**Suppl 2.** **Publicly available virus sequences: a human H1N1 influenza virus, H5N1, Indonesia H1N1, and bovine H5N1.**

To perform the solid-phase binding assay, we purchased recombinant HA proteins of each viruses; a human Isumi-H1N1 influenza virus, H5N1, Indonesia H1N1, Bovine H5N1 from the following manufacturers and distributors. We purchased Hemagglutinin (HA) protein obtained from Isumi-H1N1 virus from Sino Biological Inc. (BDA, Beijing, 100176, P.R.China). We purchased recombinant influenza a HA1(H5N1) protein (Active) (ab219879) from Abcam Inc. (Waltham, MA 02453 USA). We purchased HA protein from Indonesia H1N1 (A/Indonesia/5/2005) from Sino Biological Inc. (BDA, Beijing, 100176, P.R.China). We purchased HA protein obtained from Bovine H5N1 from Acrobiosystems Inc. Newark, DE 19711, USA.

Regarding the sequence of segment 4 hemagglutinin (HA) gene obtained from Human H1N1 virus; A/Isumi/UT-KK001-01/2018, H1N1 virus’s complete cds is described in Web site of The National Center for Biotechnology Information (NCBI) (Bethesda, MD, USA).

Regarding the sequence of segment 4 hemagglutinin (HA) gene obtained from Human H5N1 virus; A/Hong Kong/483/1997(H5N1), H5N1 virus’s complete cds is described in Web site of The National Center for Biotechnology Information (NCBI) (Bethesda, MD, USA).

Regarding the sequence of segment 4 hemagglutinin (HA) gene obtained from Human Indonesia H5N1 virus; A/Indonesia/5/2005 (H5N1), Human Indonesia H5N1 virus’s complete cds is described in Web site of The National Center for Biotechnology Information (NCBI) (Bethesda, MD, USA).Regarding the sequence of segment 4 hemagglutinin (HA) gene obtained from Bovine H5N1 (influenza A virus gene; A/bovine/New Mexico/A240920343-93/2024(H5N1)), Bovine H5N1 virus’s complete cds is described in Web site of The National Center for Biotechnology Information (NCBI) (Bethesda, MD, USA)..

Expression and purification of soluble recombinant H5N1 HA protein the sequence for influenza A/Texas/37/2024 H5N1 HA was downloaded from Global Initiative on Sharing All Influenza Data (GISAID) (1).

1. Y. Shu, J. McCauley, GISAID: Global initiative on sharing all influenza data - from vision to reality. Euro Surveill. 22, 30494 (2017). doi:10.2807/1560-7917.ES.2017.22.13.30494 Medline