

Functional and Structural Characterisation of Mitochondrial Complex II in *Toxoplasma gondii*

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Mitochondrial Complex II (succinate dehydrogenase, SDH) is a key component of both the electron transport chain and the tricarboxylic acid cycle. In *T. gondii*, this complex exhibits a highly divergent composition comprising nine subunits, including lineage-specific proteins such as SDH10, whose role in complex stability and membrane anchoring remains unclear.

We investigate the structural and functional role of one lineage specific (SDH10), and one conserved (SDHB) SDH subunits. Using site-directed mutagenesis, we will introduce targeted amino acid substitutions in SDH10 and SDHB to assess their impact on complex formation and mitochondrial function via methods such as Blue Native PAGE, immunoprecipitation, immunofluorescence, extracellular flux assays, and enzymatic activity measurements.

The work further explores a potential structural analogue of a missing subunit named Chain U, a complex II protein identified in the *Perkinsus marinus* II₂-III₂-IV₂ mitochondrial supercomplex, where it seems to contribute to the catalytic site.

This work will provide insights into the molecular assembly and function of Complex II and potentially into its integration into higher-order respiratory structures, with implications for targeting parasite bioenergetics in therapeutic development.

Keywords: *T. gondii*, Complex II, SDH10, SDHB, Mitochondria function.