Student Handout

Quantifying Stress: Using Blood Biomarkers to Study Sharks

Introduction

Sharks live in many different environments throughout Chesapeake Bay. Some parts of the Bay are warmer, saltier, or change more quickly than others. These environmental conditions can cause stress in sharks, even when the sharks do not look injured or unhealthy.

Scientists cannot ask sharks how they feel, so they study what is happening inside the shark's body. One-way scientists do this is by analyzing blood samples. Blood can provide information about how an animal is responding to its environment. Higher levels of stress-related substances in blood can indicate that an animal is experiencing more stress.

In this investigation, you will act as a marine scientist. You will analyze simulated shark blood samples using beads to represent blood stress biomarkers. You will collect data, calculate averages, create graphs, and use evidence to determine which environmental factors are most closely related to stress in sharks.

Your Task as a Scientist

You will work in a group to study five sharks. Each shark is represented by a baggie that contains beads simulating a blood sample. Each shark also has an identification card that includes environmental and biological information such as water temperature, salinity, month, sex, and age class.

Scientists do not rely on just one measurement. To improve accuracy, you will take three replicate blood samples (subsamples) from each shark and calculate the mean number of stress biomarkers.

Your goal is to use your data and graphs to identify patterns and determine which environmental factors appear to have the greatest effect on shark stress.

Rules for Sampling

- Do not pour out or count all the beads in the bag.
- Take three level scoops, one at a time.
- After counting each scoop, return the beads to the bag before taking the next scoop.
- Record all data carefully.
- Do not guess conclusions until after you analyze your data.