



293e Optimizing T Cell Growth in a Centrifugal Fluidized Expansion (CentriFLEX) Bioreactor through Kinetic Growth Models

Details

Session: Biomanufacturing with Advanced Bioreactor and Bioprocess Engineering (/aiche2021/event/9b9c648a-9040-4dd5-a91c-d595a2f510ac)

Location: John B. Hynes Veterans Memorial Convention Center, 110

Date: Tuesday, Nov 9 1:42 PM

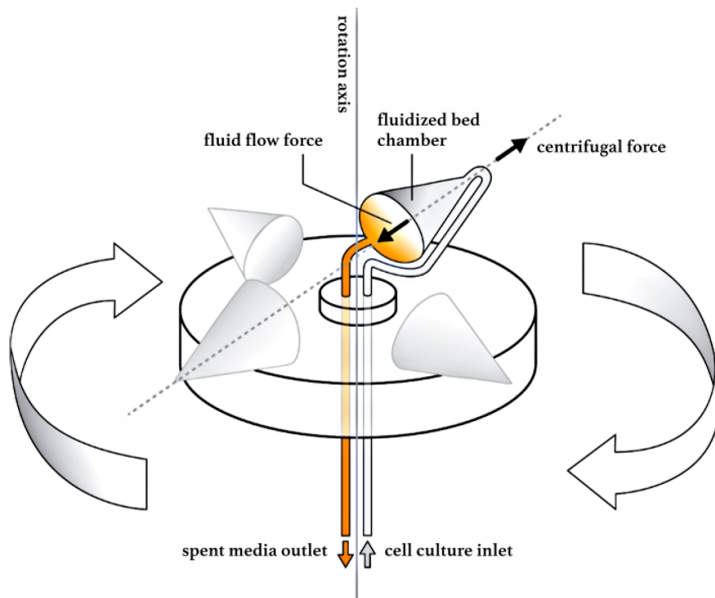
Duration: 18 minutes

Rate Session

About

Kitana Kaiphanliam¹, Brenden Fraser-Hevlin¹, William C. Davis² and Bernard Van Wie¹, (1)Gene and Linda Voiland School of Chemical Engineering and Bioengineering, Washington State University, Pullman, WA, (2)Department of Veterinary Microbiology and Pathology, College of Veterinary Medicine, Washington State University, Pullman, WA

Cancer is the second leading cause of death globally and remains a significant issue in medicine. Immunotherapy treatments such as Chimeric Antigen Receptor T cell (CAR-T) therapies are becoming a more promising option because of their effectiveness in killing cancer cells without harming healthy tissue in the body. CAR-T therapies, however, are inaccessible to many due to the high cost—a result of inefficient cell expansion and manufacturing methods. To address this issue, we have developed the Centrifugal Fluidized Expansion (CentriFLEX) bioreactor that balances centrifugal and fluid forces, allowing the system to operate in perfusion and maintain a high cell density. Shown in past applications for similar cell types, the CentriFLEX can expand cultures up to 2.1 billion cells in an 11.4 mL chamber over the course of one week. Recently, we have used this system to expand bovine T cells as part of a collaboration with the College of Veterinary Medicine at Washington State University. Through the project, we conducted kinetic studies to model substrate consumption and metabolite production of bovine T cells and have enhanced the bioreactor design by making it more compact to fit entirely within a biosafety cabinet—mitigating contamination concerns. Current efforts have been spent determining the remaining parameters for the kinetic models and using such models to understand how the cells grow over time and in the space of a high-population density chamber. In this presentation, we will share how we use growth models that are based on a series of kinetic studies to predict substrate and metabolite levels over time in the bioreactor, allowing us to alter feed and dosing rates of medium and nutrients to maintain cell growth at the maximum specific growth rate.



(https://aiche.confex.com/data/abstract/aiche/2021/Paper_628990_abstract_177683_0.png)

Speakers

Authors

William C. Davis
Washington State University

(/aiche2021/speaker/52e1e5574ada0e0e29d54b9fa6e529ff)

Authors

Brenden Fraser-Hevlin
Washington State University

(/aiche2021/speaker/8f40a90cc522dbd4ae848e0b485ab47e)

Authors

Bernard Van Wie
Washington State University

(/aiche2021/speaker/daaa1c4dd9b706a6752048d768659ee6)

Presenting Author

Kitana Kaiphanliam
Washington State University

(/aiche2021/speaker/a6b807738c97fe413b6d0ee7465ff035)

Groups

Bioengineering (/aiche2021/events?
trackIds=002309c77cf108fff1a6a8a101b1dab6)