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Metabolic control of the TCA cycle by the YdcI transcriptional regulator in *Escherichia coli*

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Understanding the regulation and control of the expression of genes encoding metabolic enzymes is crucial for production using microbes. To overcome technical difficulties involved in identifying regulatory network systems, we designed a DNA motif finding procedure combining transcriptome and genome sequence data. Here, we used the ArcAB two-component system of *Escherichia coli*, which controls genes involved in the TCA cycle and energy metabolism, as a model to identify DNA motifs involved in gene-expression regulation. DNA-array data were used to extract up-regulated genes from Δ*arcA* and Δ*arcB E. coli* strains, and the upstream sequences were subjected to DNA-motif finding. Sequence similarity and conserved residues identified the known ArcA-binding motif and a novel DNA-motif candidate that was estimated to be related to YdcI, a putative LysR-type transcriptional regulator. A hypothetical YdcI-binding motif was found upstream of the *gltA* gene, suggesting that YdcI might control the carbon flux into the TCA cycle. To verify this, L-glutamic-acid production and citrate synthase activity in the ydcI gene-amplified strain were investigated. Our findings suggested that YdcI is a transcription factor that regulates the expression of *gltA* and other genes, and controls the carbon flux into the TCA cycle.

Biography

Yousuke Nishio is a Senior Researcher of Institute for Innovation, Ajinomoto Co., Inc. His major research field is systems biology and metabolic engineering. He finished Master degree at Department of Chemistry, Graduate School of Science and Hiroshima University in 1999, and entered Ajinomoto Co., Inc. He obtained his PhD degree from the Graduate University for Advanced Studies (SOKENDAI) in 2005. His major interest is in industrial bio-based material production using microbes.

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