ApplicationForum

Flu Titer on Chip®: A New Influenza Vaccine Potency Assay

Despite recent advances in flu vaccine production technologies, vaccine characterization and potency determination is still performed using conventional analytical methods [1]. For example, the single radial immunodiffusion assay (SRID) has been used to quantify flu vaccine potency by measuring influenza hemagglutinin (HA) since 1978 [2] and it remains the WHO-approved gold standard method. The SRID assay is an antigen-antibody based assay that relies on seasonal antigens and antisera generated and distributed by Reference Laboratories around the world. The time required for generation and distribution of reference reagents is recognized as a rate limiting step in influenza vaccine development and characterization [3, 4]. Furthermore, the SRID assay is expensive because it is a time- and labor-intensive assay that takes 2–3 days to complete with a minimum of 6 hours hands-on time by well-trained analysts.

Influenza Titer on Chip (Flu-ToC™) is a new, multiplexed immunoassay for HA quantification that utilizes a panel of subtype-specific but broadly reactive monoclonal capture antibodies. Multiple capture antibodies against seasonal A/H1, A/H3, B/Yamagata-like and B/Victoria-like strains are printed in an array format (Figure 1) and signal readout is based on fluorescence from a fluor-conjugated “universal” primary antibody label. Analysis of recombinant HA (rHA) representing a 10 year time period and archived vaccines derived from split virus demonstrate flexibility with regard to antigen type and robust to antigenic drift (Figure 2). This retrospective analysis demonstrates that this approach eliminates the need for new seasonal reference antisera each year, making Flu-ToC the first commercially available, off the shelf kit for influenza HA quantification

Flu-ToC Features:

- Subtype specific (H1, H3) and lineage specific (B/Vic and B/Yam-like)
- Correlated with single radial immunodiffusion (SRID)
- Stability indicating
- Eliminates need for in-house preparation of plates or gels
- Total assay time < 3 hrs
- Obtain calibrated results for up to 24 samples simultaneously
- Simultaneous quantification of all HAs in multivalent vaccine
- Use ~1000x less material than SRID, ~20x less material than ELISA
- Powerful, easy to use software and automated data analysis package

For additional information regarding Flu Titer on Chip, please visit www.indevr.com/toc.

References

- [1] Thompson CM, Petiot E, Lennaertz A, Henry O, Kamen AA (2013) Analytical Technologies for Influenza Virus-Like Particle Candidate Vaccines: Challenges and Emerging Approaches. *Virol J* 10: 141. doi: 10.1186/1743-422x-10-141
- [2] Williams MS (1993) Single-Radial-Immunodiffusion as an In Vitro Potency Assay for Human Inactivated Viral Vaccines. *Vet Microbiol* 37(3–4): 253–262. doi: 10.1016/0378-1135(93)90027-5
- [3] EMA/EDQM (12 Dec 2011) Joint EMA/EDQM Workshop on Improved Potency Assays for Inactivated Influenza Vaccines. Meeting Report 25 June 2012
- [4] Donabedian A (13 Aug 2009) In a talk presented at the USP 2nd Bioassay Workshop, on behalf of Health and Human Services and BARDA.

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Figure 1. Flu-ToC array layout and antibody description. The array contains 9 replicate spots (~200 µm in diameter) of each monoclonal antibody (designated A–I). Details for each antibody are given in the table.

Figure 2. Representative fluorescence images of rHA and split virus vaccines (right column) from strains ranging over a broad time period. The originating strain designations are listed below the respective images for rHA and to the right side for the viral vaccines.