Dreams as a Surrogate Marker for Disease Progression in Multiple Sclerosis Patients

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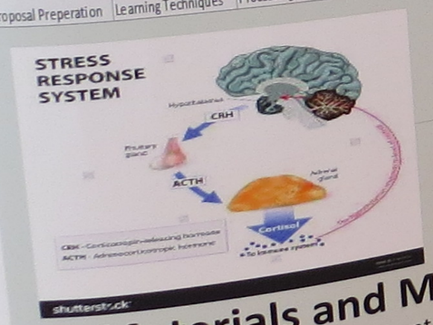
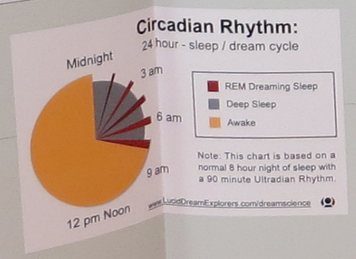
Abstract

Multiple Sclerosis (MS) is an autoimmune disease that leads to brain disorders which can significantly disrupt many different cognitive actions and activities in our body. Dreaming is a cognitive ability like speaking or processing information that could provide insight or serve as a possible surrogate marker for stress and disease progression in MS patients. Dreaming is connected with neuron activity and neurons are the brain tissue that MS specifically targets. This study will focus on the assessment of relationships between cortisol levels, dream intensity and frequency, and the severity of progression of MS disease by using immunofluorescent techniques that measure antibodies to myelin and competitive ELISA to assess cortisol in saliva. In addition to both immunofluorescent and competitive ELISA techniques, we will be using dream questionnaires. Specifically, the questionnaires will inquire about the MS patients dream experience, duration of sleep, feelings and emotions associated with sleeping. We hypothesize that the quality of sleep, frequency of negative dreaming and increased cortisol levels will correlate directly with more severe MS disease as assessed by autoantibody titers to myelin.

Timeline

Week 1	Week2	Week 3	Week 4	Week5	Week 6
Proposal Preperation	Learning Techniques	Data Collection & Sample Processing	Data collection & Sample Processing	Data collection & Sample processing / Data analysis	Data analysis, Conclusions, Poster, Final Paper





Materials and Methods

- Enzyme-linked immunosorbent assay (ELISA)
  - determine titers of antibodies to myelin and concentrations of cortisol in serum and saliva, respectively.
- Immunofluorescence Technique
- Questionnaires
  - We will assess cortisol levels using a competitive ELISA assay. The less glow/color you have with the reaction, the more cortisol is present which will be used as an indicator of stress.

Research Question:

Can dreams be a surrogate marker for stress and disease progression in Multiple Sclerosis patients?

Introduction

MS specifically targets brain cells that are referred to as neurons. Neurons are responsible for the physical actions and mental thoughts we make in our everyday lives and act as receptors in the brain that send out and receive signals.

- There are many components that make up a neuron in the brain within the Central Nervous System (CNS).
- A latent virus, genetic trigger, or an immune system malfunction may cause inflammation in the body. It is believed by scientists and researchers that MS may start with inflammation.
- White blood cells that fight infections and viruses enter the CNS and begin to attack the myelin sheath and axons. This process is known as "demyelination"
- Many physical problems may occur including numbness in limbs, impairment of speech/muscle coordination, blurred vision, trouble processing information, recalling memories, and severe fatigue. [5]
- 400,000 people in the United States alone have MS, 2.5 million people world-wide
- About 200 individuals in the US are diagnosed with MS each week.
- Although there is only a 0.1% chance of developing MS, certain factors increase the chance of developing the disease such as a parent with MS (1-5%), an identical twin with MS (25-30%), type 1 diabetes, thyroid disease, or inflammatory bowel disease.
- Dreams are typically formed and experienced by an individual during a sleep phase known as Rapid Eye Movement (REM). REM is the phase of sleep in which the brain is the most active, essentially stating that the mind is active while the body is sleeping.
- Because dreams are processed in the brain and use stored memory, which could theoretically present a challenge to MS patients because their minds are affected in such a way that prevents them from processing information and recalling memories normally.

Expected Outcomes

We are expecting to see a correlation between sleep regulation and dream experiences in MS patients as well as the severity and progression of MS symptoms. We are predicting that dreams can be a surrogate marker for stress and disease progression in Multiple Sclerosis patients. Furthermore, this research may provide useful data to design therapies and interventions to alleviate stress in MS patients by improving sleep regulation and to decrease severity of symptoms in MS patients.

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