

Genomic Analyses of the Quinol Oxidases and/or Quinone Reductases Involved in Bacterial Extracellular Electron Transfer

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Up to date, 3 different families of quinol oxidases and/or quinone reductases involved in bacterial extracellular electron transfer (EET) have been discovered. They are the CymA, CbcL/MtrH/MtoC and ImcH families of quinol oxidases and/or quinone reductases that are all multiheme *c*-type cytochromes (*c*-Cyts). To investigate to what extent they are distributed among microorganisms, we search the bacterial as well as archaeal genomes for the homologs of these *c*-Cyts. Search results reveal that the homologs of these *c*-Cyts are only found in the Domain Bacteria. Moreover, the CymA homologs are only found in the phylum of Proteobacteria. In contrast to CymA, CbcL/MtrH/MtoC homologs are found in 15 phyla, while ImcH homologs are found in 12 phyla. Moreover, CymA and CbcL/MtrH/MtoC homologs are suggested to catalyze both quinol-oxidizing and quinone-reducing reactions. ImcH homologs are implied to be only the quinol oxidases. Finally, some bacteria have the homologs of 2 different families of *c*-Cyts, which may improve the bacterial capability to exchange electrons with extracellular substrates.