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EXPERIMENTAL WORKS

Degenerate Primer Based PCR for Rapid and Accurate Detection of Infectious Pathogens, *Acinetobacter baumannii*, and *Staphylococcus aureus*, with the Targeting of *FtsZ* Gene

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Abstract—Aims: FtsZ is a highly conserved protein that is found in most of the major groups of bacteria. Considering the importance of the *FtsZ* gene in bacteria, in this study, *Acinetobacter baumannii*, *Escherichia coli*, and *Staphylococcus aureus* pathogens were detected by a new degenerate primer using PCR method with the targeting of *FtsZ* gene. **Methods**: Of each bacterium 30 clinical samples were collected from clinical diagnostic laboratories. For the specificity, The *FtsZ* gene was amplified using uniplex and triplex PCR with a degenerate primer as forward and three specific reverse primers for *A. baumannii*, *E. coli*, and *S. aureus* samples and some other species as negative control samples. The sensitivity of the primers was determined by PCR using a serial dilution of the genomic DNA template (100 ng to 1 pg). **Results**: The results showed that the PCR assay is positive for all of the *A. baumannii*, *E. coli*, and *S. aureus* samples (100%) while the PCR amplification was negative for other species. **Conclusions**: According to the results, the developed PCR assay using *FtsZ* gene is a reliable, fast, easy to perform and high specific and sensitive diagnostic method for early detection of the *A. baumannii*, *E. coli*, and *S. aureus.*

Keywords: pathogenic bacteria, detection, *FtsZ* gene, PCR, degenerate primer

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INTRODUCTION

Acinetobacter baumannii, *Escherichia coli*, and *Staphylococcus aureus* bacteria are the most common pathogens responsible for nosocomial infections. Generally, these bacteria are responsible for infections occurring in hospitalized patients with compromised immune systems [1, 2], which are predisposed by factors such as burns, malignancy, surgery, and weakened immune systems. According to the reports, infection by *A. baumannii* is the reason for about 40% of mortality in the intensive care unit (ICU) [3]. *E. coli*, as the normal intestinal flora of humans and animals that in general it does not cause harm, however, in other parts of the body, this bacterium can cause critical illnesses such as bacteremia, meningitis, and urinary tract infections. Some *E. coli* strains can cause diarrhea that ranges from mild and non-bloody to highly bloody, which is indistinguishable from hemorrhagic colitis. In addition, about 5% of cases can develop the potentially fatal hemolytic uremic syndrome (HUS), which is characterized by acute renal failure and hemolytic anemia [4]. Another nosocomial infectious pathogen is *S. aureus* that relatively widespread in the environment but found mainly on the skin and mucous membranes as the normal microbial flora and also in the nasopharynx of 20–30% of adults at any one time. Generally, infections caused by *S. aureus* are a major problem in hospitals and other health care facilities. This pathogen in tissues can result in manifestations such as septicemia, skin sepsis, boils, enteric infections, post-operative wound infections, endocarditis, osteomyelitis, and pneumonia [5]. Considering the importance of infections caused by these bacteria,