PRODUCTION OF VB _ ECOS _ NBD2 BACTERIOPHAGE-ORIGINATED POLYTUBES USING DIFFERENT YEAST EXPRESSION HOSTS

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Virus-like particles (VLPs) are protein nanostructures that mimic viral morphology while lacking infectious genetic material. Their structural versatility and safety have positioned VLPs as promising platforms for biomedical applications, including vaccine development and immunotherapy [1]. Nonetheless, since no single structure is universally suitable for all applications, the identification of new VLPs remains essential. Among these, the nanostructures formed by the tail tube protein gp39 of bacteriophage vB_EcoS_NBD2 exhibit high potential due to their stability and immunogenicity [2].

Yeast-based recombinant systems represent an attractive approach, as they do not release endotoxins, allowing the production of recombinant proteins suitable for therapeutic use. Nevertheless, yeast strains differ in their characteristics, including glycosylation patterns, which can significantly influence downstream protein use [3]. The aim of this study was to analyse the suitability of different yeast species for producing recombinant bacteriophage tail tube protein gp39, as well as its purification and self-assembly into polytubes.

In this study, recombinant gp39 protein expression experiments were conducted using *Saccharomyces cerevisiae*, *Kluyveromyces lactis*, *Kluyveromyces marxianus*, and *Pichia pastoris* yeast. The sufficient expression was achieved only in the *K. lactis* and *S. cerevisiae* systems. Therefore, nanostructures were purified using sucrose density gradient centrifugation and analysed by electron transmission microscopy to assess VLP tube assembly. Furthermore, quantitative yield analysis demonstrated variations in gp39 production efficiency between yeast species.

The results show differences in bacteriophage gp39 expression and VLP assembly in yeast. *S. cerevisiae* was identified as the most effective platform for gp39-based VLP production, supporting their potential use in future experiments.

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