

THE EFFECT OF *ESCHERICHIA COLI HFQ* GEN DELETION ON DNA REPLICATION REGULATION AND BACTERIOPHAGE P1 VIR DEVELOPMENT

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The Hfq protein is one of the most important regulatory factors, acting in cells at the RNA level. At first, this protein was discovered as a host factor necessary for Q β bacteriophage development. Since then, the Hfq role in bacteriophage development was not deeply investigated. In subsequent years, many studies revealed various riboregulatory functions of this protein, mainly focused on facilitating sRNA and mRNA pairing, regulating both degradation and stability of many transcripts. Hfq protein exhibits the ability to bind nucleic acids. Despite the fact that Hfq binds more efficiently to RNA, it can also attach to DNA. These properties may result from Hfq involvement in nucleoid organization. Thus, these observations open new possibilities to speculate about the potential role of Hfq in DNA replication regulation. Because Hfq protein affects many cellular processes, effects of deletion of the gene encoding this protein are pleiotropic.

The aim of this thesis was to investigate effects of *Escherichia coli hfq* gene deletion on DNA replication regulation as well as on the bacteriophage P1 vir development. To achieve this aim, high-throughput techniques were used. The phenotype microarray analysis, as well as deep RNA sequencing, were applied to answer the question whether there is a correlation between the phenotype of Δhfq strain and the expression of genes involved in DNA-related processes. Next, using the analysis of *in vivo* DNA replication kinetics, the effect of *hfq* gene deletion on the replication of chromosome and plasmids with various replication *origins* was investigated. Additionally, using both, classic microbiology methods, and RNA sequencing, the effect of Hfq deficiency on the virus-host relationship was evaluated. *E. coli* cells and the bacteriophage P1 vir were used as a model of this interaction.

The results of this work indicate that Hfq protein plays a role in DNA replication regulation, despite the fact that the full mechanism remains not fully revealed. Moreover, Hfq protein is an important and global factor in the proper P1 vir development due to modulation of many processes in host cells and processes involved in the bacteriophage development.