV beads or paper
- UV light box or sunlight

DEFINE AND DELIMIT

Write a statement identifying the problem you are designing a solution for. What are the criteria and constraints for an effective testing system?

DESIGN

As a team, brainstorm some possible solutions to the problem. Make a decision matrix to choose the solution that best meets the criteria. Once you have chosen a potential solution, make a prototype of your testing system.

TEST

Conduct a test to gather data showing how well your testing system works. If your solution does not fully meet the criteria, return to your design. Continue developing and testing solutions until you feel certain that your solution meets the most important criteria and constraints.

COMMUNICATE

Write an explanation communicating your results. Which type of system is best for testing these fabrics? Give evidence to support your explanation. Include a diagram of the final solution your team selected.

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