



Analysis of the Molecular Role of ANK3 in Bipolar Disorder

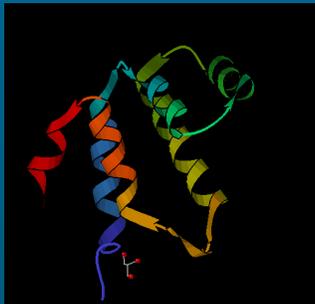
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Abstract

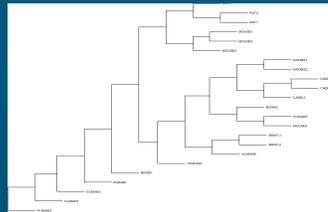
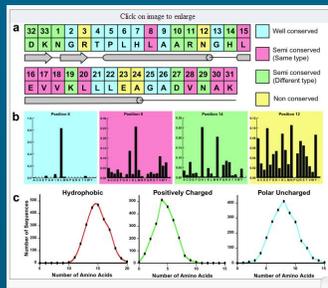
The protein ankyrin 3 is encoded by a gene called *ANK3* located on chromosome 10q21. Ankyrins are peripheral membrane proteins thought to interconnect integral proteins with the spectrin-based membrane skeleton. Ankyrin 3 is an immunologically distinct gene product from ankyrins ANK1 and ANK2, and was originally found at the axonal initial segment and nodes of Ranvier of neurons that has been shown to regulate the assembly of voltage-gated sodium channels in the central and peripheral nervous systems. According to a genome wide association study, mutations in the *ANK3* gene may be involved in the bipolar disorder, which is a chemical imbalance of neurotransmitters in the brain. This mental condition causes dramatic mood swings characterized by episodes of elation and high activity alternating with periods of low mood and low energy. Bipolar disorder affects approximately 5.7 million American adults, or about 2.6 percent of the U.S. population age 18 and older in a given year. The median age of onset for bipolar disorders is 25 years. During the Spring 2009 Introduction to Chemical Research class, we used bioinformatics to visualize mutations in this disorder. We wanted to investigate ANK3 to elucidate its role in bipolar disorder.



ANK3
Disease: Bipolar Disorder
Protein name: Ankyrin-G
Gene symbol: ANK3
PDB symbol: 2yvi
OMIM: 600465
Chromosome: 10q21
Pfam: ANK (PF00023)



Consensus Ankyrin Repeat Proteins

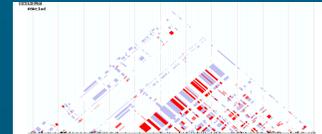


International HapMap Project

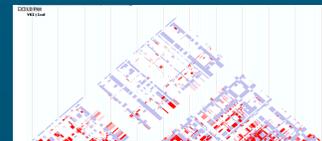
CEU: Utah residents with Northern and Western European ancestry from the CEPH collection



ASW: African ancestry in Southwest USA

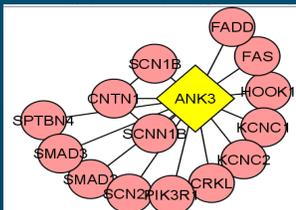


YRI: Yoruban in Ibadan, Nigeria

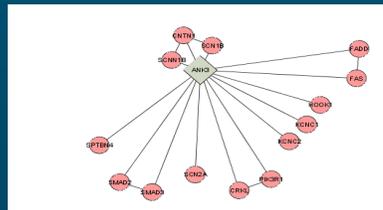


CYTOSCAPE

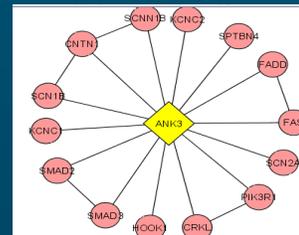
Circular Layout



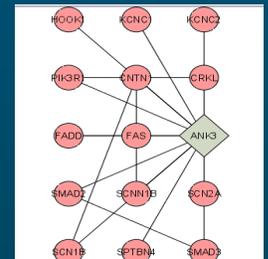
MIMI Plug-in



Edge-weighted Spring Embedded-unweighted



Grid Layout



Software and References

Protein DataBank=www.rcsb.org/pdb
Universal Protein Resource=<http://www.uniprot.org>
Putty=<http://www.chiark.greenend.org.uk/~sgtatham/putty>
WinSCP=<http://winscp.net/eng/index.php>
<http://meme.sd.edu/meme/meme.html>
GeneDoc=<http://www.nrbsc.org/downloads/>
FigTree=<http://tree.bio.ed.ac.uk/software/figtree>
<http://www.hapmap.org>
<http://portal.ncbi.nlm.nih.gov/gateway>
<http://java.sun.com>
<http://pfam.sanger.ac.uk/family/PF00023>
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?tool=pubmed&pubmedid=12461176>,
Mosavi, L.K., Minor, Jr, D.L., Peng, Z., "Consensus-derived Structural Determinants of the Ankyrin Repeat Motif"

Acknowledgments

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