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Independent Study & Mentorship

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## Product Proposal

### Introduction and Statement of Purpose

Comprising a significant part of neurology, migraines are the third most common disease in the world, with over 14% of the population being affected by this condition. Technically speaking, migraines are headaches of varying intensity that are often accompanied by nausea and sensitivity to light and sound. However, the triggers of migraines are different for each person and they can be preceded by dehydration, hormonal changes, and even stress. Despite the significant number of people who are affected by this disease, research about migraines and its causes is largely underfunded. Thus, this lack of research on migraines has made it difficult for neurologists to effectively treat this disease.

Although the symptoms of migraines often lead to a multitude of symptoms that are difficult to function with, the psychological aspect of this condition is what makes migraines often unbearable to patients. Unable to concentrate on work or daily activities greatly diminishes the quality of life for such patients, rendering them to feel helpless and depressed. Thus, migraine patients become stuck in a cycle where pain and discomfort dictate their social and intimate lives.

Ultimately, since the main goal of healthcare professionals is to improve the quality of life for patients, it is important that the prescribed migraine medications achieve this exact purpose. No matter how beneficial a certain medication is at decreasing the intensity of a certain symptom, it must ultimately improve the patient quality of life in order to be proven effective. Thus, for my final product, I will be conducting a survey study to measure whether the intake of the relatively new class of medication, Calcitonin gene-related peptide (CGRP-R) is correlated with a statistically significant improvement in patient quality of life.

### Review of Skills and Research

In order to successfully see this project into completion, I will need to gain a better understanding on migraines and the different factors that affect this disease. Because migraines comprise such a significant portion of neurology, there are many different journals such as *The Journal of Headache and Pain* and *The Journal of Head and Face Pain* which feature multiple articles about this disease in each issue. Thus, these articles can be used to build up my knowledge of migraines so that I am able to conduct a research project over them. I will also conduct research about CGRP medication and how exactly it works so that I have an understanding of its effectiveness on the molecular level. In addition, I will also have to research about the guidelines and formats that must be followed in order to submit an article for publishing. By looking up this information beforehand, I can work on the pacing and organization of my final product effectively.

In terms of the high-level thinking skills that will be used in order to complete this project, I will be synthesizing different academic resources and working with Dr. Dike to create a preliminary understanding of migraines and the CGRP medication. Then, after collecting my data, I will analyze the patient data to create a solid conclusion about whether a correlation exists between the CGRP medication and quality of life. This step will also involve synthesizing because I will have to use my knowledge from AP Statistics to bring together data from various sources to create a conclusion. Finally, I will be synthesizing once again by sharing my findings in a research paper so that I can meet my ultimate goal of helping others.

### Methodology

To start off, I will talk to Dr. Dike to see if some of his colleagues at other neurology clinics would be willing to share data about patients suffering from migraines. The reason I will talk to Dr. Dike first before contacting other neurology clinics is because he can introduce me to doctors who will then take me seriously because of the shared connection. Although Dr. Dike has more than enough patients with migraines, I want to collect a larger sampling size so that my results are more representative of the true population. Next, I will conduct research about migraines, the different factors that have been linked to this disease, and the tests that can be used to diagnose them. I will also research the guidelines of different journals to find out due dates and the required formatting styles in order to get an article published so that I am aware of this information and what is needed before I formally begin my analysis. In addition, I will also use this research time to learn more about the statistics side of conducting a retrospective analysis. If I am confused, I can talk to Ms. Courtney, my AP Statistics teacher, or Coach Addo,

who is pursuing a masters in statistics. By asking for help and verifying my experimental design, I can be sure to eliminate any bias.

After conducting research, I will collect the patient data by calling Dr. Dike's migraine patients and asking them a series of questions from the Migraine-Specific Quality of Life Questionnaire version 2.1. In order to call the patients, I will have to maintain HIPAA regulations. Then, I will analyze the patient data that I have collected to see if there is a correlation between quality of life and the migraine medication. For this part of the project, I will have to draw multiple graphs and use Dr. Dike's guidance in order to figure out what must specifically be done in order to statistically measure the improvement. Finally, I will write a research paper over my results in order to share my findings with the public.

### Materials

The materials that I will need for my final product are essentially a computer with internet access so that I can analyze the patient data and write my research paper.

### Conclusions

Overall, I hope to use this final product to delve into the world of medical research so that I have a preliminary understanding of how to professionally conduct research before I go into college. This research project will also help me see what it is like to work as a neurologist and how patient data can be used to make larger, more overarching conclusions about the nature of a disease. Even if I do not find convincing evidence for a correlation between the migraine medication and improvement in quality of life, the mere experience of conducting a survey

analysis will be a helpful skill that I will learn through this project. Furthermore, data that does not support a hypothesis is just as important as data that supports a hypothesis because both scenarios provide ample information about the topic at hand.

In addition, my research project will also benefit doctors and medical researchers because it will create conversation about migraines, a truly under-researched disease. Professionals can use the results of my retrospective analysis to support or perhaps contradict their own findings. Regardless of the results, my research will be unleashing new information about migraines to others, and it can be used to one day find a cure for treating this common disease.

### Product Calendar

| <b>Date</b> | <b>Task</b>  |
|-------------|--|
| 2/12        | Talk to Dr. Dike to see if some of his colleagues at other Neurology clinics would be willing to share data about patients suffering from migraines.   |
| 2/12-2/15   | Conduct research about how migraine occur and what the different treatment options/ causes are so that a generalized understanding can be achieved.  |
| 2/16-2/26   | Learn about the different risk factors that are associated with migraine development in order to look out for confounding factors that must be taken into account during the retrospective analysis. |
| 2/26-3/06   | Do research about the CGRP medications and how they differ with one another.   |
| 3/6-3/11    | Research/ email/ call different journals to find out due dates and the required formatting styles in order to get an article published.  |
| 3/18 -4/18  | Call Dr. Dike's migraine patients and collect data about their quality of life improvement.  |
| 4/18-4/28   | Analyze the data with Dr. Dike   |
| 4/28-5/08   | Write the research paper   |
| 5/08-5/10   | Work on sending article in the correct format for publication at different   |

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|  | academic journals about neurology. |
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