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Aptamers: Rapid and Emerging Tool for Diagnosis of *Pseudomonas aeruginosa* Keratitis

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Dear Editor,

Bacterial keratitis is a corneal disease commonly associated with the extended use of soft contact lenses (1). This bacterial infection of the cornea is a serious medical condition that requires urgent treatment due to the risk of reduced vision or even vision loss in the affected eye (2). Bacteria isolated from patients with keratitis include a variety of organisms, such as *Pseudomonas* spp., *Staphylococcus* spp., *Serratia* spp., and *Streptococcus* spp. (2). Among these, *Pseudomonas aeruginosa,* a Gram-negative pathogen, is known as an opportunistic bacterium, particularly in immunocompromised patients (3). It is responsible for a wide range of infections and is the most common causative agent of bacterial keratitis related to contact-lens use (4). *Pseudomonas aeruginosa* infections are difficult to treat due to the bacterium's ability to rapidly acquire antibiotic resistance (3). Bacterial keratitis is notorious for causing rapid, fulminant disease and vision loss, even in treated patients. Early detection of keratitis is crucial for treatment and for preventing vision loss. As such, new strategies are needed for the rapid detection of microorganisms responsible for bacterial keratitis.

Aptamers, single-stranded nucleic acids that bind to specific targets, function similarly to antibodies. Aptamers have recently gained attention due to their desirable properties, including ease of chemical modification, cost-effective production, long-term stability, and binding affinity comparable to proteins (5). Several methods exist for detecting *P. aeruginosa* , including bacterial culture, ELISA, polymerase chain reaction (PCR)-based methods, MALDI-TOF MS assays, and electrochemical biosensors (6). While these methods are sensitive, they are also costly, time-consuming, and require specialized facilities. Therefore, it is necessary to explore new, low-cost, simple, and rapid methods for detecting *P. aeruginosa* in bacterial keratitis cases (7). This study proposes aptamers as a promising tool for the urgent detection of *P. aeruginosa.*

In a study conducted in 2018, a colorimetric aptamer was designed to detect *P. aeruginosa* in water and chicken samples, with a linear detection range of 10^2 to 10^6 CFU/mL and a detection time of 2 hours (8). Another study detected *P. aeruginosa* in water samples within just 10 minutes (9), while a separate study reported detection in milk, juice, and popsicle samples within 1.5 hours (10).

Although immunological methods offer faster results than bacterial culture, the quality of antibodies and the complexity of operations can affect the accuracy of the results. Molecular methods, such as PCR, are highly sensitive and specific. However, various factors may interfere with the results, leading to false positives or negatives (11). Additionally, PCR-based methods cannot distinguish between live and dead bacteria, which is a potential limitation for their future development (12). Therefore, it is crucial to develop a fast, accurate, sensitive, affordable, and portable method for detecting pathogenic bacteria, which is essential for both public health and clinical diagnosis.

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