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Abstract Details:

Breakout Session: Biomedical Manufacturing For Warfighter Treatment Needs
Submission Category: Oral Presentation
Title: Biomedical Manufacturing for Warfighter Regenerative Medicine Needs

Abstract:

The US Department of Defense (DoD) and the Defense Health Agency (DHA) through the Armed Forces Institute for Regenerative Medicine (AFIRM) is developing advanced treatment options through novel tissue engineering therapies, raising great hopes for the severely wounded warfighter. The development of such innovative therapies has yet to reach their full potential and market needs partly due to the lack of robust manufacturing processes for the preparation of therapeutic tissues. In particular, large-scale cell production in bioreactors requires careful monitoring of the growth and quality of cell cultures over extended periods. Moreover, when cell differentiation is required, monitoring the progression of heterogenous cultures is needed. Many of the current techniques for monitoring viability and growth of cultured cells involve subsampling of the culture, which destroys a portion of the cell culture and increases the risk of contamination. To meet the need for innovative GLP/GMP-compatible cell manufacturing processes, ChromoLogic (CL) is developing a Cell Monitoring system based on Optical Coherence

Tomography (CM-OCT) for constant, the in-line, non-invasive and non-destructive cell monitoring of dynamically growing cultures. The CM-OCT system is based on low coherence interferometry for the direct optical imaging of cells in moving media. By using a non-cytotoxic light source in the near-infrared, CM-OCT will not perturb cellular behavior and can be run continuously for days. An advanced image processing algorithm extracts key parameters from the cell culture to calculate object size, concentration, and complexity and enables comprehensive characterization of dynamic cultures in terms of proliferation, differentiation status, viability, and contamination. The CM-OCT system can accurately (i) detect objects within the range of 5 to 50 um, (ii) measure cell size, and (iii) cell viability. Our results show strong correlation with hemocytometer measurements of concentration, brightfield microscopy measurements of cell size, and XTT assay measurements of cell viability.

Disclaimer:

Learning Objectives

1. Discuss the use of low coherence interferometry-based imaging technology for in-line, non-invasive and non-destructive monitoring of cells in dynamically growing cultures
2. Discuss recent results on the capabilities and performance of the CM-OCT system
3. Describe how CM-OCT system enables GLP/GMP-compatible cell monitoring with robust manufacturing processes

Submit for Young Investigators Competition? No

May We Publish Abstract on the MHSRS website? Yes

Curriculum Vitae: View CV File *(uploaded: 3/30/2021 6:04 PM)*

Conflict of Interest (COI) Disclosure: View COI Disclosure File *(uploaded: 3/30/2021 6:16 PM)*