

Hiroshi Ogawara: Distribution of PASTA domains in penicillin-binding proteins and serine/threonine kinases of *Actinobacteria*. REVIEW ARTICLE

Summary: PASTA domains (penicillin-binding protein and serine/threonine kinase-associated domains) have been identified in penicillin-binding proteins and serine/threonine kinases of Gram-positive Firmicutes and *Actinobacteria*. They are believed to bind β -lactam antibiotics, and be involved in peptidoglycan metabolism, although their biological function is not definitively clarified. *Actinobacteria*, especially *Streptomyces* species, are distinct in that they undergo complex cellular differentiation and produce various antibiotics including β -lactams. This review focuses on the distribution of PASTA domains in penicillin-binding proteins and serine/threonine kinases in *Actinobacteria*. In *Actinobacteria*, PASTA domains are detectable exclusively in class A but not in class B penicillin-binding proteins, in sharp contrast to the cases in other bacteria. In penicillin-binding proteins, PASTA domains distribute independently from taxonomy with some distribution bias. Particularly interesting thing is that no *Streptomyces* species have penicillin-binding protein with PASTA domains. Protein kinases in *Actinobacteria* possess 0 to 5 PASTA domains in their molecules. Protein kinases in *Streptomyces* can be classified into three groups: no PASTA domain, 1 PASTA domain and 4 PASTA domain-containing groups. The 4 PASTA domain-containing groups can be further divided into two subgroups. The serine/threonine kinases in different groups may perform different functions. The pocket region in one of these subgroup is more dense and extended, thus it may be involved in binding of ligands like β -lactams more efficiently.

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