Correlations Between Glucose Uptake & Growth Rate Of Breast Cancer Cells

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Introduction

Cancer cells require characteristic metabolic processes in order to grow and proliferate. The Graham Lab focuses on these metabolic processes by analyzing the metabolic behavior of different breast cancer cell lines. Through this research, the hope is to find metabolic vulnerabilities and potential therapeutic targets.
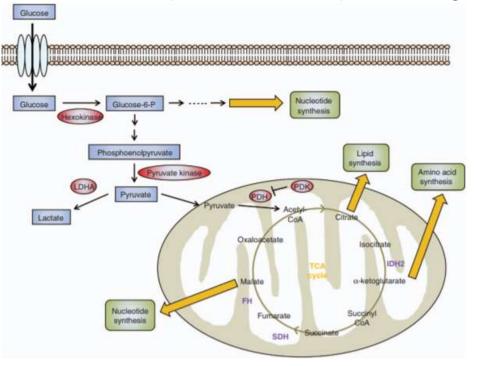

Figure 1: Cancer cell metabolism

Skills Learned

- Reading Scholarly Literature
  - how to utilize the IMRAD method to break down scientific articles into a more digestible format
- Learned the basics of R software, a coding software used to analyze data
  - Completed DataCamp: Intro to R Basics to learn how to code for vectors, matrices, factors, data frames, and lists.
  - Utilized R Software to create a correlation table and a scatter plot using the Gray lab Data
- Completed MATLAB training course
- Completed lab safety training & earned my lab safety certification
- Completed LabXchange laboratory simulations to learn:
  - pipette basics
  - running a protein gel
- Learned the basics of how to write a personal statement for college applications

My STEM Coursework

- Analysis of Scholarly Literature
  - Through SHINE I learned the essentials of reading scientific literature, which will most definitely give me an advantage when writing research papers or projects in the future. Being able to read and understand scientific literature will open up many more avenues in terms of learning new knowledge and providing reliable evidence.
- MATLAB and R software
  - Through using MATLAB and R software, I can create tables, charts, and graphs to analyze data more easily and accurately. It will also widen my skill set when it comes to applying for future internships and jobs
- LabXchange laboratory simulations
  - Despite not having access to the on-campus lab facilities, I was still able to use simulations to learn laboratory basics such as how to use a pipette, and other skills such as running a protein gel. This will be especially helpful in the future since I have yet to take my AP Chemistry class this fall.

Advice for Future SHINE Students

Some advice I would give to future SHINE students would be to take full advantage of the resources that are provided. Since this program is only 7 weeks long, the best thing to do would to reap as many benefits as possible. Whether that be attending a python class, learning how to write a college personal statement, or even chat with the alumni & other staff, do as much as you can, Most importantly, don't be afraid to ask for help.

Objective, Results, & Impact

Through bioinformatics using R software, we studied 46 different breast cancer cell lines to closely analyze the metabolism of certain breast cancer cells and whether or not it would be correlated to its growth rate.
While the results showed there was no distinct correlation between doubling time and glucose uptake, it proved how varying in behavior each breast cancer cell exhibited, even within the same cell line.

This information can hopefully provide motivation for researchers to study the difference in metabolism between these different breast cancer cell lines, placing more focus on the development of new targeted cancer therapies.
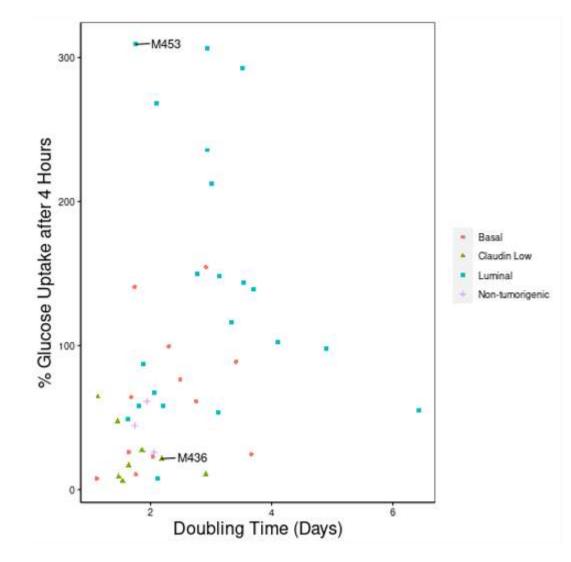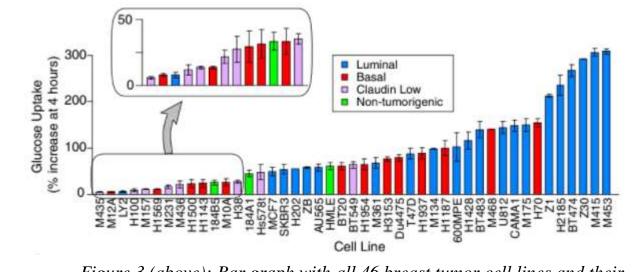

Figure 2 : Glucose Uptake after 4 hours

Figure 3 (above): Bar graph with all 46 breast tumor cell lines and their glucose intake after 4 hours. (Timmerman LA, et al. Cancer Cell. 2013)

Subtype	Correlation Type	Correlation Estimate	p value	N
Basal	Pearson	0.2820	0.375	12
Claudin Low	Pearson	-0.4984	0.209	8
Luminal	Pearson	-0.0737	0.751	21
Non-tumorigenic	Pearson	-0.3844	0.749	3
Basal	Spearman	0.3636	0.245	12
Claudin Low	Spearman	-0.3571	0.385	8
Luminal	Spearman	0.0747	0.748	21
Non-tumorigenic	Spearman	-0.5000	0.667	3

Figure 4 (above) : Correlation of glucose uptake & doubling time

Acknowledgements