Optimizing Transient CHO-DG44 Production: Valproic Acid Addition, Temperature Shift, and Medium Composition

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College Park Scholars Academic Showcase, May 5, 2023

Introduction:

This past summer, I interned at the Vaccine Research Center (VRC) at NIAID at the Vaccine Production Program (VPP). I worked in cell line development of vaccine production in order to mass manufacture the monoclonal antibodies needed to produce vaccines, such as HIV. I utilized a technique called **transient transfection**, which is a method of mass-producing antibodies quickly.

Activities:

I assisted my PI with her research project at the NIH, where I designed my own experiment, conducted data analysis using a new software, learned how to read intricate journal articles, participated in team meetings, and even presented my findings at the end of the summer. This experience taught me science and engineering in a unique way and how to apply my education to problem-solve real-world obstacles. To this day, I apply skills I grasped, both technical and soft skills, to market myself to future opportunities.

Impact:

My experimental results had an amazing impact on the current protocol and led to potential modifications to continue optimizing transient production.

Conclusion:

Medium composition was the most significant factor in optimizing transient production.

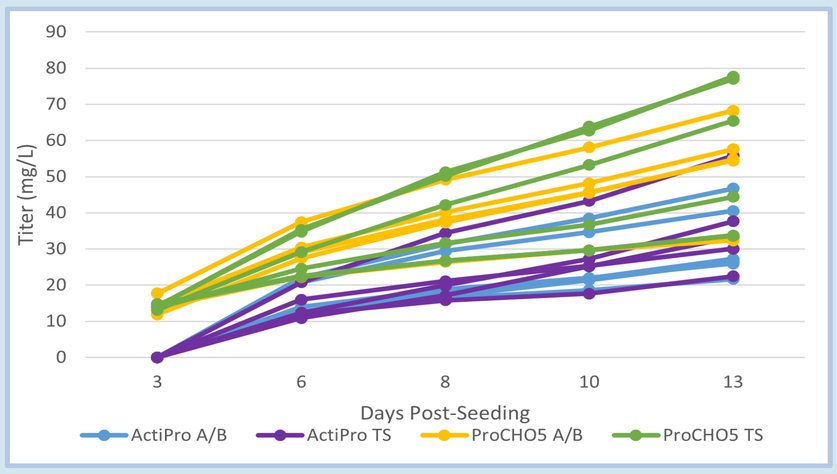

Figure 1. Monoclonal antibody titer by Medium Composition
23 shake flasks with mediums + feeds ActiPro A/B, ActiPro TS, ProCHO5 A/B, and ProCHO5 TS in combination with other experimental factors.

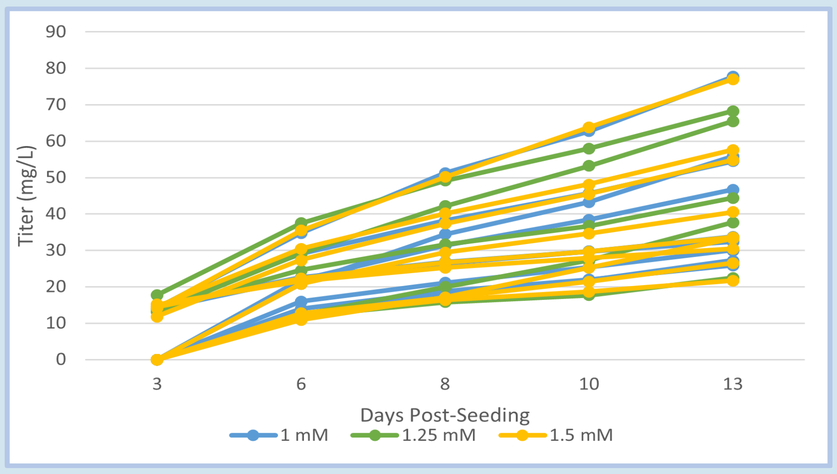

Figure 2. Monoclonal antibody titer by VPA Concentration
23 shake flasks with VPA concentrations of 1mM, 1.25mM, and 1.5mM in combination with other experimental factors

Transfected cells
Image taken in lab during the experiment. 6 shake flasks treated with different conditions.

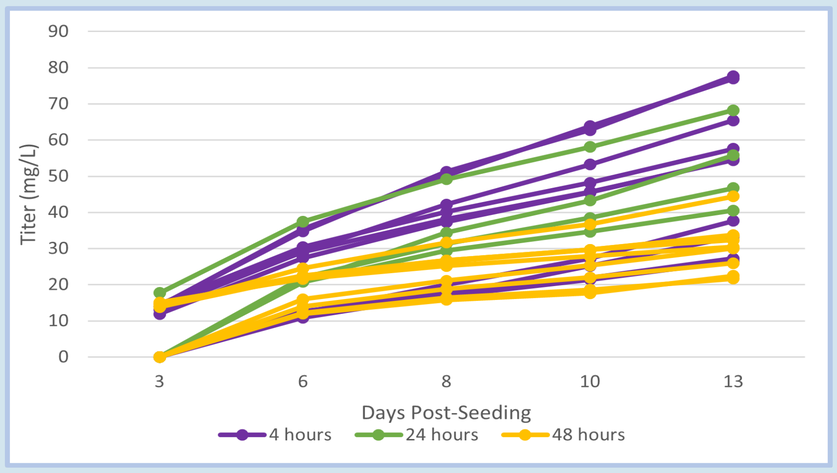

Figure 3. Monoclonal antibody titer by Temperature Shifts
23 shake flasks with temperature shift after 4, 24, and 48 hours in combination with other experimental factors.

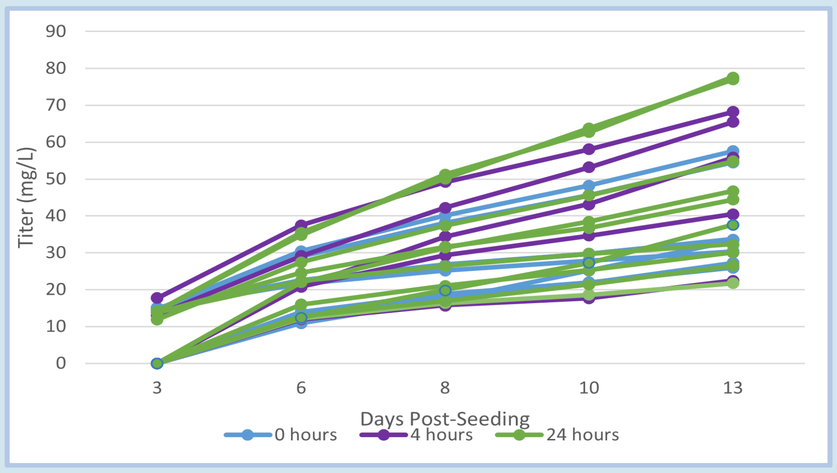

Figure 4. Monoclonal antibody titer by VPA Addition
23 shake flasks with VPA addition after 0, 4, and 24 hours in combination with other experimental factors.

MaxCyte Transfection System
Image from Cell Culture Dish (https://cellculturedish.com/poster-flow-electroporation-provides-a-highly-efficient-flexible-and-scalable-transient-protein-expression-system/).

Image from data analysis conducted after consolidating results from the experiment. Utilized Microsoft Excel to create the diagrams show above.

Acknowledgments:

Elizabeth Scheideman, Dr. John Merck, Dr. Thomas Holtz

Site Information:

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NIAID's mission is to conduct basic and applied research to better understand and ultimately prevent diseases.

The **VPP** has the mission to mass produce vaccines to preparation for clinical trials.