Spring 5-12-2016

Development of chemically-defined, animal component-free medium for suspension MDCK cell-based influenza vaccine production

Jenny Bang
Irvine Scientific

Title- Development of Chemically-defined, animal component-free medium for suspension MDCK cell-based influenza vaccine production

Authors- Jenny Y. Bang[1], Tsa-Chuan Weng[2], Catherine Nguyen[1], Jessie H.-T. Ni[1] and Alan Yung-Chih Hu[2]

1. Department of Research and Development, Irvine Scientific, Santa Ana, California
2. National Institute of Infectious Diseases and Vaccinology, National Health Research Institutes, Taiwan

Abstract

Cell culture-based vaccine production is advantageous over chicken eggs-based production because it does not rely on the availability of eggs and can be performed on a larger scale in a timely manner. Madin-Darby canine kidney (MDCK) cells are favorably used for vaccine production, particularly for influenza vaccines. However, there are several drawbacks to the traditional method of culturing MDCK cells. MDCK cells require undefined supplement for culturing, such as serum or hydrolysates which pose regulatory concerns especially when making pharmaceutical products for human use. Furthermore, MDCK cells grow in adherent culture which requires significant surface area or the use of microcarriers, thus it is more challenging in a large commercial scale process and is more costly compare to a suspension culture process. In this study, we report the development of a chemically-defined (CD) and animal component-free (ACF) medium that was able to adapt an adherent MDCK cell line to grow in suspension without a need of microcarriers. The results show that suspension-adapted MDCK cells in this CD and ACF medium achieved comparable cell growth and influenza production to that of the existing process which uses adherent MDCK cells on microcarriers in an undefined medium. In addition, the cell growth and production of the suspension cultures were consistent over ten passages while maintaining antigenicity of the virus. This newly established chemically-defined, suspension culture process can overcome the drawbacks of the traditional MDCK culture, leading to a more cost-effective, robust, and scalable process for MDCK cell-based vaccine productions.