**BIO380: Cancer Biology**

**Homework Assignment #12: Bioimage Informatics, Part 2**

**50pt, Due Wednesday April 26**

1. Complete Bioimage Informatics, Part 2, section 3.4 **Statistical Analysis**. Use the files provided on moodle (Folder: Bioimage Informatics Part 2 Results). Answer the following questions:
	1. For the purposes of statistical analysis, can each of the nine sites (images) within each replicate be considered a replicate? That is, if you determined the mean nuclei count for nine images for each of five replicates, do you have 45 replicate measurements or only five replicate measurements? Explain your answer. (4pt)
	2. Why is it important to do replicates? (3pt)
	3. Did you observe a significant effect for each EGFR mutation on the mean nuclei **count?** Did the result match your prediction? (2pt)
	4. Did you observe a significant effect of each EGFR mutation on the mean nuclei **area?** Did the result match your prediction? (2pt)
	5. Calculate the mean, standard deviation and the 95% confidence interval for the Control, Mutant 1 and Mutant 2. Fill in your values in the charts below. (14pt)

|  |  |  |  |
| --- | --- | --- | --- |
| **Counts** | **Control** | **Mutant 1** | **Mutant 2** |
| T-test (vs control) | N/A |  |  |
| N |  |  |  |
| Mean |  |  |  |
| Standard deviation |  |  |  |
| 95% Confidence interval |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Areas** | **Control** | **Mutant 1** | **Mutant 2** |
| T-test (vs control) | N/A |  |  |
| N |  |  |  |
| Mean |  |  |  |
| Standard deviation |  |  |  |
| 95% Confidence interval |  |  |  |

* 1. Include a histogram of your mean nuclei **counts** and another of your mean nuclei **areas**, including error bars that show the 95% confidence interval. (hint, you can designate multiple sizes of error bars by separating your custom error bar value cells with commas). (16pt)
1. What two mutations might you predict were selected, based on your knowledge of EGFR, to generate the two mutant cell lines? Why? (2pt)
2. Would gefitinib be effective on the control cells and/or the mutants? (3pt)
3. Below is a figure from a scientific paper. Are the results shown consistent with your answer to question 3? Why or why not? (you may need to refer to Homework 5).[[1]](#endnote-1) (4pt)



A549: wt EGFR

H460: wt EGFR

H1650: Exon 19 deletion mutant (E746-A750 deleted)

HCC827: Exon 19 deletion mutant (E746-A750 deleted)

H3255: L858R exon 21 point mutation

PC9: Exon 19 deletion mutant (E746-A750 deleted)

1. Costa, Daniel B., BalÃ¡zs Halmos, Amit Kumar, Susan T. Schumer, Mark S. Huberman, Titus J. Boggon, Daniel G. Tenen, and Susumu Kobayashi. "BIM Mediates EGFR Tyrosine Kinase Inhibitor-Induced Apoptosis in Lung Cancers with Oncogenic EGFR Mutations." *PLoS Medicine* 4.10 (2007) [↑](#endnote-ref-1)