

Autoimmunity Capstone

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OVERVIEW

After pursuing an in-depth study of the immune checkpoint protein PD-L1 and its various post translational modifications, I wanted to gain a broader picture of the field of immunology. I did this by reading the first 200 pages of *The Autoimmune Diseases* Sixth Edition, Edited by Noel R. Rose and Ian R. Mackay, taking detailed notes, and formulating a set of experiments inspired by my new knowledge.

CHOOSING THE BOOK

Well before my year-long project on PD-L1, I owned *The Autoimmune Diseases*. I wanted to read this textbook ever since attending the 2019 American Society for Cell Biology conference where I watched many presentations relating to autoimmune disease (specifically cancer).

However, at the beginning of my sophomore year, the book seemed overwhelming. I instead chose to read select scientific articles covering recent developments in cancer and dementia therapy to take in the complex field of immunology in more manageable pieces.

After reading numerous detailed articles and gaining lab experience through my own projects, I finally returned to the holy grail of immunology.

PROCESS

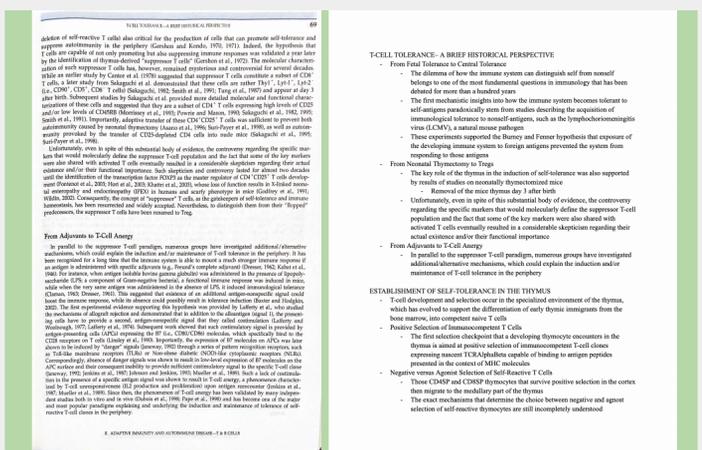


Figure 2: Page 69 from *The Autoimmune Diseases* (left), Frances' notes corresponding to page 69 (right)

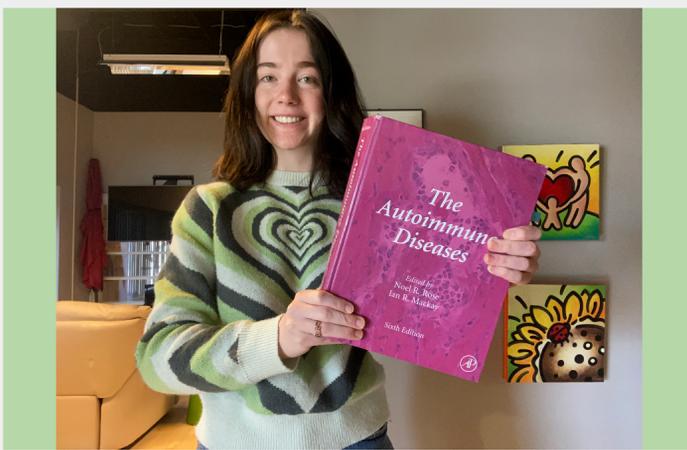


Figure 1: Frances with *The Autoimmune Diseases*

Most nights after school, I would sit down with *The Autoimmune Diseases* and read while writing down important bullet points on the content.

The text was extremely comprehensive with multiple (in my opinion, overly specific) examples for each process described— so picking what made it into the notes was a challenge in and of itself.

I ultimately decided on leaving out most specific examples and focus on the general processes of the innate and adaptive immune response.

I would get through about two pages every half hour.

NOTES ARCHIVE + EXPERIMENTAL DESIGN

After four months of studying the immune response in relation to autoimmunity, I produced comprehensive notes on 9 chapters totaling 38 pages of writing all together.

The Chapters covered are:

1. Autoimmune Disease: Reflections and Projection
2. Autoimmunity: A History of the Early Struggle for Recognition
3. General Features of Autoimmune Disease
4. Innate and Adaptive Systems of Immunity
5. Immunological Tolerance— T Cells
6. T Cells and Their Subsets in Autoimmunity
7. The Role of Invariant Natural Killer T cells
8. B-Cell Development: How to Become One of the Chosen Ones
9. B Cell Activation and B Cell Tolerance

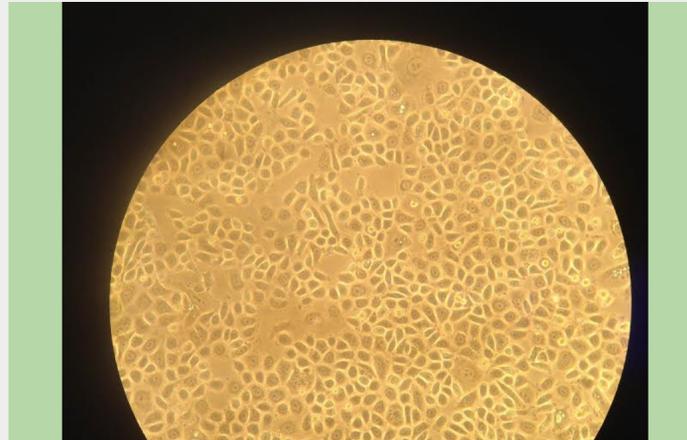


Figure 4: DU145 prostate cancer cells used in SUMO(2/3)-ylation research

CONCLUSION

Taking a pause from lab time to focus on *reading* about immunology was an enriching experience. While I'm excited to get back in the lab during my senior project and over the summer, I gained a greater appreciation for simply having a wider breath of knowledge in my back pocket. Moving forward to Johns Hopkins, I hope to find a balance between reading, thinking, and doing.

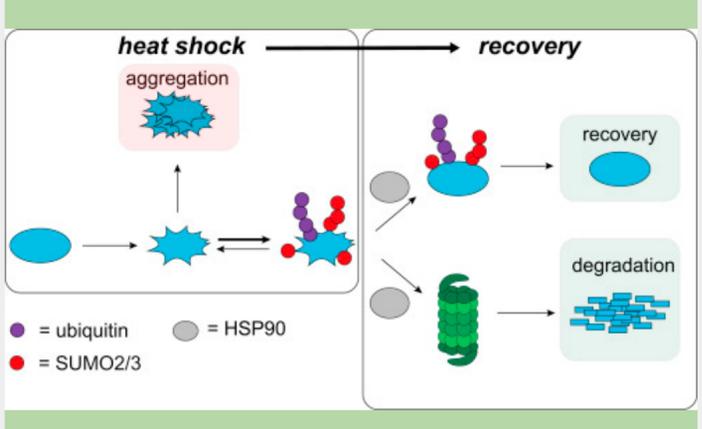


Figure 3: Diagram of the general phenomenon of SUMO2/3 and Ubiquitin aiding in protein/cell recovery after heat shock relative to non-modified cell/proteins

BACK TO PD-L1 PTMs!

Luckily enough, I have been able to begin executing my experiments inspired by my capstone project during the allotted three weeks for senior projects.

At the time of this presentation, I should have just gotten in my first set of Western blot results attempting to detect PD-L1 SUMO(2/3)-ylation.