ACCELERATING THE VERO VACCINE PRODUCTION PLATFORM THROUGH THE GENERATION OF HIGH-DENSITY CELL BANKS AND DIRECT THAW INTO MICROCARRIER BIOREACTOR CULTURES

Samantha Marrone, Vaccine Process Development, Merck & Co., Inc., West Point, PA 19486, United States
Samantha.moyer1@merck.com
Christopher Ton, Vaccine Process Development, Merck & Co., Inc., West Point, PA 19486, United States
Brianna Frederick, Vaccine Process Development, Merck & Co., Inc., West Point, PA 19486, United States
Nickolas Swisher, Bioprocess Clinical Manufacturing & Technology, Merck & Co., Inc., West Point, PA 19486, United States
David Adler, Bioprocess Clinical Manufacturing & Technology, Merck & Co., Inc., West Point, PA 19486, United States
Jillian Shingler, Vaccine Process Development, Merck & Co., Inc., West Point, PA 19486, United States

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The recent challenges in the world of vaccine manufacturing have centered around speed to market and the ability to generate large vaccine doses in a short amount of time. Traditional vaccine manufacturing using mammalian cells involves generation of frozen working cell banks in cryovials and a cell expansion stage to achieve the number of cells required to plant a production-scale bioreactor. Manual cell banking in vials requires several aseptic manipulations that increase contamination risks and the subsequent static cell expansion steps add multiple weeks to the vaccine manufacturing process, limiting the number of batches that can be scheduled each year. We demonstrated the development of a shortened, completely closed system viral production process, employing a CARR Unifuge® to generate high-density Vero cell banks, banking in bags in addition to cryovials, and implementing a direct thaw of the cell banks onto microcarriers at various scales. Utilization of the CARR Unifuge® yielded high cell viabilities (> 90%) post-centrifugation and greater percent recoveries (> 90%) after banking compared to the manual process (> 70%). High-density cell banks at 3e7 and 5e7 viable cells/mL, compared to the baseline process of 1e7 viable cells/mL, were successfully generated and functionally tested as direct-thaw options in single-use bioreactors. Cell banking at higher concentrations in bags allows for less - manipulations required in direct thaw operations and reduces the footprint required for cell bank storage in cryofreezers. When thawing cells from their frozen intermediate stage containing DMSO directly into bioreactors, the impact of shear on the cells was managed by employing a lower power per volume (P/V). A lower P/V enabled comparable cell growth in bioreactors planted using a direct thaw to bioreactors utilizing the traditional static cell expansion process. The ability to cell bank into bags using closed-system technology and the ability to directly plant bioreactors from the working cell bank significantly reduces aseptic risk and circumvents the entire cell expansion pathway. This accelerates the production process by almost 4 weeks. The presentation focuses on the development of a closed-system cell banking process, generation of high-density cell banks, and direct thaw onto microcarriers at different scales of bioreactors.