Escherichia Coli Protein P, a New Possible Universal solubility Partner: Solubility Improvement of Aggregation-prone Proteins by Fusion Expression

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E. coli protein P is resistant to proteolitic cleavage. The strong stability and rigidity of protein P is noticeable since all fusion partners need the abilities to work as solubility enhancers. When the full length protein P was used as a fusion partner of recombinant proteins which were individually aggregated to inclusion bodies in *E. coli* cytoplasm, the solubility of the proteins is dramatically increased by the post priming effect of the protein P. The remained insoluble fractions, however, still leave the doubt of the application possibility for a universal enhancer. Protein P consists of two domains, the C-domain and the N-domain. The N-domain protein P induces correct folding of C-domain, and they make solid globular conformation. When the individual N-domain was positioned at the N-terminus of the target proteins, the N-domain protein P has great ability in enhancing the solubility of all recombinant proteins fused. The CD spectra analysis showed that the structure of the target protein did not be deformed by fusion expression. These imply that the N-domain *E. coli* protein P can be used as a universal solubility tag for aggregation-prone heterologous proteins.