Sulfurtransferases and Cdc25 phosphatases, two enzymes for one fold. Sequence and structural analysis.

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Rhodaneses (thiosulfate:cyanide sulfurtransferases) and Cdc25 phosphatases are enzymes that catalyze distinct reactions. Rhodaneses are involved in the formation, interconversion and transport of compound containing sulfane atoms. Dual-specific Cdc25 phosphatases are tyrosine protein phosphatases required for progression of the cell cycle in mammals. Both enzymes are widespread among living organisms, although their phisiological role is not yet fully elucidated. The recently determined three-dimensional structures of Cdc25A (Fauman et al., 1998) has shown that Cdc25 has a three-dimensional fold very similar to that of rhodanese, and that the catalytic Cys residue has the same location in the two enzymes. The structural similarity of Cdc25A is greather towards Azotobacter vinelandii rhodanese, RhdA (Bordo et al., 2000). The distinct substrate specificity of the two enzymes apperars to be due to the distinct lenght of the catalytic loop, which assumes a cradle-like structure around the catalytic Cys residue, and is formed by five residues (C-X(4)-R) in RhdA and six residues (C-X(5)-R) in Cdc25A. The use of computer analysis, including homology search and threading techniques, has allowed to identify amino acid sequence belonging to the Cdc25 or rhodanese families, to depict a common evolutionary path and to suggest novel biological functions, such as arsenic and mercury resistance.

REFERENCES

Fauman et al. (1998) Cell, 93, 617-625.
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