Pre-Lab

Audience

This lab is appropriate for undergraduate biology students (200 level and up) and advanced high school students (completed AP Biology and advanced electives).

Important Terms

Here are some important terms you may already be familiar with as well as some resources to review before watching the presentation. If you are unfamiliar with any of these terms, please look them up before watching the presentation.

- DNA

- mRNA

- RNA-Seq

- Next generation/high-throughput sequencing

- Biological replicates

- Bioinformatics

- Probability distribution

Bioinformatics Lab Computer Setup

To follow along with this laboratory you will need:

1. Access to an up-to-date web browser such as Chrome or Firefox.

2. (Required) A *DNA Subway* account through *CyVerse* to use *DNA Subway Green Line*. To get a free account, go to https://user.cyverse.org/

Resources

Scientific papers (open access)

RNA Sequencing Data: Hitchhiker's Guide to Expression Analysis
https://www.annualreviews.org/doi/abs/10.1146/annurev-biodatasci-072018-021255

Zika Infection of Neural Progenitor Cells Perturbs Transcription in Neurodevelopmental Pathways
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0175744

Illumina DNA Sequencing

Illumina Sequencing by Synthesis: https://youtu.be/fCd6B5HRaZ8

Bioinformatics

What Does a Bioinformatician Do? (short interview): https://dnalc.cshl.edu/view/2018-Bioinformatics-defined.html

DNA Subway

Green Line Walkthrough: https://learning.cyverse.org/projects/dnasubway_guide/en/latest/step7.html

Laboratory Questions

These questions can be completed by watching the video.

1. In your own words, what is the purpose of an RNA-Seq experiment?

2. What are the major steps in an RNA-Seq experiment?

3. What is biological variation and what role does it play in an RNA-Seq experiment?

4. What can determining the amount of an mRNA present in a cell or tissue potentially tell about what is happening in a cell/tissue?

5. What is a FastQ file and how does the information in the file tell us about the quality of the DNA sequence?