Abstract

The bacterium *Staphylococcus aureus* is currently one of the most frequently detected pathogenic bacteria in laboratory practice. It is particularly problematic when it comes to antimicrobial resistance. An important tool in the fight against this pathogenic microorganism is a suitable method of its detection, which could be the loop-mediated isothermal amplification method. The presented diploma thesis deals with the optimization of this method for the detection of the *nuc* gene of the *Staphylococcus aureus* bacterium. A protocol was established for the detection of *Staphylococcus aureus* bacteria using loop-mediated isothermal amplification method using newly designed "primers" targeting the *nuc* gene. To improve the detection limit of the method and to combat false positives of the negative control, steps were taken to optimize the method. Using the method, we were able to safely distinguish samples containing template DNA with a concentration of 0.05 pg/µl from a negative sample within 20 minutes. Using an optimized protocol, it was possible to reliably identify the bacterium *Staphylococcus aureus* in clinical samples taken from the breath of patients. The result of the work was a new, fast, and reliable method of detecting the bacterium *Staphylococcus aureus* using the loop mediated isothermal amplification method.

Key words: loop mediated isothermal DNA amplification (LAMP), *Staphylococcus aureus,* gene *nuc*

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