

MASTER'S THESIS

Gene regulation and metabolic flux reorganization in aerobic/Anaerobic switch of *E. coli*

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**Gene Regulation And Metabolic Flux
Reorganization in Aerobic/Anaerobic Switch
of *E. coli***

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Abstract

E. coli is a prokaryotic model organism about which there is relatively complete knowledge on both transcriptional regulation (TR) and metabolism. In response to external oxygen level, two global regulators, Fnr and ArcA, activate or repress the expression of a large number of enzymes, which in turn switch on/off certain metabolic pathways. This so-called aerobic/anaerobic switching has been under extensive study. Based on metabolic flux simulations and the known regulatory network, we investigate regulatory mechanisms underlying the presumably efficient switch. The target genes regulated by Fnr and ArcA are compared with the metabolic flux pattern generated from the Flux Balance Analysis (FBA) under aerobic, micro-aerobic and anaerobic conditions, and their physiological role examined. We also compare the theoretical study with microarray gene expression data to cross-validate the data from different sources, thereby gaining a more complete view of the regulatory processes involved.

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