

BIOCHEMISTRY SEMINAR SERIES



“Characterization of RquA – a novel enzyme used in microbial rhodoquinone biosynthesis”

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Rhodoquinone (RQ) is a close analogue of ubiquinone (UQ) that confers diverse bacterial and eukaryotic taxa the ability to utilize fumarate as an electron acceptor in hypoxic conditions. The RquA protein, identified in a *Rhodospirillum rubrum* RQ-deficient mutant, has been shown to be required for RQ biosynthesis in bacteria. In this talk, it will be shown that RquA, homologous to SAM-dependent methyltransferases, is necessary and sufficient to catalyze RQ biosynthesis from UQ in vitro. RquA uses SAM as the amino group donor in a substitution reaction that converts UQ to RQ. In contrast to known aminotransferases, RquA does not use pyridoxal 5'-phosphate (PLP) as a coenzyme, but requires the presence of Mn²⁺ as a cofactor. As these findings reveal, RquA provides an entirely new example of a non-canonical SAM-dependent enzyme that does not catalyze methyl transfer, instead it uses SAM in an atypical amino transfer mechanism. The RQ biosynthetic pathway in microbes differs significantly from that of animals which derive RQ from tryptophan using part of the kynurenine pathway.

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