

Clinical and Research Genomics Assignment #2 **From Lecture_04-05 (March 28th):**

RNA-Sequencing, Epigenomes, Gene Fusions, and DNA Modifications

Assignment: Answer questions about RNA-Sequencing and their methods

Due Date: 10:00AM on April 4th

This week has two sections: short-answer questions and a data exercise.

(State whether the statement is true or false, then explain with one sentence).

- 1) There are 20 types of RNA present in cells.
- 2) Once spliced and 5' capped, an RNA is no longer modified.
- 3) Gene fusions identified by RNA sequencing always correspond to rearrangements in the DNA as well.

Essay Questions

- 1) If you were designing an experiment with RNA-Sequencing for each sample:
 - a.) How much sequencing is required to assay each sample?
 - b.) What are the parameters that affect this depth of sequencing?
 - c.) How would you calculate an expression value?
-

Epigenome and DNA Modifications

Analyze and Contextualize DNA Methylation data from a RRBS experiment

If you do not already have it installed, install the free statistical program R on your computer:

<http://www.r-project.org/>

You can use the slides on this blog to understand the algorithms that we have discussed in class:

<http://zvfak.blogspot.com/2013/03/epiworkshop-2013-dna-methylation.html>

If you have trouble getting the package for R from the tutorial, you can download it here:

<http://code.google.com/p/methylkit/>

Utilize the tutorial to familiarize yourself with R and the program.

Then, from the test dataset within the package, your assignment is to:

1. Check if there is an indication of PCR bias in the experiment.
 2. Calculate # of differentially methylated cytosines (DMCs)
 3. Annotate the DMCs with genes and discuss implications of that annotation.
 4. Check correlation between samples.
 5. Cluster samples to see if replicates cluster together
-

Please hand the assignment on the day of the lecture, or email if you cannot attend.

For any questions, please contact Alexa McIntyre (abm237@cornell.edu), Ebrahim Afshinnekoo (eba2001@med.cornell.edu), or Professor Mason (chm2042@med.cornell.edu).