Methodology development for the characterization of proteins responsible for heartbeats.

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Presentation Description:

There is currently no known approach that can accurately measure the amount of proteins responsible for heartbeats. To assist treatment of heart diseases, we are developing a sensitive and accurate mass approach that can measure the precise amount of these proteins in heart cells.

Abstract:

Heart disease is the leading cause of death worldwide and thus new treatments are incredibly important. Irregular heartbeats are a major cause of heart diseases, and heartbeats are orchestrated by a number of membrane proteins. Among them, Nav1.5, an essential domain of a sodium membrane protein is responsible for allowing positively charged sodium ions to flow into the cell quickly, making the charge in the heart muscle cells less negative. This change in charge allows for the characteristic contraction in the heart muscle cells. Malfunction of Nav1.5 is involved in various heart diseases such as Type 3 long QT Syndrome and Brugada Syndrome. These diseases result in an abnormally large amount of sodium ions entering the cells through the sodium membrane proteins. By decreasing the amount of Nav1.5 in the heart cells, researchers have created a treatment for Brugada Syndrome. The treatment can decrease the amount of Nav1.5 in the heart cells, however, due to its properties, Nav1.5 is a difficult protein to experiment on. Therefore, minimal studies have been done to characterize the absolute amount of this protein, which could be critical for the creation of new treatments. In this presentation, I will talk about how I participated in the development of a method called “mass spectrometry based parallel reaction monitoring assay and glycopeptide capture” which allows us to characterize the absolute amount of the Nav1.5 protein. Currently, we have been testing this technique on Chinese hamster ovary cells that have been modified to produce the Nav1.5 protein. However, further tests will involve using the difficult to access, heart cell muscles.