

Structural and functional characterization of sugar epimerases in Pathogenic bacteria

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Several gram negative and positive bacteria have the ability to scavenge and catabolize sialic acids. This gives them the advantage of evading the host immune system. The genes of the sialic acid catabolic pathway are generally present as an operon NanAKE. The main enzymes of the of operon are Nan A- lyase which breaks down sialic acid to N acetyl Mannosamine(ManNAc) and acetate, NanK- kinase which phosphorylates the ManNAc ,NanE- epimerase which epimerises Mannosamine 6Phosphate(ManNAc6P) to Glucosamine 6 Phosphate (Glc-NAc6P). A deaminase and deacetylase subsequently act on the GlcNAc6P leading to the formation of Glucose 6 Phosphate which enters glycolysisThe NanE or the N-Acetylmannosamine 6 Phosphate 2 epimerase is an important enzyme in the sialic acid catabolism pathway as commits the ManNAc6P towards Glycolysis.

The ManNAc6P epimerases belong to the TIM barrel superfamily having a common Phosphate binding domain. Previous studies on C.perfringens epimerase suggest that it employs a single base protonation/deprotonation mechanism to catalyze the epimerization.

We have carried out comparative structural and functional characterization of from the NanE epimerasetwo important gram negative bacteria- Fusobacterium nucleatum(Fn)and Vibrio cholera(Vc).. Fusobacterium nucleatum is a major player in periodontitis, extra-oral infections of the skin, brain, vagina and the uterus. It has also been implicated in complications in pregnancy. Vibrio cholera causes the severe diarrheal disease Cholera.This is the first characterization of the NanE epimerase from these two organisms till date.

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