LASER FORCE CYTOLOGY FOR RAPID QUANTIFICATION OF VIRAL INFECTIVITY

Sean J. Hart, LumaCyte
sean.hart@lumacyte.com
Colin G. Hebert, LumaCyte
Margaret E. McCoy, LumaCyte
Zachary L. Evans, LumaCyte
Keya L. Rodrigues, LumaCyte

Key Words: Viral infectivity, process analytical technology, bioreactor

The quantification of viral infectivity is an integral step at multiple stages in the process of virally producing recombinant protein, studying the mechanism of viral infection, and developing vaccines. Accurate measurements of infectivity allow for consistent infection and expansion, maximum yield, and assurance that time or environmental conditions have not degraded product quality. Traditional methods to assess infectivity, including the end-point dilution assay (TCID50) and viral plaque assay, are slow, labor intensive, and can vary depending upon the skill and experience of the user. Application of Laser Force Cytology (LFC) for the rapid detection and quantification of viral infection will be presented and discussed for several viral systems in the context of improving the development and production of vaccines. LumaCyte's Radiance™ instrument is an automated cell analyzer and sorter that measures the optical force, size, shape, and deformability and captures images of single cells. By measuring the intrinsic properties of single cells, cellular changes due to viral infection can be rapidly and objectively quantitated. LFC is very sensitive to agents that perturb cellular structures or change biochemical composition. High quality viral infectivity measurements can be made in a fraction of the time, labor, and cost of traditional assays such as plaque or endpoint dilution. For in-process automated bioreactor monitoring, infectivity can be measured by Radiance in near real-time throughout the process, allowing critical feedback control and optimization. The measurement speed and data quality of LFC / Radiance serve to enhance vaccine development, process optimization/scale-up, and manufacturing to ultimately improve the delivery of vaccines to patients.