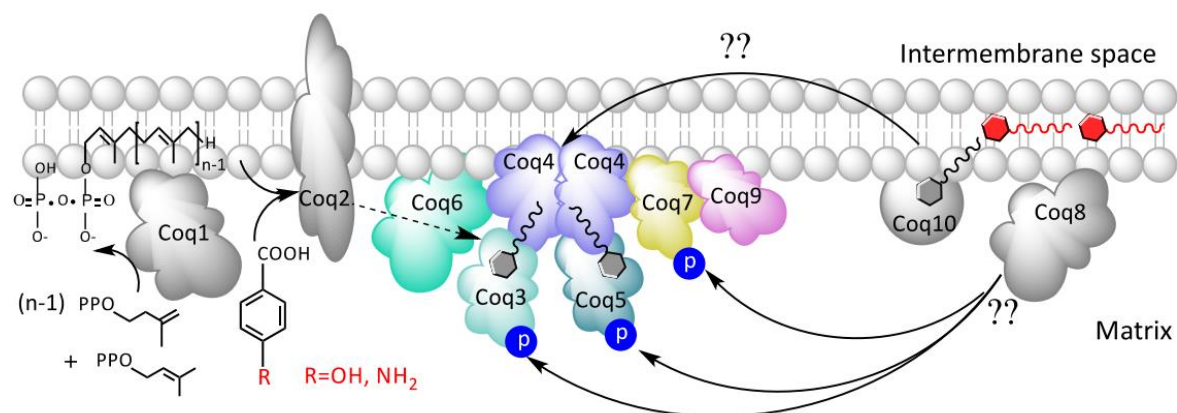


Jia Lab Project #3 BCHM 421/422 – 2020/2021

Project Outline: Coenzyme Q (CoQ or CoQ10 which is marketed as a nutrient supplement) is an electron transporter in the electron transport chain (ETC), transporting electrons from complex I and II to complex III. The proton gradient created by ETC is coupled to the oxidative phosphorylation which produces 90% of the ATP used for maintaining proper bodily functions. Aberrations in the synergetic action of CoQ biosynthesis are reported to result in clinical disorders, dominated by neurodegenerative complications. 15 proteins of this complex are required for CoQ biosynthesis in human, each with different characteristics and functions. Expression and purification of individual CoQ synthesizing proteins and their complexes will facilitate functional characterization and structural studies. We have cloned and expressed several CoQ proteins and will characterize their biochemical function such as methyltransferase activity. Attempts to express various complexes of CoQ proteins in insect cells are underway. Structural characterization will be carried out by crystallography and CryoEM. This work will help understand the biosynthesis process of CoQ and pave the way for the CoQ mediated drug discovery studies.



Supervisor: Zongchao Jia

Project Title: Structural and functional characterization of biosynthesis of Coenzyme Q

Project Goals: This project aims to characterize the functional role of components in Coenzyme Q complexes and determine the protein structures.

Experimental Approaches: molecular cloning, insect cell and *E. coli* protein expression system, *in vitro* functional characterization, structural studies

References:

1. DC Lohman et al, An Isoprene Lipid-Binding Protein Promotes Eukaryotic Coenzyme Q Biosynthesis, *Mol Cell.*, 2019, 21;73(4):763
2. JA Stefely et al, Cerebellar Ataxia and Coenzyme Q Deficiency through Loss of Unorthodox Kinase Activity, *Mol.Cell*, 2016, **63**: 608-620.