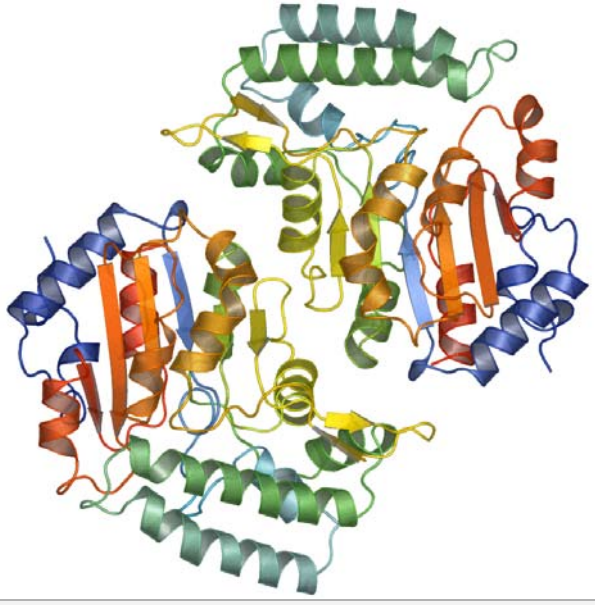
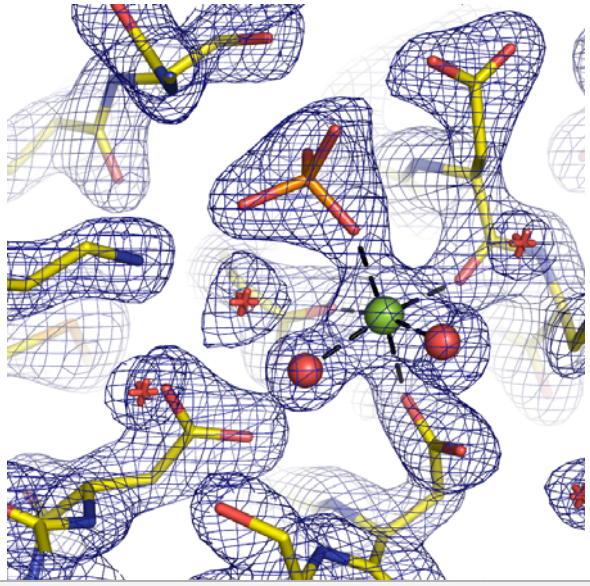
Center for Eukaryotic Structural Genomics

Protein Structure Initiative

Target ID	GO.36414	
Source Organism	*Mus musculus*	
Target Name	BC038029	
PDB Entry	2BDU	Deposition: 20-Oct-2005
Function	cytosolic 5´-nucleotidase III (FF/Refine: 2G06, 2G07, 2G08, 2G09, 2G0A, 2Q4T)	
Produced From	*E. coli* B834, pRARE2, pVP-16	
Structure by X-ray	Resolution: 2.35Å	R-value (R-free): 16.3% (22.0%)
	No. of Residues/ASU: 582 (592)	Complexes/ASU: 2
Data Collected At	Advanced Photon Source SER-CAT 22-ID 10-Oct-2005	
Authors	E. Bitto, C.A. Bingman, G.E. Wesenberg, G.N. Phillips, Jr.	





Structural Features

PN-1 catalyzes dephosphorylation of pyrimidine 5'-mononucleosides. Deficiency of PN-1 activity in erythrocytes results in non-spherocytic hemolytic anemia. This deficiency can be either hereditary, or acquired through lead poisoning. This is the first structure of a PN-1, and at 92% sequence identity to its human counterpart provides and excellent framework for understanding the human enzyme. The structure reveals a fold in the haloacid dehydrogenase superfamily. The active site is highly similar to phosphoserine phosphatases. In an extensive follow-up studies, we have defined the entire catalytic cycle of this enzyme through structures with Mg^{++} alone, Mg^{++} PO4, a beryllium fluoride phosphoenzyme analog, and an aluminum fluoride transition state analog. We have further structurally characterized the Lead(II) binding site, and propose a mechanism whereby Lead(II) compromises the active site, and inhibits this enzyme in acquired spherocytic anemia resulting from lead poisoning.

References: (1) Bitto, E., Bingman, C.A., Wesenberg, G.E., McCoy, J.G., Phillips, G.N., Jr. (2006) Structure of pyrimidine 5'-nucleotidase type 1. Insight into mechanism of action and inhibition during lead poisoning. *J Biol Chem* 281(29):20521-9.

Percent Identity with Nearest PDB Structure at Time Solved	16% (1NN1),10% (1QYI)
Pfam Cluster	UPMH-1
Sequence Cluster Size : Structures in PDB	70 NR at e<0.1

Center for Eukaryotic Structural Genomics (CESG), University of Wisconsin-Madison Biochemistry Department, 433 Babcock Drive, Madison, WI 53706-1549; phone: 608.263.2183; fax: 608.890.1942; email: cesginfo@biochem.wisc.edu; website: http://www.uwstructuralgenomics.org. This research funded by NIH / NIGMS Protein Structure Initiative grants U54 GM074901 and P50 GM064598.