FungiBug: Detection of Fungal Infection via a Rapid, Accurate, Handheld Small Blood Volume Diagnostic Device and Color Analysis

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The COVID-19 pandemic caused by the SARS-CoV-2 virus[1], and its secondary bacterial and fungal infections [2-5] have created an urgent need for a new, Small Biological Sampling Volume Diagnostic (SBVD) Device, which is Handheld, Low-Cost, Fast, and Reliable. This device needs to detect new rising pathogens at the triage level - before pathogen identification and specific tests can be developed and widely distributed. Pathogen load evaluation is needed to rapidly evaluate both the infection degree of severity and therapies effectiveness. Presently, state-of-the art infection diagnostics in Blood, Serum, Urine, Sputum and Spinal fluids use the universally accepted Colony Forming Units (CFUs) counting. This requires 10-30 mL of fluid and 24-72 hours of incubation, taking days for results, and yielding 30% false positives. This excess of diagnosed infections leads to massive overuse of antibiotics and costs US hospitals ~ $20 Billion/year. The device concept investigated in this study, FungiBug™, aims to test pathogen detection and count pathogen loads using SYBR-safe fluorescent dyes that bind to nucleic acid pairs in DNA/RNA helices. Recently, macroscopic bacterial detection was tested successfully using 0.3 mL drops of SYBR-safe dyes on 0.3 mL calibrated pathogen solutions, via the first proof-of-concept studies to develop InnovaBug™ [6-9] . The present work uses the same approach to detect fungal infections by Macroscopic Epi-Fluorescence using SYBR-safe dyes on fungal colonies for FungiBug™.

Awards Won:
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