Università degli Studi di Napoli Federico II

PhD in Biotechnology - 37th cycle

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Industrial implementation of *Pseudoalteromonas haloplanktis* TAC125 as a non-conventional host for recombinant production of difficult proteins

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Harnessing microbial metabolic machinery for recombinant protein production is the gold standard of modern biotechnology enabling large-scale production of proteins with significant biotechnological applications[1]. Besides, the implementation of strain engineering has deeply revolutionized the enforceability of heterologous expression platforms. However, conventional hosts bear drawbacks that lead the scientists to focus on the exploitation of non-conventional platforms for recombinant production of difficult-to-express proteins. In this scenario, the Antarctic bacterium *Pseudoalteromonas haloplanktis* TAC125 (*Ph*TAC125) turns out to be particularly outstanding because of its unique physiochemical conditions and folding processes raising it as a well-suited host for the production of difficult proteins[2]. Although being successfully improved[3] as a non-conventional host, *Ph*TAC125 still deals with relevant issues: the recombinant product instability and the lack of precise schemes for large scale production. Thus, my PhD projects will focus on strain optimization by DNA technology approaches, the enhancement of psychrophilic expression vectors and the development of an efficient fed-batch strategy. The implemented *Ph*TAC125 will be exploited to produce the difficult-to-express CDKL5 protein as a proof of concept aiming at its scale-up development. Employing cold-adapted protein production platforms have proved beneficial and the implementation of *Ph*TAC125 might be favourable for moving towards a successful production of difficult proteins and biopharmaceuticals.

References

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3.Colarusso, A., Lauro, C., Calvanese, M., Parrilli, E. & Tutino, M. L. Improvement of *Pseudoalteromonas haloplanktis* TAC125 as a Cell Factory: IPTG-Inducible Plasmid Construction and Strain Engineering. Microorganisms 8, 1466 (2020).