SMART Teams 2013-2014
Research and Design Phase

West Bend High Schools SMART Team

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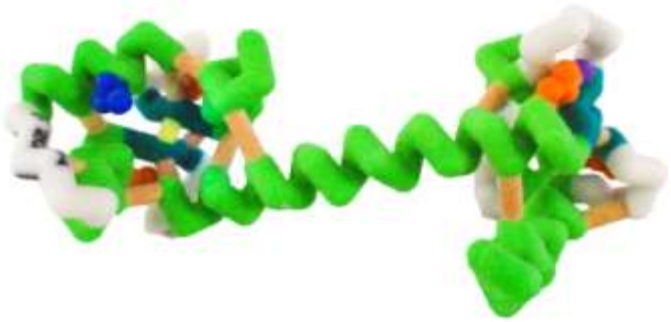
CaM I Make You Feel Better?

PDB: 3CLN

Primary Citation: Babu, Y.S., Buggs, C.E., & Cook, W.J. (1998) Structure of Calmodulin refined at 2.2 A resolution. J.Mol. Biology. 204. 191-204.

Format: Alpha carbon backbone



RP: Zcorp with plaster

Description:

According to the Alzheimer's Association, more than 5 million Americans are living with Alzheimer's. One in three seniors dies with this disease or another type of dementia. The potential to eliminate this painful disease lies within calmodulin, an intra-cellular receptor protein that is found throughout the body but functions in the brain to affect learning and memory. Calmodulin (CaM) plays a role in cell growth, proliferation and movement of electrons within the electron-transport chain. It enters from the post-synaptic side of the spine of a dendrite within the brain and automatically binds to calcium causing a conformational changing of the calmodulin itself. Calcium binds to the EF hand motif (a conserved helix–loop-helix sequence) found in calmodulin. The action of the calcium binding induces a conformational change to calmodulin, which forms a calmodulin-complex. An enzyme, CaM Kinase 2 binds to and activates the calmodulin-complex. Activation causes an influx in the amount of α-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid receptors (AMPAR), which increases the amount of calcium entering the cell. Researchers believe that an increase in calcium absorbed directly impacts the durability and stability of the brain. The West Bend SMART (Students Modeling A Research Topic) Team modeled CaM using 3D printing technology. Further calmodulin studies could prove to be the key to developing therapeutic treatments for mental illness, as well as finding ways to increase mental function.

Specific Model Information:

- Alpha helices are highlighted in lime green.
- Beta sheets are highlighted in teal.
- The calcium ion is displayed in ball and stick and colored purple.
- Amino acids (Glu31, Glu67, Glu104 and Glu140), displayed in ball and stick and colored orange are responsible for binding calcium.
- The amino acid, Met 124 displayed in ball and stick and colored blue, is the binding site for CaM Kinase I.
- Four terminal alpha carbon backbone are colored white.
- Hydrogen bonds are colored yellow.
- Structural supports are colored grey.

http://cbm.msoe.edu/smartTeams/

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