

Semmelweis University

Budapest, Hungary

Princeton IIP Program

Kathleen Mulligan

June 1, 2015 – July 31, 2015

Working at Semmelweis

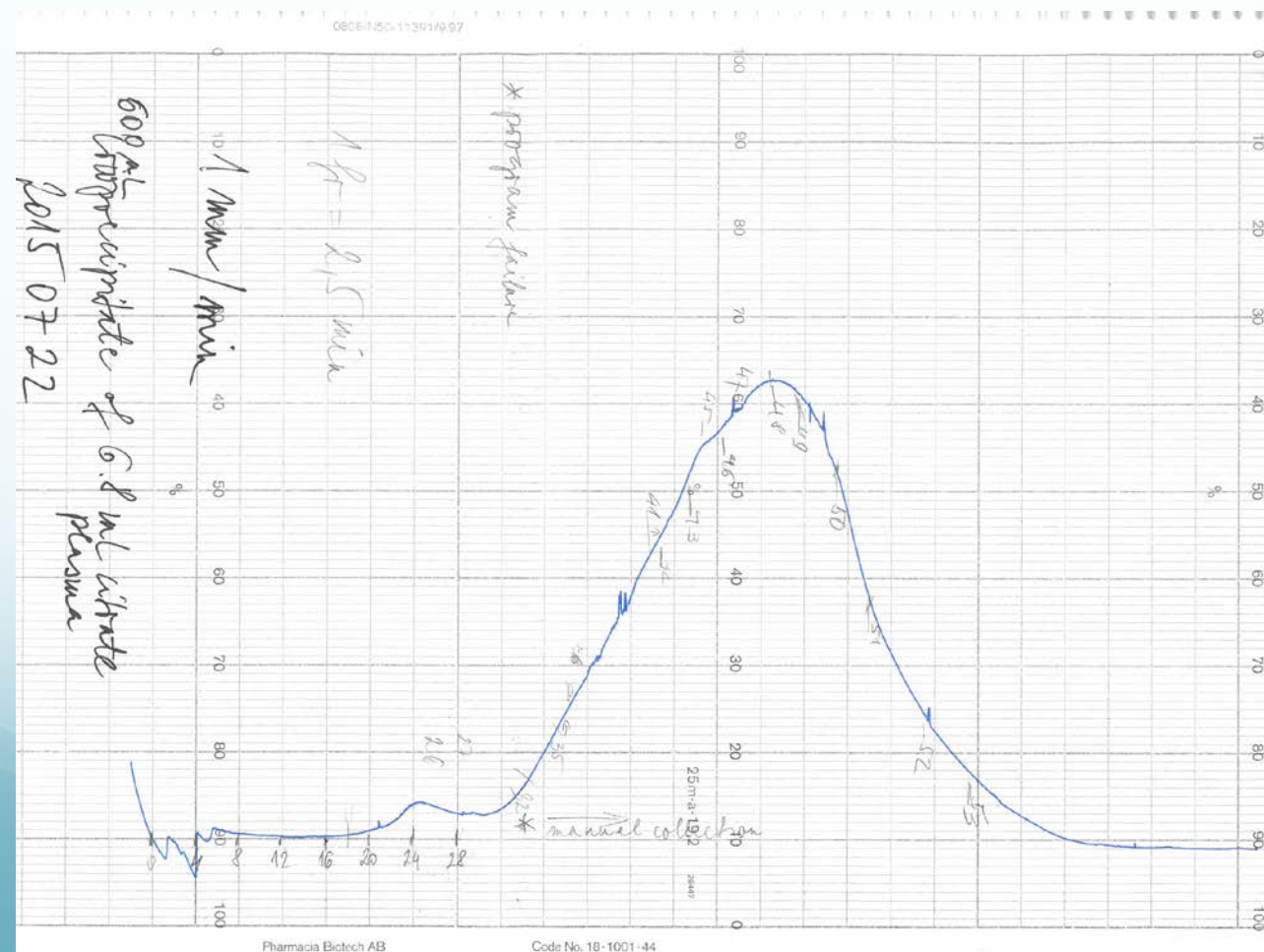
- The interns were presented with 7-8 different research options under different mentors in the first 3 days
- We each decided on our main projects with one or more secondary projects
- We were free to change main projects if we found another more interesting



Main Project

- My main project with Dr. Jolan Harsfalvi was investigating binding properties of von Willebrand factor (a critical protein in the blood-clotting cascade) with collagen and different kinds of antigens
- Work included:
 - Column chromatography
 - Learning the ELISA plate method and running several without assistance
 - Microvolume spectroscopy

- Size exclusion gel chromatography:



Checking for VWF Concatamer and the Purity of the Monomer in the Fractions

SDS-Agarose ELFO
PAGE

SDS-

1 2 3 4 5 6 7 8 9 10 11 12 13 14

VWF SDS-agarose ELFO
2015.07.22-23.

Cryo
20 22 24 26 28 30 32 34 38 40 42 44 46 48 50

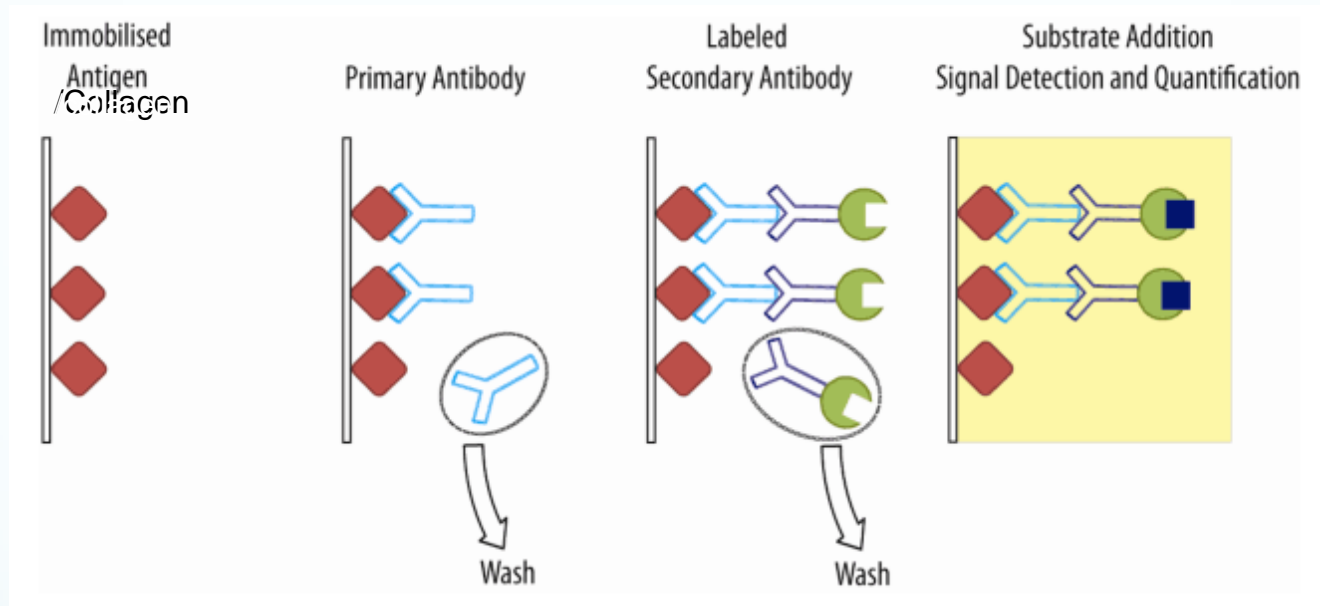
1. 1/10 dilution cryo
2. cryo fraction 20
3. cryo fraction 22
4. cryo fraction 24
5. cryo fraction 26
6. cryo fraction 28
7. cryo fraction 30
8. cryo fraction 32
9. cryo fraction 34
10. cryo fraction 38
11. cryo fraction 40
12. cryo fraction 47
13. B15 (patient)
14. Control N (Siemens)

Sigma
Mr (d)

205000
97000
84000
66000
55000
45000

Purification: Sepharose CL2B, on the same day; Dilution: 1.-12. : 1:1 with denaturing buffer, 13-14. : 5x dil with PBS-T, and 1:1 with denaturing buffer

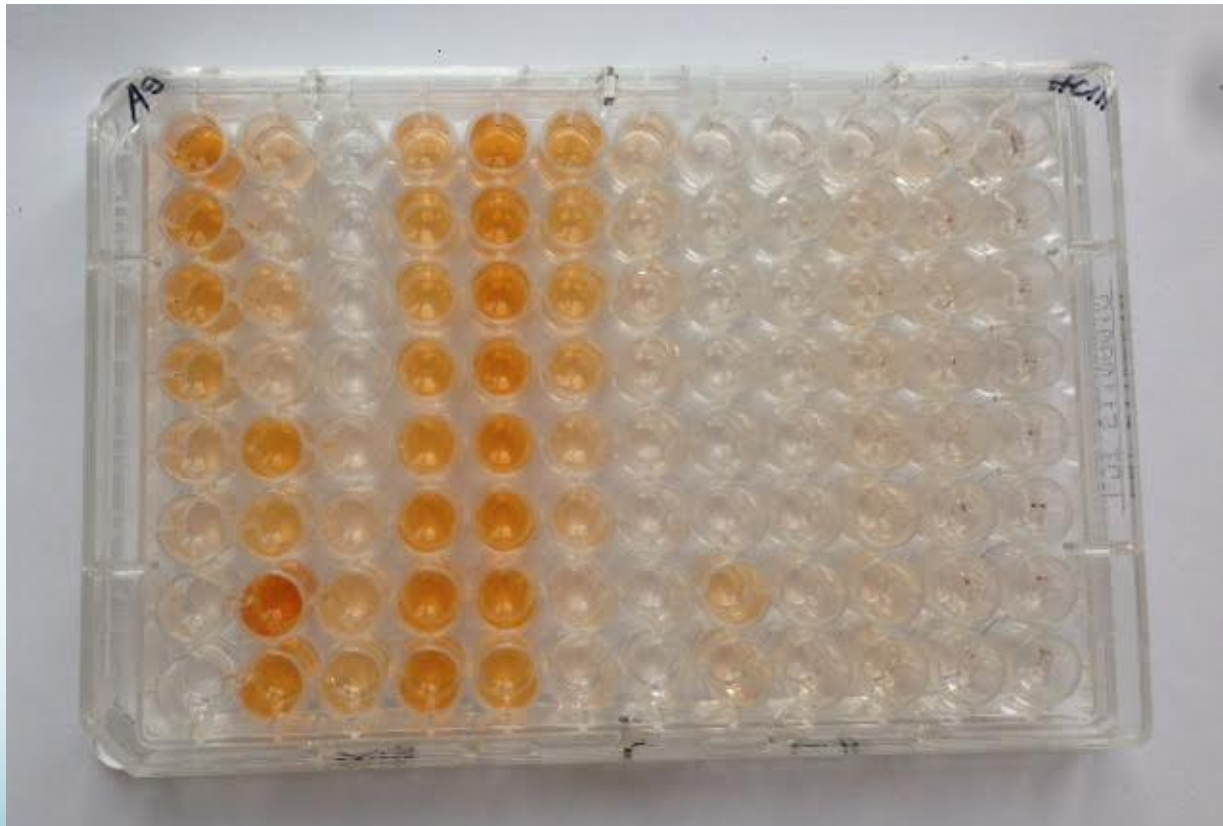
ELISA



Two variations of ELISA were performed: one in which the base layer was Human Collagen Type III, and anti-human antibody.

ELISA Procedure

- Create an 8-part serial dilution as a control
- May use experimental samples in additional wells

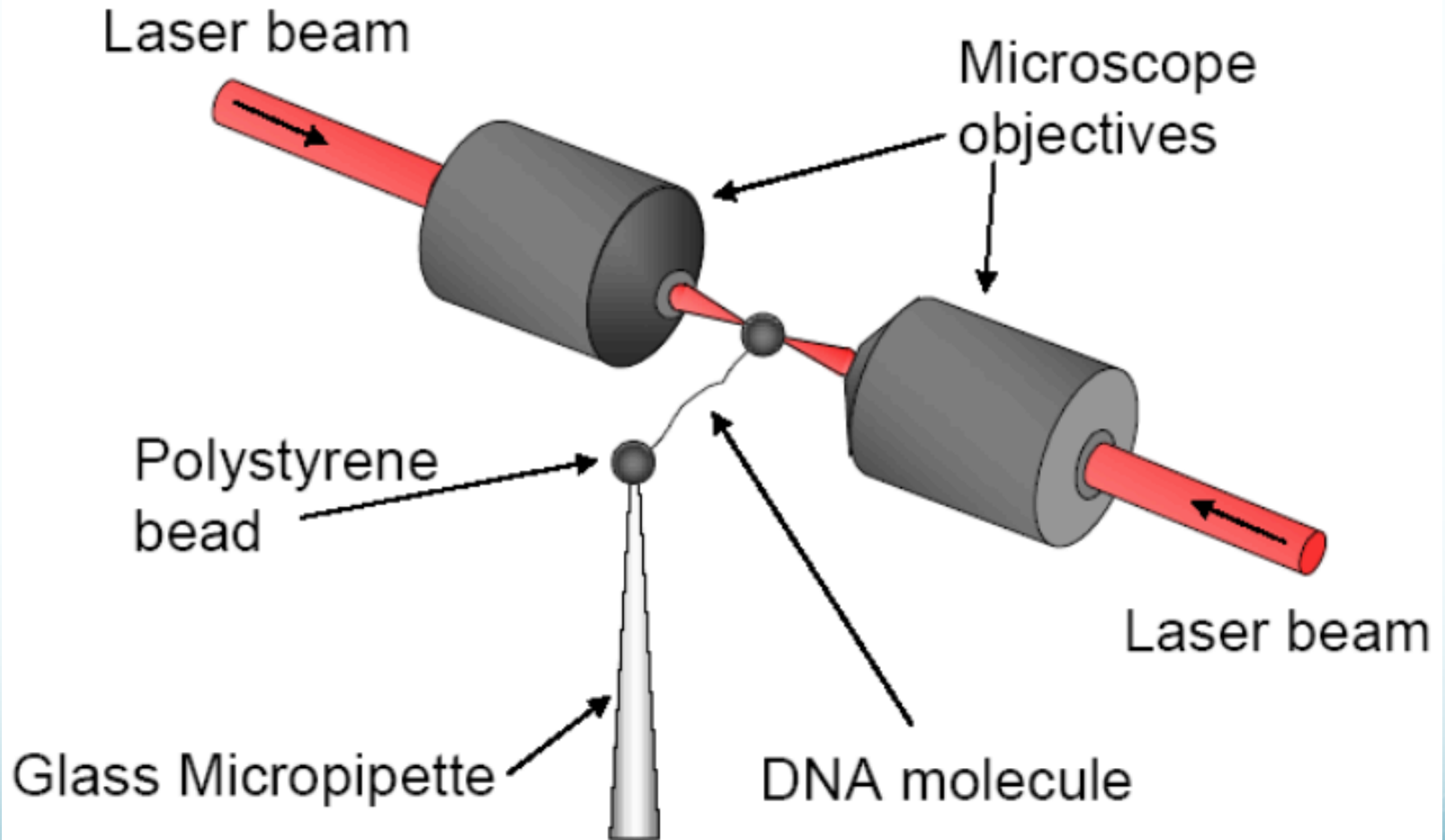


A finished ELISA plate with different levels of dilution of von Willebrand proteins; the left side is measuring binding to antigen, and the right side to

Secondary Project

- When my main mentor was on holiday, I worked for one of her colleagues in the same lab building, Zsolt Martonfalvi. This project was focused on identifying the folding patterns of the largest muscle protein, Titin
- Work included:
 - Independently running polymerase chain reactions (PCRs)
 - Learning the mechanism behind and operating a robotic “optic tweezers” to manipulate individual Titin proteins
 - Testing molecular cross-linkers with SDS-PAGE

Basic mechanism of optic tweezers:



We pushed this pipette back and forth with a computer, stretching the molecule and measuring its

The Scientists

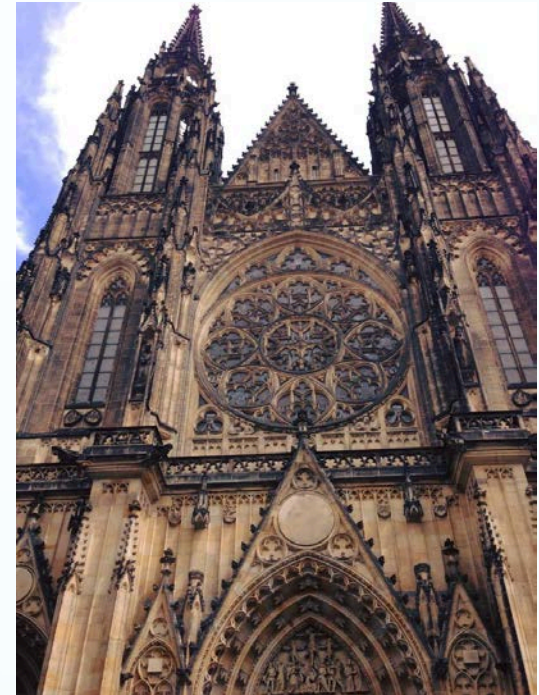
- The scientists we worked under were very helpful and eager to teach us; we even went as a large group after work one day to play laser tag!
- The head of the program allowed us to be flexible with our hours so we could travel many weekends

A short train ride away....

- Vienna



- Prague



- Lake Balaton (largest lake in central Europe)



Taking Away

- An incredibly enjoyable and amazing experience
- Made me reconsider my academic focus in regards to my major back at Princeton
- Became friends with many locals
- Learned a little Hungarian



My coworker Csilla, myself, and Jolan Harsfalvi

Köszönöm Szépen!

(Thank you very much)

- Incredibly grateful for the entire IIP experience!
- Living in and traveling to Budapest is incredibly underrated. It's a fascinating city filled with rich history and culture (and food!), and it seemed like many areas were undergoing renovations to restore their pre-communist era beauty.
- I can't wait to go back in several years to see how the city has continued to develop as well as eat some of their delicious langos again!

