

## Rapid and Cheap Test for Detection of Streptococcus pyogenes and Streptococcus pneumoniae with Antibiotic Resistance Identification

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**Abstract :** Upper respiratory tract infections are one of the most common reasons for visiting a general doctor. Streptococci are the most common bacterial etiological factors in these infections. There are many different types of Streptococci and infections vary in severity from mild throat infections to pneumonia. For example, *S. pyogenes* mainly contributes to acute pharyngitis, palatine tonsils and scarlet fever, whereas *S. Streptococcus pneumoniae* is responsible for several invasive diseases like sepsis, meningitis or pneumonia with high mortality and dangerous complications. There are only a few diagnostic tests designed for detection Streptococci from the infected throat of patients. However, they are mostly based on lateral flow techniques, and they are not used as a standard due to their low sensitivity. The diagnostic standard is to culture patients throat swab on semi selective media in order to multiply pure etiological agent of infection and subsequently to perform antibiogram, which takes several days from the patients visit in the clinic. Therefore, the aim of our studies is to develop and implement to the market a Point of Care device for the rapid identification of Streptococcus pyogenes and Streptococcus pneumoniae with simultaneous identification of antibiotic resistance genes. In the course of our research, we successfully selected genes for to-species identification of Streptococci and genes encoding antibiotic resistance proteins. We have developed a reaction to amplify these genes, which allows detecting the presence of *S. pyogenes* or *S. pneumoniae* followed by testing their resistance to erythromycin, chloramphenicol and tetracycline. What is more, the detection of  $\beta$ -lactamase-encoding genes that could protect Streptococci against antibiotics from the ampicillin group, which are widely used in the treatment of this type of infection is also developed. The test is carried out directly from the patients' swab, and the results are available after 20 to 30 minutes after sample subjection, which could be performed during the medical visit.

**Keywords :** antibiotic resistance, Streptococci, respiratory infections, diagnostic test

**Conference Title :** ICMBBB 2020 : International Conference on Molecular Biology, Biochemistry and Biotechnology

**Conference Location :** Dubai, United Arab Emirates

**Conference Dates :** January 30-31, 2020