**Table S2.** Comparison of the binding kinetics of bivalent versus monovalent cross-neutralising antibodies R1a-B6 and R1a-A5 on different hemagglutinin subtypes.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **H1-HA** | | | **H5-HA** | | | **H9-HA** | | | **H2-HA** | | |
|  | ***kon***  **(M-1s-1)** | ***koff***  **(s-1)** | **KD**  **nM** | ***kon***  **(M-1s-1)** | ***koff***  **(s-1)** | **KD**  **nM** | ***kon***  **(M-1s-1)** | ***koff***  **(s-1)** | **KD**  **nM** | ***kon***  **(M-1s-1)** | ***koff***  **(s-1)** | **KD**  **nM** |
| R1a-A5 monovalent | 4.41x105 | 6.85x10-4 | 1.56 | 6.22x105 | 1.68x10-4 | 0.27 | - | - | - | - | - | - |
| R1a-A5 bivalent | 6.53x105 | 2.19x10-4 | 0.36 | 7.06x105 | 1.67x10-4 | 0.24 | - | - | - | - | - | - |
| R1a-B6 monovalent | 3.70x105 | 1.32x10-4 | 0.36 | 2.57x105 | 1.32x10-4 | 0.51 | 3.12x105 | 1.31x10-3 | 4.19 | + | + | + |
| R1a-B6 bivalent | 2.67x105 | 3.40x10-5 | 0.13 | 1.50x105 | 4.00x10-6 | 0.031a | 1.28x105 | 3.00x10-5 | 0.23 | 2.02x105 | 2.60x10-4 | 1.29 |

Association rate constant *kon*, dissociation rate constant *koff* , equilibrium dissociation constants KD determined by single cycle kinetics on a high density surface (approximately 10,000 RU) of recombinant H1, H5, H9 and H2-HAs. No binding on H3 or H7-HA was observed.

a indicates binding constants were beyond the limits that could be accurately determined by the instrument.

+ binding could be seen but the kinetic data could not be analysed using the BIAevaluation software

- represents no binding seen.