

論文 / 著書情報
Article / Book Information

題目(和文)	
Title(English)	Characterization of the sulfide responsive transcriptional factor YgaV of Escherichia coli
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Author(English)	Rajalakshmi Balasubramanian
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Category(English)	Doctoral Thesis
種別(和文)	論文要旨
Type(English)	Summary

(博士課程) Doctoral Program

論文要旨

THESIS SUMMARY

系・コース

ス:

Department of, Graduate major in
Life Science and Technology

**Life Science and
Technology**

系
コース

学生氏名:

BALASUBRAMANIAN

Student's Name

RAJALAKSHMI

申請学位 (専攻分 博士

野):

Doctor of

Philosophy

Academic Degree Requested

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Academic Supervisor(main)

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Academic Supervisor(sub)

要旨 (英文 300 語程度)

Thesis Summary (approx.300 English Words)

Sulfur is one of the most abundant elements present on the earth which is necessary for all living things. H₂S is an electron rich molecule and acts as a signalling molecule in non-sulfur bacteria. The enteric bacterium such as *Escherichia coli* is a non-sulfur bacterium which thrives in the gastrointestinal tracts of humans and other warm-blooded animals. *E. coli* can switch the respiration from aerobic to anaerobic under O₂ limiting conditions in the intestinal tract. Recent studies indicated that H₂S is involved in aerobic to anaerobic switching, and the sulfide-sensitive transcription factor SqrR/BigR homologs were found in gut microbiota, such as *E. coli*. Here, to get more insights into the H₂S-dependent physiology of enteric bacteria, characterization of YgaV and *ygaV* mutant of *E. coli* were performed. The RNA seq data revealed that anaerobic respiratory genes are mostly upregulated in the *ygaV* mutant compared to WT. In addition, a catalase gene *katG* was also upregulated in the *ygaV* mutant as well. Purified YgaV tightly associates with heme as like *Rhodobacter capsulatus* SqrR/BigR, and the apo-YgaV binds to the *ygaVP* and *katG* promoter DNA in vitro, although ~20-times higher concentration of apo-YgaV was needed for the *katG* shift compared to that for the *yagV* promoter. The Cys residues of YgaV were modified with 10 mM of Na₂S in vitro and in vivo, with forming an intramolecular tetrasulfide bond between Cys³¹ and Cys⁹⁸. Given Na₂S is equilibrium with hydrosulfide ion in the solution, YgaV may sense extracellular sulfide with modification of its Cys residues. H₂O₂ levels in the *ygaV* mutant was significantly higher than those in the WT. Antibiotic sensitivity test showed that WT is more resistant to antibiotics compared to the *ygaV* mutant especially under aerobic H₂S conditions, indicating that H₂S- and YgaV-dependent transcriptional regulation is beneficial to increasing resistance to antibiotics. Further studies of YgaV must be important for further understanding biological and physiological role of H₂S/RSS in non-sulfur bacteria as well as developing a new type of antibiotics.

備考: 論文要旨は、和文 2000 字と英文 300 語を 1 部ずつ提出するか、もしくは英文 800 語を 1 部提出してください。

Note: Thesis Summary should be submitted in either a copy of 2000 Japanese Characters and 300 Words (English) or 1 copy of 800 Words (English).

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