SMART Teams 2014-2015 Research and Design Phase

Kettle Moraine High School SMART Team

Mahi Gokuli, Jerad Grewe, Ethan Helfenstein, Lindsay Jost, Samuel Kanakkanatt, Rylie Morris, Christina Nielsen, Justin Smet, and Andrew Straka

Teacher: Melissa Kirby

Mentor: Robert W. Peoples, Ph.D., Marquette University, Department of Biomedical Sciences

N-Methyl-D-aspartate (NMDA) Receptor

PDB: 4PE5

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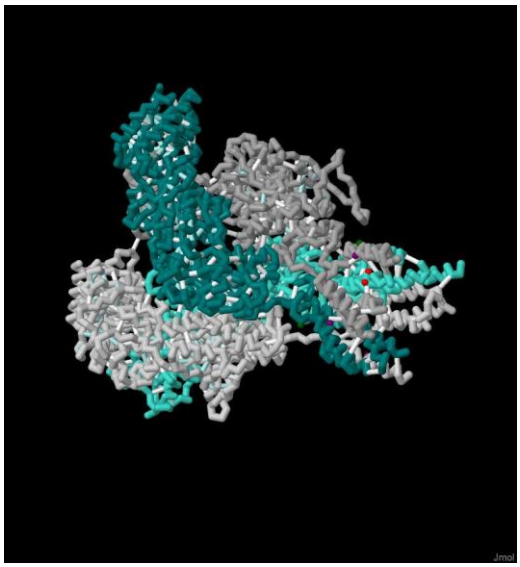

Format: Alpha carbon backbone

RP: Zcorp with plaster

Description:

Alcohol affects our world more than any other drug. As the third leading preventable cause of death, it is adolescents' drug of choice, and parental alcoholism impacts the lives of one in four children. Alcohol consumption interferes with communication between neurons in the central nervous system, causing symptoms such as motor incoordination and memory impairment. The NMDA receptor, an ion channel located within neuronal membranes, is a major target upon which alcohol acts. When activated by the signaling molecule glutamate, a gate in its membrane-associated (M) domains opens; allowing calcium and sodium cations to enter the neuron through its ion channel. Alcohol, however, interferes with this process by binding to the M domains, preventing cations from entering the neuron and causing many of the known effects of alcohol consumption. Mutations at positions in the M domains, such as M823 in the GluN2A M4 domain and F636 in the GluN2A M3 domain, have been found to significantly alter alcohol sensitivity; making it less susceptible. The Kettle Moraine High School's SMART (Students Modeling A Research Topic) Team has designed a model of the NMDA receptor using 3D printing technology to investigate structure-function relationships. Further research on the interactions between alcohol and the NMDA receptor could aid in finding a solution to the abuse of this historically documented and often detrimental drug.

Specific Model Information:

- GluN1 (Lys25 - Leu830) - light grey backbone
- GluN1 (Lys25 - Ile833) - dark grey backbone
- GluN2B (Lys30 - Leu841) - turquoise backbone
- GluN2B (Pro32 - Ser 838) - teal backbone
- hbonds-pale turquoise
- struts - silver
- Gly638 - blue
- Phe637 - red
- Met824 - dark green
- Phe639 - red
- Leu825 - purple
- Met818 - dark green
- Phe637 - red
- Leu819 - purple
- Phe638 - red

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

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