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ASIA EDITION

Singapore develops method to detect microbial contamination in cell cultures

June 20, 2022 | News | By Hithaishi C Bhaskar

SMART researchers pioneer an anomaly detection model that utilizes machine learning to detect the presence of microbial contamination in near-real-time



Researchers from the Critical Analytics For Manufacturing Personalized-Medicine (CAMP) Interdisciplinary Research Group (IRG) at Singapore-MIT Alliance for Research and Technology (SMART), MIT's research enterprise in Singapore have developed a new method of detecting adventitious microbial contamination in mesenchymal stromal cell (MSC) cultures, ensuring the rapid and accurate testing of cell therapy products (CTP) intended for use in patients.

Utilizing machine learning to predict if a culture is clean or contaminated in a near-real time-like manner, this breakthrough method can be used during the cell manufacturing process, compared to less efficient end-point testing.

"The practical application of this discovery is vast: when combined with at-line technologies, the model can be used to continuously monitor cultures grown in bioreactors at Good Manufacturing Practice (GMP) facilities in-process. Consequently, GMP facilities can conduct sterility tests for bacteria in spent culture media more quickly with less manpower under closed-loop operations. Lastly, patients receiving cell therapy as part of their treatment can be assured that products have been thoroughly evaluated for safety and sterility," said Shruthi Pandi Chelvam, lead author and Research Engineer at SMART CAMP who worked with Derrick Yong and Stacy Springs, SMART CAMP Principal Investigators, on the development of this method.

Moving forward, CAMP aims to develop an in-process monitoring pipeline in which this anomaly detection model can be integrated with some of the in-house at-line technologies that are being developed, which would allow for periodic culture analysis using a bioreactor. This would open the possibilities for further, long-term experimental studies in continuous culture monitoring.