DNA Microarray Analysis of Quorum Sensing Regulated Gene Expression in *Escherichia coli* SE15 Isolated from Indwelling Catheter

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Introduction. Bacteria can detect their own cell density by quorum sensing (QS) signal to coordinate the expression of particular genes. The QS signal molecule such as autoinducer-2 (AI-2) has been proposed to promote interspecies signaling in a wide-ranging of bacterial species when a critical threshold concentration is reached. LuxS is responsible for the production of AI-2, which is involved in the quorum-sensing response of *Escherichia coli*. The luxS-encoded signal AI-2 has been found to regulate various genes in bacteria. For example, in E. coli, a total of 242 genes were found to be regulated by the luxS-encoded QS system. These included genes responsible for cell division, DNA processing, virulence, biofilm formation, and motility. Therefore, AI-2 is considered a good candidate for an interspecies communication signal molecule. The aim of this study is to use the DNA microarray techniques to identify genes of *E.coli* SE15 that are regulated by AI-2 signal molecule via the use of a luxS mutant that was unable to synthesize AI-2 and to establish the possible functions of these genes.

Methods. *E.coli* SE15 was isolated from the indwelling catheter of patient. *E. coli* SE15 was grown in 1 L of Luria-Bertani (LB) broth at 37 ºC for 24 h. To extract RNA, cells were harvested by centrifuge and resuspended in lysozyme containing buffer at room temperature. Total RNA was purified by using RNeasy mini kit. Total extracted RNA was labeled with either Cy-3dUTP or Cy-5dUTP as outline previously. *luxS* mutant *E.coli* SE15 microarray were manufactured and kindly provided by E-Biogen Incorporation.

Results. Using DNA microarrays, we identified 1623 genes representing approximately 31% of the entire genome that were increased (510 total genes) or repressed (832 total genes) in *luxS* mutant *E.coli* SE15. Importantly, QS in *E.coli* has been implicated in regulating the expression and activity the cell division genes *ftsQAZ* through AI-2. In this study, expression of genes *ftsQAZ* in *luxS* mutant *E.coli* SE15 repressed approximately 0.6-fold than wild type *E.coli* SE15.

Conclusions. The genetic test results confirm our hypothesis that the role of QS is the primary regulator of *luxS* mutant general changes. In a future study, we intend to elucidate our hypothesis by means of an *E.coli* function test.

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