Clean or Contaminated?

HOW TO TEST











From aspirin to antibiotics, the medicines we take are vital to our everyday health and well-being. But what if bacteria, viruses or toxic substances accidentally contaminate a drug during manufacturing?

Scientists play a critical role in ensuring that our medicines are both pure and safe. In this lab, students will act as a quality control team in a manufacturing facility by testing whether a mock drug – GrapeX, for multiple sclerosis – is



pure or contaminated with an 'endotoxin' that causes allergies and illness.

Students will analyze samples of GrapeX using reverse phase

chromatography to separate out the drug colors and look for additional yellow molecules, which signal the presence of an endotoxin. They will verify their results using a spectrophotometer and then decide whether their batch is safe to be released to the market for public use.

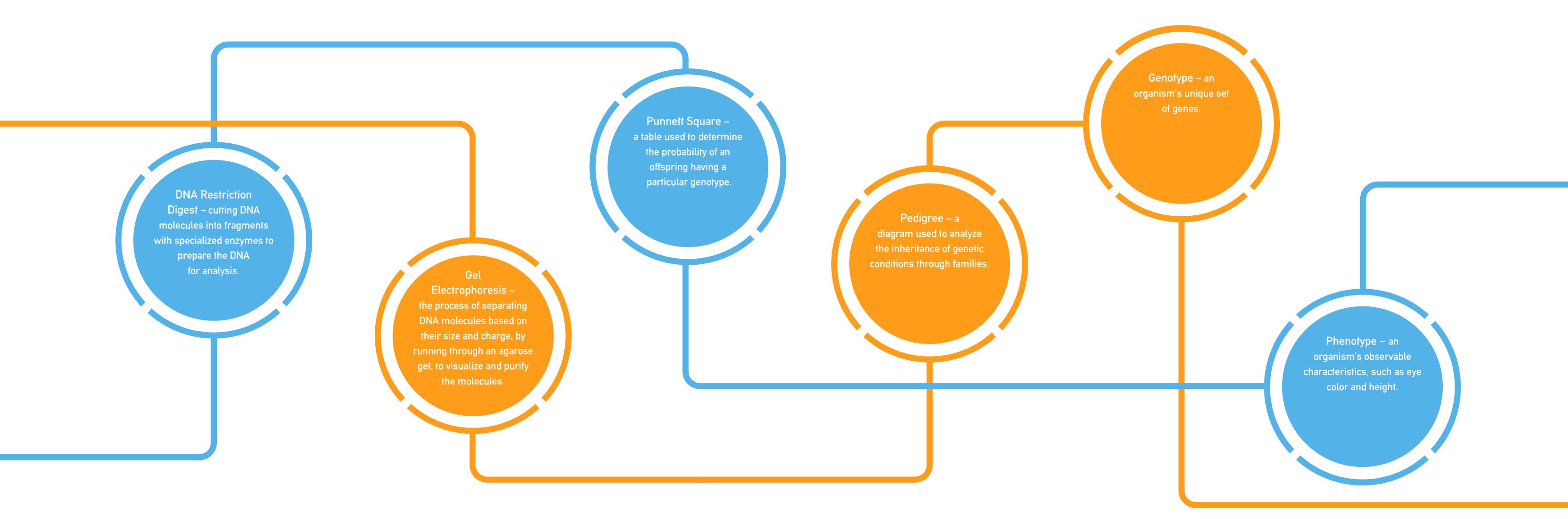




When a Band-Aid Won't Stop the Bleeding:

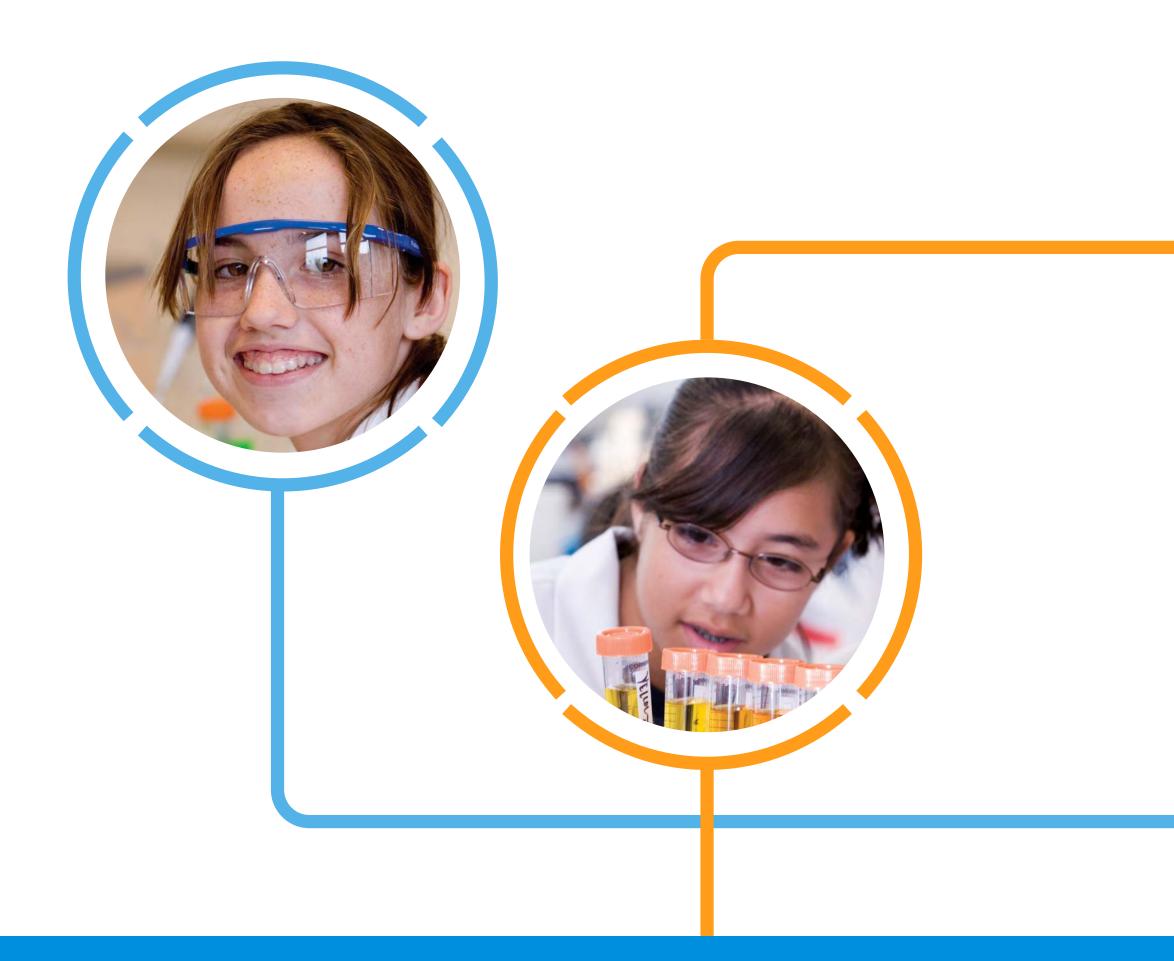
A CASE STUDY OF

Hemophilia



Small scrapes and cuts are the stuff of childhood. Falling off a bike, stubbing a toe or wrestling with siblings are all rites of passage for most youngsters. However, such minor injuries can be life-threatening for people with hemophilia, a rare disorder in which the blood fails to properly clot.

In this lab, students will learn about the symptoms of



hemophilia, how it is inherited, and which proteins give rise to hemophilia A and B. Students will perform molecular biology

- techniques DNA restriction digests, gel electrophoresis,
- pedigree analyses and Punnett Squares to determine which
- members of a hypothetical family have the disease and how to

predict their respective genotypes and phenotypes.

This lab is designed for high school students and will take approximately 3.5 hours in addition to pre and post labs at school.



Medicine Making Machines

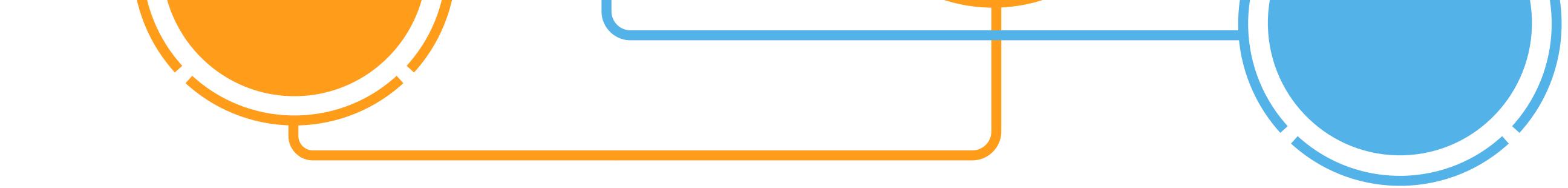
SHEDDING LIGHT ON



Yeast Cells – single-celled organisms that are easy to manipulate as a model system for studying the cell cycle. The same genes that control the cell cycle in baker's yeast perform in much the same capacity in human cells.

Bioreactor – a tool used to grow cells or tissues in the context of cell culture. Centrifuge – a machine that uses centrifugal force to spin substances and thereby separate its various components; typically used to separate fluids of different densities (e.g., cream from milk) or liquids from solids.

> Hemocytometer – an instrument used to count the number of cells in a sample.



Everyone knows that proper nutrition helps us grow and perform at peak levels. The same is true of the cells grown in a laboratory. By giving cells the proper nutrients and optimal growing conditions, they rapidly multiply and produce the specialized proteins needed to make life-saving medicines.

In this lab, students will work with yeast cells as a model for

understanding how cells multiply and what they need to survive, thrive and produce therapeutic proteins. Acting as technical development scientists, students will observe and measure the quantity of yeast cells at each growth temperature using a hemocytometer and an automated cell counter. They will also use a centrifuge to determine cell mass. From this information, students will gain new appreciation for the complexity and importance of making medicines from cells.





This lab is designed for seventh grade students and will take approximately 2 to 2.5 hours in addition to pre and post labs at school.

