Zinc phosphodiesterase – a new member of the metallo beta-lactamase superfamily

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The elaC gene of Escherichia coli encodes a binuclear zinc phosphodiesterase (ZiPD) [1]. ZiPD belongs to the metallo-β-lactamase superfamily of proteins. Proteins sharing this fold catalyze a wide variety of different reactions. Hydrolytic metallo-β-lactamase proteins mostly bind zinc, recombinant glyoxalase II (a thiolesterase) is isolated with iron, manganese and zinc, while redox-active rubredoxin-oxygen-oxidoreductase requires a bi-iron site. In general, the metallo-β-lactamase fold allows for remarkably different catalytic activities and metal selectivities. ZiPD homologues are found in all domains of life and the homolog gene in B. sublitis is essential for viability [2]. In order to characterize the function of E. coli gene and the gene product:

(a) the metal binding residues were identified by mutational exchange and kinetic as well as X-ray absorption spectroscopic analysis of the mutant proteins;
(b) the enigmatic physiological function of E. coli ZiPD was investigated by the characterization of the E. coli elaC deletion mutant;
(c) the metal specificity of different members of the metallo beta lactamase superfamily was addressed by a comparison of the metal binding affinities [3-5] and
(d) the function of conserved sequence pattern in the ElaC genes [6].

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