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The biosynthesis, biochemistry and physiology of coenzyme 3PG-F420

Coenzymes promote productive enzymatic activities assisting in almost all major metabolic pathways. Coenzyme F_{420} is a deazaflavin that acts as a hydride carrier in diverse redox reactions and has been indicated in a range of both bacteria and archaea. 3PG -F_{420} is a novel hydroxylated derivative of coenzyme F_{420}, found in the Gram-negative, endofungal bacterium *Paraburkholderia rhizoxinica*, a symbiont of phytopathogenic fungi *Rhizopus microsporus*.

The availability of the exotic cofactor F_{420} is not generous and the biosynthetic pathway of F_{420} has remained elusive regarding the starting precursor and substrate specificity of key enzymes involved. 2-phospho-L-lactate guanylyltransferase (CofC in Archaea and also known as FbiD in Bacteria) is a key enzyme in the biosynthesis of coenzyme F_{420}. Within the field of research, both 2-phospho-L-lactate (2-PL) and phosphoenolpyruvate (PEP) have been recognized as the accepted substrates by CofC/FbiD of Archaea and Mycobacteria respectively. In contrast, CofC of *P. rhizoxinica* accepts 3-D-phosphoglyceric acid (3-PG) as a substrate thus leading to the formation of a novel derivative termed coenzyme 3PG-F*420*. Both 3-PG and PEP are intermediate of glycolysis while availability, source and function of 2-PL are yet to be determined.

The main goals of the thesis are to complete our model of 3PG-F_{420} biosynthesis, to discover more 3PG-F_{420} producing organisms and to study the biochemical and physiological roles of 3PG-F_{420} in these organisms.

Publications

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