## STS Essay Questions

## 1. Research Project “Layperson’s Summary” (maximum 200 words)

Summarize your project in layperson’s terms, while maintaining scientific accuracy. Your explanation should be easily understandable and include background, procedures, conclusions and relevance. This summary will aid readers, including evaluators, journalists and the public.

In diabetics, beta cells produce insulin to maintain glucose levels. In beta cells, there are cell organelles called the Endoplasmic Reticulum. The Endoplasmic Reticulum surrounds the nucleus and is important to the cell’s survival. There are two types of Endoplasmic Reticulum: the Smooth ER and the Rough ER. The Rough ER is the type of ER that have ribosomes on their outside coverings that allow them to perform protein synthesis. In endocrine secretory cells, the Rough ER produces insulin. In every person, a certain amount of insulin is needed to lower the glucose levels to healthy levels. Over time, more stress is put on the Rough ERs of the beta cells since they must produce more insulin to lower the glucose levels. ER stress leads to the death of beta cells and eventually this leads to a decrease in insulin levels which cause glucose levels to rise dramatically. Through the insulin demand by the body, beta cells can detect the need for beta cell proliferation. The greater the insulin demand, the greater the need for more beta cells. This leads to the ER in beta cells activating the Unfolded Protein Response to proliferate beta cells and maintain healthy insulin levels.

## 2. Project Benefits and Impact (maximum 200 words)

What benefits do you think your research will bring to the world, and/or to your field? What additional steps, and by whom, might be needed for this benefit to be realized?

This research will allow further research of diabetics and offer more solutions on how to better treat diabetics and hopefully prevent people from getting diabetes. For example, if the UPR’s factors are controllable, then it could be possible to prevent ER stress from ever occurring, meaning that more beta cells will survive and be able to maintain healthy glucose levels in the body. Also, beta cell apoptosis could be prevented through the use of p53. By limiting p53 in beta cells, it would be possible to reduce the amount of beta cell apoptosis that occurs. Some additional steps that would need to be taken, would be to develop a technology that could maintain factors such as p53 in the body to ensure the survival of beta cells. This would then make it possible for a diabetic to maintain homeostasis without the requirement of insulin injections.

## 3. Your Potential as a Scientist, Mathematician or Engineer (maximum 250 words)

Address through specific and concrete examples what characteristics you have that best demonstrate your affinity and aptitude for being a good scientist.

* What have you done that illustrates scientific aptitude, leadership, curiosity, inventiveness and/or initiative?
* After completing your research, how has your interest in science, engineering, and/or math been clarified? What are your other STEM-related interests besides your project?
* How does your experience suggest future success as a scientist, mathematician or engineer?
* What do you plan to study in post-secondary education and what occupation do you plan to pursue? What do you hope to be doing 10 years from now?

Something I have done that illustrates scientific aptitude would be my ability to check over my data multiple times to ensure that I have collected accurate data so I can make evidence supported conclusions based off of them. Also, by doing this, I drew other conclusions based on my findings. This makes it possible for my study to have multiple connections to other studies which in turn could lead to it having many possible applications to real life. After completing my research, my interest in science and math have only grown. Through completing my research, I have been exposed to other studies that piqued my interest making me engaged in other topics I am unfamiliar with. Also, my interest in math has increased because of the importance of data collection in research and how it can be done multiple ways using statistics. My experience suggests that I am prepared to have a future career in science, because I’m willing to have an open mind based on what I learn. After high school, I hope to pursue a bachelor’s degree in chemistry, and I aspire to be a forensic toxicologist. I want to use my knowledge of science to help others that were wrongly accused or weren’t given justice for their crimes. Since science is factual evidence, it is an extremely useful tool for forensic scientists.

## 4. Major Scientific Question (maximum 250 words)

What is a major scientific question in your field whose answer you believe will have a significant impact on the world in the next 20 years, and why? Using examples from your own experience or research, explain how you might envision addressing the question over the next 20 years.

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A major scientific question whose answer I believe will have a significant impact on the world in the next 20 years would be, “Are AI’s becoming too human?”. The reason why this question is a very important one in today’s society would be because of society’s over reliance on technology to do work for them. For example, everyday people use technology to make life easier for them. However, with the introduction of AIs, it’s almost as that they are becoming so integrated in our society, that they are considered human. Eventually, I believe it is possible that AIs become so advanced that we rely on them to live. In my study, I suggest in the future it might be possible for researchers to develop a technology that enables diabetics to maintain p53 levels in their bodies. This is an example of how we can become too reliant on technology. We might become so reliant on technology in the future, that we end up becoming less human than AIs themselves. While technology is a very useful tool, it might be possible that we are overusing it.

## 5. "Tweet" about your project! Tell us about your project in 280 characters or less.

The Society might share this response if you are named a scholar or finalist.

Endoplasmic Reticulum Stress is when pancreatic beta cells are overworked. The goal of my study is to prevent beta cells from being overworked by controlling the factors that prevent Endoplasmic Reticulum Stress.

## 6. Greatest Accomplishment or Challenge (COMMON APP)

Please answer ONE of the prompts below from the Common App; we prefer that you think beyond your research project in this essay. (maximum 200 words)

A. Discuss an accomplishment, event, or realization that sparked a period of personal growth and a new understanding of yourself or others.

OR

B. The lessons we take from obstacles we encounter can be fundamental to later success. Recount a time when you faced a challenge, setback, or failure. How did it affect you, and what did you learn from the experience?

One time I achieved an accomplishment that sparked a period of personal growth would be when I first made varsity on my Cross Country team my sophomore year. When I made varsity, I was extremely happy, but unfortunately that was the only time I was able to run varsity that year because of my performance. However, running on varsity with 6 of the fastest runners on my team, made me realize how much I truly appreciated it because I looked up to the other varsity runners on my team. They inspired me to become better at running than I thought I could originally be. However, unfortunately the pandemic started, and my outdoor track season was canceled. But I stuck with my goal to train for the following Cross Country season as much as possible, so I could make varsity. Due to my hard work and effort, I was able to make varsity in my first race of the season, and I never gave up my spot since then.

## 7. About You (COMMON APP) (optional)

Some students have a background, identity, interest, or talent that is so meaningful they believe their application would be incomplete without it. If this sounds like you, then please share your story. (maximum 200 words)

I was introduced to chess in elementary school when I joined the chess club. At first, I only viewed chess as a leisure activity, but I eventually realized how complex it truly was. Each meeting, I was introduced to a new opening or tactic I never knew of before. This piqued my interest in the game because I realized I could use these openings and tactics to not only improve my playstyle, but also improve my decision making in life. Eventually, I enrolled in a chess tournament and I unfortunately lost. However, in chess you can either win, draw or lose a game. While a win is great, and draws are certainly better than losses, I always grew the most after my losses. After losing my first tournament, I analyzed the mistakes in my games, and I was able to find how to improve upon them. Eventually, when I enrolled in another chess tournament, I ended up winning it. I was so happy of my accomplishment, but I knew the only reason I won the tournament because I was able to admit my mistakes and find ways to fix them.

## 8. COVID-19 Pandemic (adapted from COMMON APP) (optional)

The COVID-19 pandemic has been experienced differently throughout the country and world. Share how it has impacted your life, especially its impact on your learning and as applicable on your submitted project and ability to work on that project. Examples include:

* Illness or loss within your family or support network
* Employment or housing disruptions within your family
* Food insecurity
* Toll on mental and emotional health
* New obligations such as part-time work or care for siblings or family members
* Availability of computer or internet access required to continue your studies
* Access to a safe and quiet study space
* A new direction for your major or career interests

(maximum 200 words)

Life since the pandemic has been so different that it almost seems I am currently living a second life, and my first one ended as soon as the pandemic began. Living during the pandemic wasn’t fun at all, but on the bright side it did give me more free time which I spent with my family. Surprisingly, I felt more social during the beginning of the pandemic than I have ever felt before. Online communication applications made it so easy to keep in touch with friends more than in person. However, while my social life improved surprisingly, my academic life certainly declined. Since I had to use Zoom for my classes, I was never able to learn much in a lesson as I did when I was in school. I was always faced with distractions in my house, that it made it quite difficult to pay attention to class. Also, being on Zoom made me feel extremely disconnected from class, that I eventually lost interest in many of my classes, which I probably would have enjoyed if they were in person. I am excited to return to in person classes this year and start fresh.