

**Supplementary Figure 1.** The amino acid sequences of m610.27 (A) and m630.3 (B) in alignment with their corresponding germlines of human antibody V genes and/or wild types. The complementarity-determining regions (CDRs) and framework regions (FRs) are indicated according to the ImMunoGeneTics annotation (<http://imgt.cines.fr/>). The somatic mutations in the V regions of the antibodies and the mutations induced by random mutagenesis are highlighted with gray background.

**Supplementary Figure 2.** Schematic representation of antibody structures and SDS-PAGE analysis. (A) Fab m610.27 was converted to a standard IgG1 format. (B) m630.3Fc was constructed by joining eAd m630.3 to the N terminus of human IgG1 Fc through a hinge linker. (C) The bispecific antibody, m660, was generated by fusing scFv m610.27 and eAd m630.3 to the N termini of the heavy and light chain constant regions of a human IgG1, respectively, via a linker composed of three repeats of the G<sub>4</sub>S motif. (D) Reducing and nonreducing SDS-PAGE of the antibodies purified from 293 free style cell cultures.

# Supplementary Figure 1

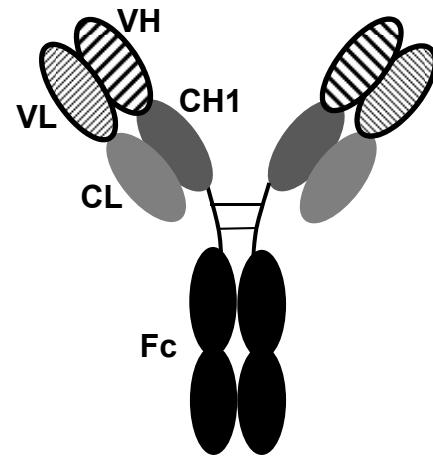
(A)

(A)	FR1	CDR1	FR2	CDR2	FR3	CDR3	FR4	
	1 10 20	30	40 50	60	70 80	90	100	
m610 VH IGHV1-46*01	QVQLVQSGA.EVKPGASVKVSCKAS QVQLVQSGA.EVKPGASVKVSCKAS	GYTF....TSYY GYTF....TSYY	MHWVRQAPGQGLEWMGI MHWVRQAPGQGLEWMGI	INPS..GGST INPS..GGST	SYAQKFQ.GRVTMTRDTSTVYMELSRLRSDDTAVYYC SYAQKFQ.GRVTMTRDTSTVYMELSSLRSEDTAVYYC	ARDVQWLAYGMDV AR	WGQGTTVTVSS	

(B)

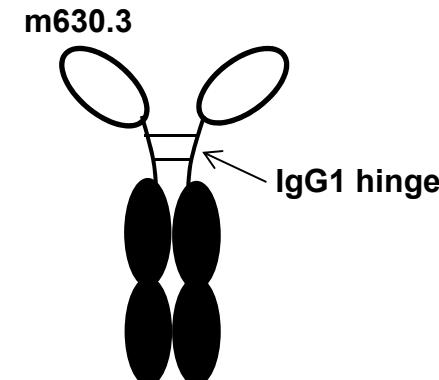
## Supplementary Figure 2

(A)



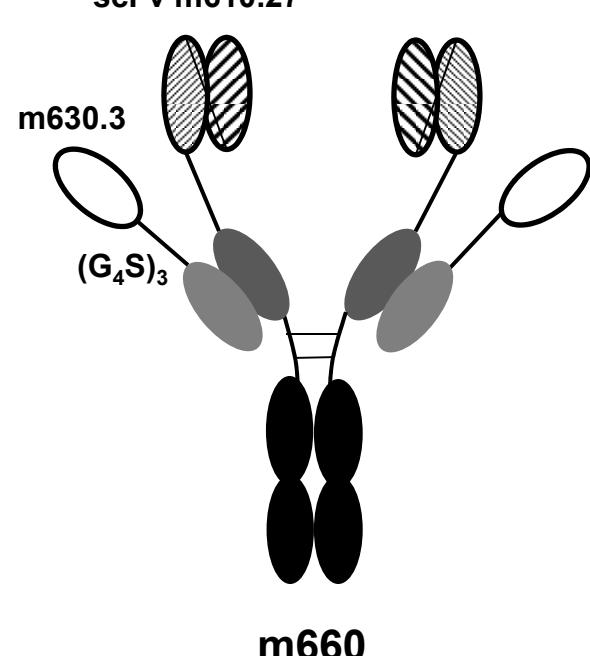
IgG1 m610.27

(B)



m630.3Fc

(C)



m660

(D)

