

Hartford Union High School SMART Team

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Not So Hot Rods: Mutations in Rhodopsin Kinase in Regards to Oguchi Disease

PDB: 3C51

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Format: Alpha carbon backbone

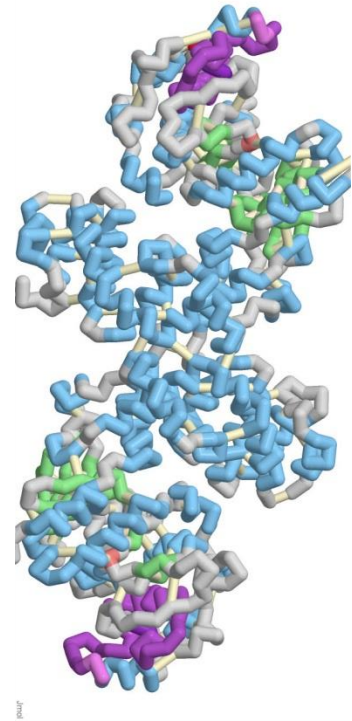
RP: Zcorp with plaster

Description:

The average person's eyes adapt to darkness within minutes. For those with Oguchi's disease, adaptation can be slowed to several hours. Oguchi disease is an autosomal recessive disorder that results in greatly slowed phototransduction.

Phototransduction is a cascade reaction beginning with a photon activating rhodopsin in the rod and leading to hyperpolarization of the cell. Oguchi disease is caused by mutations in rhodopsin kinase which prevent the phosphorylation of rhodopsin, lowering rhodopsin's affinity for arrestin. This reduced ability to bind arrestin decreases the speed in which rhodopsin is deactivated and prepped to reactivate. After a long period in a dark environment, the rhodopsin is eventually deactivated by arrestin, allowing it to be recycled. The Hartford Union High School SMART (Students Modelling a Research Topic) Team has designed a model of rhodopsin kinase to investigate its

structure-function relationship. Oguchi disease can be caused by two different mutations in rhodopsin kinase: large deletion or point mutation. In our 3D model, we will highlight the complete deletion of exon five, the partial deletion at the C-terminus, and point mutations in the catalytic domain (Val380Asp and Pro391His) that cause Oguchi disease. Understanding the structure-function relationships of rhodopsin kinase could shed more light on night blindness. This program is supported by a grant from NIH and CTSA.



Specific Model Information:

- The alpha helices in our model are colored light sky blue.
- The beta pleated sheets are colored light green.
- The amino acid chain corresponding to exon 5 is colored medium orchid.
- The ends of the amino acid chain corresponding to exon 5 are colored dark orchid and violet.
- Amino acids 380 and 391 are shown and colored cpk.
- Amino acid 334 is colored light coral.
- The structural supports are colored lemon chiffon.
- The hydrogen bonds are colored papaya whip.

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

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