Hereditary Spastic Paraplegia (HPS) is a rare group of neurological disorders associated with progressive weakness and extreme spasticity of the lower extremities. An autosomal dominant form of HSP results from mutations in the KIF5A gene [2,3,5], which leads to axonal degeneration in the corticospinal tract [1,2,3,5]. KIF5A is a kinesin motor involved in moving organelles and vesicles in axons [3,4,5]. *Although it is believed that the degeneration is linked to a faulty transportation system due to a mutated KIF5A, the pathogenesis of this disorder is still unknown.*

My **primary goal** is to determine how KIF5A affects vesicle transport in axons found in lower extremities. I will use *Drosophila Melanogaster* as a model organism because they serve as good model for probing kinesin motor function in the nervous system. My **hypothesis** is that a mutation in KIF5A prevents mitochondria from reaching the end of the axon resulting in degradation and from this spasticity of the limbs. My **long-term goal** is to understand how KIF5A mutations leads to specific neurodegenerative effects of the lower extremities.

**Aim 1: Find conserved amino acids of KIF5A that are important to vesicle transportation**

Approach: I will begin by using BLAST to find homologs for KIF5A and then ClustalOmega to perform sequence alignment. This will help me identify the most conserved regions in the kinesin motor domain. I will then use CRISPR to knockout these regions. I will then screen for those Drosophila that have observable symptoms. **Hypothesis:** those that show obvious spasticity will have stunted axonal vesicle transport. **Rational:** This will allow me to confirm that vesicle transportation is related to KIF5A.

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