Purpose of Paperclip PCR Model

In this exercise you will model a polymerase chain reaction, while playing the role of DNA polymerase. Your desktop will represent the thermocycler running three polymerase chain reaction (PCR) cycles. Colored paper clips that represent primers and free nucleotides will be used to synthesize strands of DNA. Keep in mind the complementary base pair rules: adenine (A) is complementary to thymine (T) and Cytosine (C) is complementary to Guanine (G).

Objectives-PCR Paper Clip Model

- Model and explain the three steps of PCR including the correct directionality (5'- and 3'-ends).
- Explain the role of primers in PCR.
- Demonstrate where the primers will anneal to the original DNA template and subsequent PCR products.
- Use the model to determine how many cycles must occur to get only the desired PCR product.
- Describe the mathematical growth of the DNA during PCR.

Purpose for PCR/Electrophoresis

Now that you have a basic understanding of how PCR amplifies a specific gene, you will use this technology to amplify the influenza neuraminidase gene from the DNA of your 4 patients. This gene will be amplified if the patient is infected with influenza (ie if the cells contain the viral genome).

Objectives-PCR & Gel Electrophoresis Confirmation (HER2)

- Describe the vital components needed to carry out a PCR reaction.
- Perform a PCR for the influenza neuraminidase gene in 4 patients.
- Perform gel electrophoresis of the neuraminidase gene PCR product.
- Analyze the gel to determine the presence of the viral genome (ie the presence of the influenza neuraminidase gene) in the cells of each patient.
- As a team, compare the neuraminidase gene data of all 32 patients.
- Describe how gel electrophoresis is used to determine the presence and size of the PCR product.
- Describe how the standard is used to determine size of each band in the gel.
- Analyze the gel to determine the band size and gene amplification number for each patient.

NGSS
DCI
LS3.A Inheritance of traits
LS3.B Variation in traits
CCC
System and system models
Models can be used to simulate systems and interactions in that system
SEP
Developing and Using Models

Develop and/or use a model (including mathematical and computational) to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems.