Calmodulin

Calmodulin is a calcium-binding protein that plays a critical role in regulating many cellular processes in eukaryotic cells. It is a small protein with a molecular weight of around 17 kDa and is highly conserved across species.

Calmodulin binds to calcium ions in a cooperative manner, meaning that as the concentration of calcium ions increases, calmodulin undergoes conformational changes that enable it to interact with target proteins. Calmodulin can bind to a wide range of proteins, including enzymes, ion channels, transcription factors, and cytoskeletal proteins.

Through its interactions with these target proteins, calmodulin regulates various cellular processes, such as muscle contraction, neurotransmitter release, cell cycle progression, and gene expression. It can also modulate the activity of various signaling pathways, such as the MAPK and PI3K-Akt pathways.

Dysregulation of calmodulin function has been implicated in several human diseases, including cardiovascular disease, neurodegenerative disorders, and cancer. For example, mutations in genes that encode calmodulin have been associated with cardiac arrhythmias, while altered calmodulin signaling has been linked to the pathogenesis of Alzheimer's disease and breast cancer.

Due to its critical role in cellular physiology and disease, calmodulin is an important subject of research in the fields of cell biology, biochemistry, and pharmacology.

IQGAP1 contains multiple domains, including IQ motifs that can bind to calmodulin and Ras GTPases, a WW domain that binds to proline-rich motifs, and a C-terminal domain that interacts with actin filaments. Through these interactions, IQGAP1 can modulate the activity of various signaling pathways, such as the Rho GTPase and MAPK pathways, and regulate the organization and dynamics of the actin cytoskeleton.

Studies have suggested that IQGAP1 is involved in the development and progression of several human diseases, including cancer, cardiovascular disease, and neurological disorders. Dysregulation of IQGAP1 expression and activity has been implicated in tumor invasion and metastasis, as well as in the pathogenesis of Alzheimer's disease and stroke.

Given its multifaceted roles in cellular physiology and pathology, IQGAP1 is an important subject of research in the fields of cell biology, cancer biology, and neuroscience.