Protein overexpression in Different *E. call* Strains for Industrial Scale Drug Development in Sri Lanka

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Research and industrial scale protein overexpression for pharmaceutical products uses *Escherichia con (E. coli)* strains due to their well-characterised genome and easy manipulation. This review addresses the current scope of *E. coli* strains for protein overexpression, at global scale and in Sri Lanka, and the feasibility of development of pharmaceutical protein manufacturing in Sri Lanka, through a published literature at PubMed and Google Scholar. We identified that globally *E. coli* BL21 is the most common host strain due to properties such as mutation of Lon Protease coding gene and *hsdSB* gene that degrade foreign and extracellular proteins, respectively. It is developed into BL21(DE3) for T7 expression system, C41(DE3) for toxic and C43(DE3) for highly toxic and membrane proteins, hence, useful for large Glade of enzymes in system biology. In K-12 lineage, the AD494 and GrigamiTM strains were developed with thioredoxin reductase mutation enhancing disulphide bond formation in cytoplasm. HMS 174 stain with *recA* mutation carries higher plasmid stability. In Sri Lanka, however, only few published data were available, mainly focused on pathogenicity of *E. coli* with small published research at local institutes for overexpression of growth hormone like protein of *Setaria digitata*, multiepitope IgG/IgM proteins, in *E. coli* BL21(DE3). Although, this evidenced the availability of required technology and assets in Sri Lanka for necessary protocols, protein products such as pharmaceutical drugs being imported at high cost than developing research to optimise protein overexpression in the country. Through this review, we suggest the optimum utilisation of available laboratory infrastructure, personnel asserts and protocols by developing research not only with BL21(DE3), but other strains for specific protein expressions, where the research can be developed for industrialising to meet the demands of the pharmaceutical industry and many other biomedical researches in Sri Lanka.

Keywords: Escherichia coli, Protein overexpression, Pharmaceutical