Production of recombinant proteins: a double-edged sword

Applying overexpression systems in prokaryotic hosts for production of recombinant proteins are needed in both industry and research. These systems which work on the basis of genetic manipulation of expression vectors for high-throughput protein production have been developed to overcome related problems due to the little expression of recombinant proteins. However, significant large numbers of these proteins are insoluble which cannot be used without applying technically refolding procedures. Therefore, protein aggregation & formation of inclusion bodies has been a major deterrent for overexpression systems.

Recombinant protein solubility & aggregation from the biophysical perspective:

From the structural view, many biophysical factors including protein’s thermo-stability, total number of amino acids, secondary structure variations, protein hydrophobicity, side-chain entropy, electrostatic charge & post translational modifications, have influenced on solubility of recombinant proteins. These parameters usually evaluated by theoretical analysis based on databases.

Conclusion:

Therefore, understanding the precise mechanism by which these properties affect the solubility status of the overexpressed protein results in developing new strategies to improve recombinant protein production in the near future.

References: