Mark **Zurbruegg**

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Merck Innovation Cup

April 11, 2022

Merck KGaA
Frankfurter Str. 250
64293 Darmstadt, Germany

Application Merck Innovation Cup

Dear selection committee,

As a Ph.D. student with experience in high-throughput screening and assay development, I am writing to apply for the Merck Innovation Cup. My interest in translating academic research to real world innovation and my experience make me a good candidate for this challenge.

Developing novel approaches to target existing and new diseases is one of the reasons I studied Biology. I enjoy creative problem solving and have successfully done so previously. During my time at the Karolinska institute I developed a new way to test the lipid binding capability of α-synuclein by generating in-vitro lipid vesicles. I incubated the lipid vesicles with recombinant α-synuclein and loaded them into a spin column that trapped the vesicles. I washed off unbound α-synuclein and recovered the bound fraction by inverting the column and performing a Western Blot on the eluate. I showed the importance of lipid composition on α-synuclein lipid binding. Furthermore, I demonstrated that small peptide mimics of the Saposin C protein prevented α-synuclein lipid binding.

I was also involved in developing, optimizing, and performing a pilot screen for genetic modifiers of prion disease at the University Hospital Zurich. We used fluorescently tagged antibodies binding different epitopes of the prion protein. Prion protein aggregation would then result in a detectable Förster resonance energy transfer signal. We used an siRNA library provided by Novartis to systematically investigate the effect of different genes on prion protein aggregation.

My current project focuses on characterizing bacterial physiology under osmotic stress. I wrote custom code in python and R allowing me to automatically analyze plate reader data. Furthermore, I coded a neural network to detect and segment bacterial cells in microscopy images. I therefore possess all the skill required to be a beneficial team member and would love the opportunity to apply my knowledge to this real world challenge.

The Merck innovation cup is an ideal opportunity for me to develop my career and pursue my professional goals. I have always wanted to translate my academic research into real world applications. I actively engage with Edinburgh innovations which is my university's commercialization service, as well as volunteering as a beta tester for Bountiful a platform aiming to catalyze research innovation. My ambition after finishing my Ph.D. is to found my own startup that focuses on characterizing basic cell physiology in a high-throughput manner. I believe that a lot of high-throughput screens waste the opportunity to collect free data and instead focus on a very specific target variable. I think that collecting more data on cells during the screening process will allow us to better understand the complex pathophysiology that underlies many diseases.

I would love the opportunity to discuss and develop my ideas at the Merck Innovation Cup and would like to thank you for taking the time to consider my application.

Sincerely,

Mark Zurbruegg

Attached: Curriculum Vitae