Table S1 HIV-1 Env pseudovirus panel*[1, 2]

Subtype	HIV-1 isolate	Tier	Country of origin	Mode of transmission	Source	Accession Number	IC50 with b12
B	SF162.LS	1A	USA	M-M	CSF	EU123924	<0.02
B	3988.25	-	USA	M-M	ccPBMC	AY835436	ND
B	6535.3	2	USA	M-M	ccPBMC	AY835438	0.23
B	QH0692.42	2	Trinidad	F-M	ccPBMC	AY835439	>50
B	SC422661.8	2	Trinidad and Tobago	F-M	Plasma	AY835441	0.11
B	PVO.4	2	Italy	M-M	ccPBMC	AY835444	>50
B	TRO.11	2	Italy	M-M	ccPBMC	AY835445	>50
B	AC10.0.29	2	Massachusetts, USA	M-M	ccPBMC	AY835446	2.61
B	RHPA4259.7	2	USA	M-F	Plasma	AY835447	0.03
B	REJO4541.67	2	USA	F-M	Plasma	AY835449	1
B	TRJO4551.58	2	USA	M-M	Plasma	AY835450	<0.02
B	WITO4160.33	2	Alabama, USA	F-M	Plasma	AY835451	9.19
C	Du151.2	2	South Africa	FSW	ccPBMC	DQ411851	ND
C	Du156.12	2	South Africa	FSW	ccPBMC	DQ411852	12
C	Du422.1	2	South Africa	FSW	ccPBMC	DQ411854	0.1
C	ZM197M.PB7	2	Zambia	F-M	ucPBMC	DQ388515	>50
C	ZM214M.PL15	2	Zambia	F-M	Plasma	DQ388516	12
C	ZM249M.PL1	2	Zambia	F-M	Plasma	DQ388514	1.26
C	ZM53M.PB12	2	Zambia	F-M	ucPBMC	AY423984	ND
C	ZM55F.PB28a	-	Zambia	M-F	ucPBMC	AY423971	ND

C	ZM109F.PB4	2	Zambia	M-F	ucPBMC	AY424138	>50
C	CAP45.2.00.G3	2	South Africa	FSW	Plasma	DQ435682	0.26
C	CAP210.2.00.E8	2	South Africa	FSW	Plasma	DQ435683	7.59
AE	SH18.1	-	Shanghai, CN	-	-	-	>50
AE	GX191.2	-	Guangxi, CN	-	-	-	<0.02
AE	SH188.6	-	Shanghai, CN	-	-	GU475041.1	>50
AE	SH620.55	-	Shanghai, CN	-	-	-	>50
BC	CQ30.57	-	Chongqing, CN	-	-	-	4.95
BC	CQ42.72	-	Chongqing, CN	-	-	-	>50
BC	CQ43.92	-	Chongqing, CN	-	-	-	>50
BC	SH520.4	-	Shanghai, CN	-	-	-	5.8
B'	CHLJBF06044	-	Heilongjiang, CN	BT	ucPBMC	EU131805.1	<0.02
B'	CHLJBM06050	-	Heilongjiang, CN	BT	ucPBMC	EU131798.1	0.04

ccPBMC, cocultured PBMC; ucPBMC, uncultured PBMC; CSF, cerebrospinal fluid; M-F, male-to-female; F-M, female-to-male; M-M, male-to-male; FSW, female sex worker; -，unknown. * Pseudoviruses used for examining the neutralization profile of the plasmas.

Table S2 The primers for single genome amplification of envelope genes

Couple	Round of PCR	Name	Sequence of primers
Couple1	first-round	env5’ex	5’-TAGAGCCCTGGAAGCATCCAGGAAG-3’
		env3’ex	5’-TTGCTACTTGTGATTGCTCCATGT-3’
	second-round	env5’in-Gao	5’-CACCTTAGGCATCTCCTATGGCAGGAAGAAG-3’
		env3’in Gao	5’-GTCTCGAGATACTGCTCCCACCC-3’
Couple2	first-round	OFM19	5'-GCACTCAAGGCAAGCTTTATTGAGGCTTA-3’
		V1F1	5'-GGGTTTATTACAGGGACAGCAGAG-3’
	second-round	envN	5’-CTGCCAATCAGGGAAGTAGCCTTGTGT-3’
		env1A	5'-GGCTTAGGCATCTCCTATGGCAGGAAGAA-3’
Couple3	first-round	env 3’ex	5’-TTGCTACTTGTGATTGCTCCATGT-3’
		env1A	5'-GGCTTAGGCATCTCCTATGGCAGGAAGAA-3’,
	second-round	XJ-R	5'-AGGCCATCCAACTATGCTACTTTTTC-3’
		XJ-F	5'-TAATTGATAGAATAAGAGAAAGAGCAG-3’

Table S3 The accession numbers of HIV-1 envelope genes from elite neutralizers used for signature analysis.

Patient code	Subtype	GMT	sequence name	Accession Number
GX752	C	1:438	GX752-R1	KC807912
			GX752-R2	KC807913
			GX752-R3	KC807914
			GX752-R4	KC807915
			GX752-R5	KC807916
			GX752-R7	KC807917
			GX752-R8	KC807918
			GX752-R9	KC807919
			GX752-R10	KC807920
			GX752-R11	KC807921
			GX752-R12	KC807922
			GX752-R16	KC807923
GX757	C	1:261	GX757-R1	KC807924
			GX757-R2	KC807925
			GX757-R3	KC807926
			GX757-R5	KC807928
			GX757-R6	KC807929
			GX757-R8	KC807930
			GX757-R9	KC807931
0651	07-BC	1:222	XJ0651-R1	KC807932
			XJ0651-R2	KC807933
			XJ0651-R3	KC807934
			XJ0651-R4	KC807935
			XJ0651-R5	KC807936
			XJ0651-R6	KC807937
			XJ0651-R7	KC807938
			XJ0651-R8	KC807939
			XJ0651-R9	KC807940
			XJ0651-R10	KC807941
			XJ0651-R11	KC807942
1081	07-BC	1:383	XJ1081-R1	KC807943
			XJ1081-R4	KC807944
			XJ1081-R5	KC807945
			XJ1081-R6	KC807946
			XJ1081-R7	KC807947

			XJ1081-R9	KC807948
			XJ1081-R10	KC807949
			XJ1081-R11	KC807950
			XJ1081-R12	KC807951
			XJ1081-R13	KC807952
			XJ1081-R14	KC807953
09466	07-BC	1:311	XJ09466-R2	KC807954
			XJ09466-R3	KC807955
			XJ09466-R4	KC807956
0031	07-BC	1:237	XJ0031-R1	KC807957
			XJ0031-R3	KC807958
			XJ0031-R6	KC807959
			XJ0031-R8	KC807960
			XJ0031-R9	KC807961
			XJ0031-R12	KC807962
			XJ0031-R14	KC807963
			XJ0031-R16	KC807964
			XJ0031-R17	KC807965
			XJ0031-R18	KC807966
			XJ0031-R19	KC807967
			XJ0031-R20	KC807968

Table S4 The sensitivities of HIV-1 Envs of various subtypes to monoclonal bNAbs (%)* [3-8]

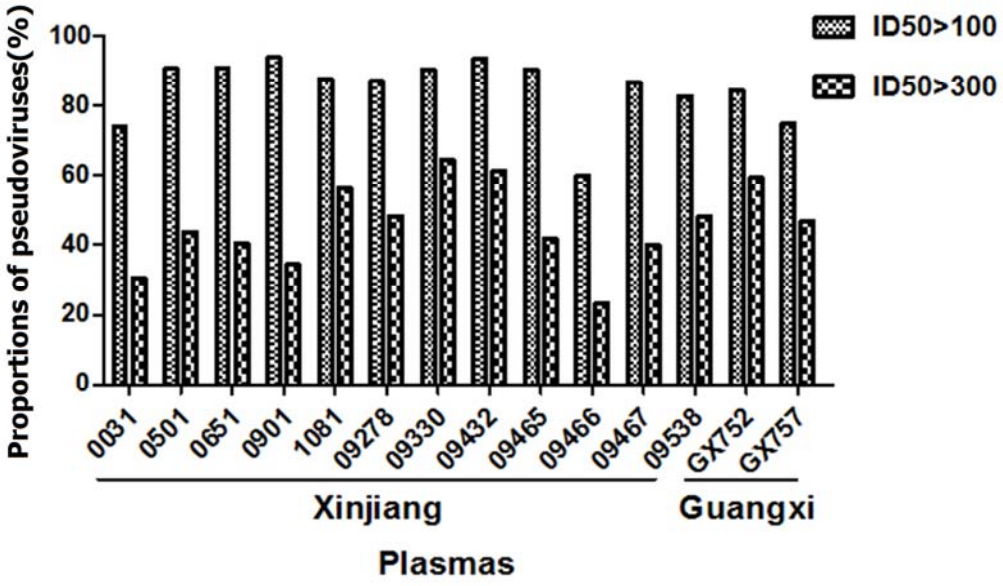
Clade /Ab	4E10	VRC01	PG9	PG16	VRC03	2F5	b12	2G12	HJ16	447-52D
A	96～100	100	81	85	59	74～92	25～33	13～26	25	0
B	90～100	94	71	71	80	68～76	58～72	52～72	31	34
C	96～100	75～87	74～100	70～100	50	0～4	0～58	0～11	27	0
D	88～100	88	72	60	13	45～56	44～55	18～20	NA	0
CRF01_AE	100	89～100	80～100	80～90	22	80～100	0～30	0	NA	0
CRF02-AG	90～100	81	70	50	19	19～80	0～30	25～50	44	0
CRF07/08_BC	80～100	80～91	50～90	50～60	73	0	30～50	0～18	36	NA
B'	78～100	78	56	44	NA	100	44	67	NA	NA

*，The neutralizing sensitivities are represented by means of the proportions of the viruses neutralized by the bNAbs with IC50, of < 25 μg/ml

NA, not available.

1. Li M, Gao F, Mascola JR, Stamatatos L, Polonis VR, Koutsoukos M*, et al.* Human immunodeficiency virus type 1 env clones from acute and early subtype B infections for standardized assessments of vaccine-elicited neutralizing antibodies. *J Virol* 2005,**79**:10108-10125.
2. Li M, Salazar-Gonzalez JF, Derdeyn CA, Morris L, Williamson C, Robinson JE*, et al.* Genetic and neutralization properties of subtype C human immunodeficiency virus type 1 molecular env clones from acute and early heterosexually acquired infections in Southern Africa. *J Virol* 2006,**80**:11776-11790.
3. Binley JM, Wrin T, Korber B, Zwick MB, Wang M, Chappey C*, et al.* Comprehensive cross-clade neutralization analysis of a panel of anti-human immunodeficiency virus type 1 monoclonal antibodies. *J Virol* 2004,**78**:13232-13252.
4. Wu X, Yang ZY, Li Y, Hogerkorp CM, Schief WR, Seaman MS*, et al.* Rational design of envelope identifies broadly neutralizing human monoclonal antibodies to HIV-1. *Science* 2010,**329**:856-861.
5. Corti D, Langedijk JP, Hinz A, Seaman MS, Vanzetta F, Fernandez-Rodriguez BM*, et al.* Analysis of memory B cell responses and isolation of novel monoclonal antibodies with neutralizing breadth from HIV-1-infected individuals. *PLoS One* 2010,**5**:e8805.
6. Walker LM, Phogat SK, Chan-Hui PY, Wagner D, Phung P, Goss JL*, et al.* Broad and potent neutralizing antibodies from an African donor reveal a new HIV-1 vaccine target. *Science* 2009,**326**:285-289.

7. Shang H, Han X, Shi X, Zuo T, Goldin M, Chen D*, et al.* Genetic and neutralization sensitivity of diverse HIV-1 env clones from chronically infected patients in China. *J Biol Chem* 2011,**286**:14531-14541.
8. Chong H, Hong K, Zhang C, Nie J, Song A, Kong W*, et al.* Genetic and neutralization properties of HIV-1 env clones from subtype B/BC/AE infections in China. *J Acquir Immune Defic Syndr* 2008,**47**:535-543.

Fig. S1.

The breath and the potency of the neutralization of the bNAb+ plasmas against the pseudoviruses. The proportions of the pseudoviruses from subtype B, C, CRF_07BC, B', and CRF_01AE neutralized by the bNAbs+ plasmas at titer > 1:100 and ID50 > 1: 300 are shown, respectively.