Developing a comprehensive organism panel to assess the detection capabilities of Growth Direct® Rapid Sterility for rapid sterility testing

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Disclaimer: Some of the data shared in this presentation was generated by the Growth Direct® Rapid Sterility System, as such, the data is specific to the Growth Direct® Rapid Sterility System technology.

Introduction

USP<1223>, EP 5.1.6 and PDA TR33 all require Specificity for the validation of alternative qualitative sterility test methods. Identifying a panel of organisms to perform Specificity testing and evaluation of Rapid Microbiology Methods (RMMs) beyond the pharmacopeial required organisms has been a challenging endeavor given the varying nature of environmental isolates and the inherent risk that what has been recovered at your site today may be different than what is recovered in future.

Objectives

1. Identify relevant literature used for the development of a comprehensive organism panel to assess the detection capability of the Growth Direct® Rapid Sterility System
2. Demonstrate the rapid detection capabilities of the Growth Direct® Rapid Sterility System
3. Assess the effects of common stress applications on the detection capabilities of the Growth Direct® Rapid Sterility System

Relevant Literature References

1. 2019 PDA Global Conference on Pharmaceutical Microbiology BacT/Alert Comparison Presentation, James ET Gebo, MPA.
2. Noor, A., & Khetarpal, S. (2023). Anaerobic infections. In *StatPearls*. StatPearls Publishing.
3. Matthew R. England, Frida Stock, James E.T. Gebo, Karen M. Frank, Anna F. Lau: Comprehensive Evaluation of Compendial USP<71>, BacT/Alert Dual-T, and BacTex FX for Detection of Product Sterility Testing Contaminants. Journal of Clinicial Microbiology 2019 Volume 57, Issue 2 e01548-18
4. Sandle, Tim. (2021). Study of fungi isolated from pharmaceutical cleanrooms: Types and origins. 26. 1-10.
5. Jones, DL & Volis, K & Griffin, O. (2024). An Alternative Medium to Support Sterility Testing using the Growth Direct® Rapid Sterility System. EJPPS EUROPEAN JOURNAL OF PARENTERAL AND PHARMACEUTICAL SCIENCES. 10.37521/29202.

Key Materials and Methods

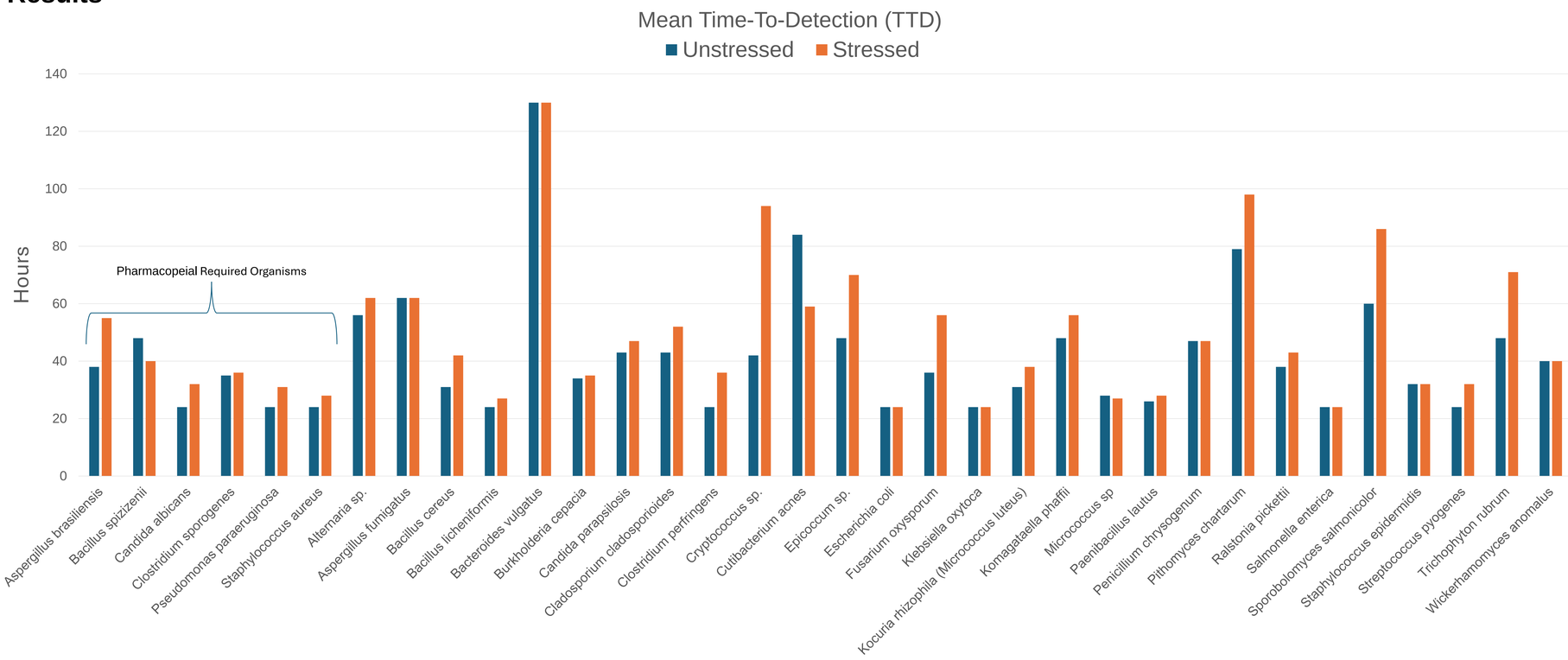
Materials

1. Growth Direct® Rapid Sterility System
2. Growth Direct® Rapid Sterility Kit
3. Growth Direct® Rapid Sterility Media
4. Various ATCC®, NBRC, and In-House Isolates

Stress Method

A stress protocol was used to model the natural stress that organisms would be under if they were present in actual test samples. Heat stress was the method used for this testing. The Acceptance Criteria for the heat stress method was ≥ 50% drop in recoverable CFU compared to a non-heat stress control.

Results



Discussion

Time To Detection (TTD)

In both Unstressed and Stressed conditions, Growth Direct® Rapid Sterility demonstrated the ability to detect pharmacopeial required organisms within 72 hours. Mean TTD for the full panel was 44 hours when Unstressed and 49 hours when Stressed.

The Growth Direct® Rapid Sterility System detected the full range of challenge organisms at consistently rapid speeds.

Pharmacopeial Organisms vs. Literature Organisms

The Results highlight the importance of assessing and validating performance of RMMs against a panel of organisms extending beyond those required by Regulations. In the Stressed condition, the pharmacopeial required organisms were consistently detected within 50 hours whereas the remaining organisms, cited by Literature as challenging and relevant, had a Mean TTD of 46 and 52 hours for Unstressed and Stressed conditions, respectively.

Effects of Heat Stress

The Results show consistently that stressing organisms will delay detection. This highlights the importance of assessing the Stressed condition of organisms when evaluating and validating RMMs. Detection appears to occur, on average, about 6 hours later for Stressed organisms regardless of which cohort is being analyzed (pharmacopeial, literature, or the entire panel).

Conclusion

Regulations for alternative RMMs require that Specificity be examined which is largely understood to be the ability of the method to detect a range of microorganisms. Given that faster TTD is often the primary reason for adopting RMMs, it can be challenging to developing a challenging and relevant validation organism panel beyond the harmonized pharmacopeial organisms. The results of this study demonstrate how critical it is to take a comprehensive approach in developing a validation panel given that organisms commonly cited by industry literature are more challenging, on the whole, compared to simply the pharmacopeial organisms.