Novel solubility Enhancer for Fusion Expression of Aggregation-prone Heterologous proteins in *Escherichia coli*

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In the *E. coli* cytoplasm, most host proteins tend to aggregate under stress conditions such as the addition of stressors, protein denaturants, guanidine hydrochloride (GdnHCl), and 2-hydroxyethyl disulfide (2-HEDS), which decrease the total number of soluble proteins and the level of protein synthesis. However, despite these stress conditions, we found that the expression level of soluble aresenate reductase (ArsC) increased by over a factor of two under stress conditions, which indicates that it is a stress induced protein. When ArsC was used as a N-terminus fusion expression partner, the solubility of various heterologous proteins was dramatically increased. To determine whether the recombinant proteins retained their native structure when fused to ArsC, circular dichroism (CD) spectrum analysis of fusion expressed hG-CSF was conducted after purification. The results of this analysis indicated that the secondary structure of recombinant hG-CSF was similar to its natural conformation. Based on these result, ArsC is expected to be used as an efficient and appropriate fusion partner for production of biologically active heterologous proteins in *E. coli* cytoplasm.