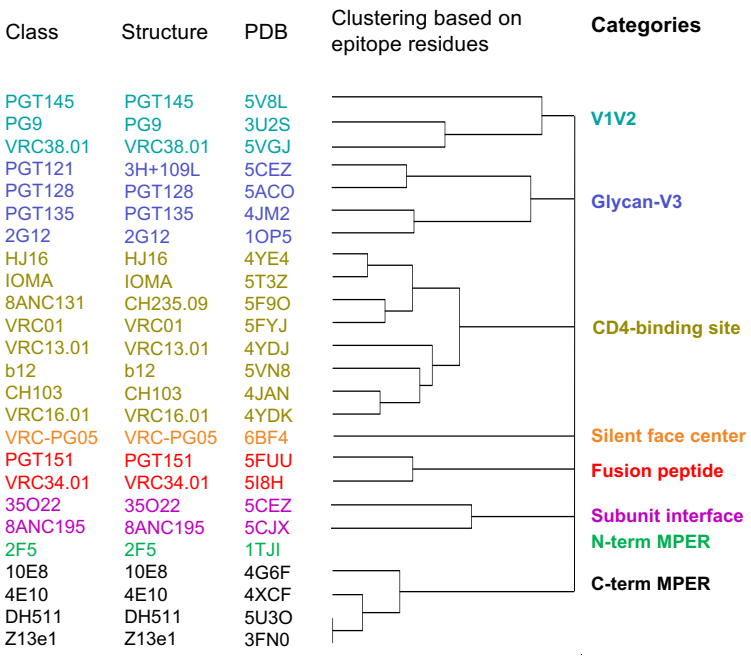

Fig. S1. MPER antibodies segregate into two additional categories, N-term MPER and C-term MPER.

Representative antibody-Env structures and PDBs for MPER-directed HIV-1 neutralizing antibodies (10E8, 2F5, 4E10, DH511 and Z13e1) were analyzed with representative antibodies recognizing the prefusion-closed Env trimer by neighbor-joining analysis based on epitope-residue overlap (dendrogram). The MPER antibodies segregated into two additional categories, N-term MPER (containing the single antibody 2F5, which recognizes primarily residues 661-670) and C-term MPER (containing antibodies 10E8, 4DE10, DH5511 and Z13e1,which recognize primarily residues 671-683).

Table S1 A. Heavy chain Read statistics for normal donor data sets associated with Healthy Donor NGS.

	LP32647	LP23810	LP08248
RAW Reads	232,094	261,224	300,213
≥ 350 nucleotide	216,971	248,046	286,701
VH assignment	203,869	203,872	223,172
Average CDR H3 length	13.42	14.46	13.82
Average SHM	9.59	8.21	8.39

Table S1 B. Lambda chain read statistics for normal donor data sets associated with Healthy Donor NGS.

	LP32647	LP23810	LP08248
RAW Reads	208,141	159,365	284,437
≥ 300 nucleotide	186,441	145,904	274,687
VL assignment	185,972	144,632	272,667
Average SHM	5.4	4.66	5.64

Table S1 C. Kappa chain read statistics for normal donor data sets associated with Healthy Donor NGS.

	LP32647	LP23810	LP08248
RAW Reads	295,412	316,019	296,609
≥ 300 nucleotide	285,178	304,104	283,451
VK assignment	284,590	299,672	269,184
Average SHM	4.78	3.32	4.80

Table S1 D. Vgene reads of 20 representative antibody for normal donor data sets associated with Healthy Donor NGS.

Antibody	Vgene	LP32647	LP23810	LP08248
PGT145	IGHV1-8	2090	734	2640
PG9	IGHV3-33	14	4533	1347
VRC38.01	IGHV3-13	89	443	9
PGT121	IGHV4-59	9984	735	7879
PGT128	IGHV4-39	57613	0	47240
PGT135	IGHV4-39	57613	0	47240
2G12	IGHV3-21	1742	24324	2376
HJ16	IGHV3-30	3784	6013	3911
IOMA	IGHV1-2	7151	18158	9054
8ANC131	IGHV1-46	2245	1334	2632
VRC01	IGHV1-2	7151	18158	9054
VRC13.01	IGHV1-69	11115	10453	6862
b12	IGHV1-3	1694	0	0
CH103	IGHV4-59	9984	735	7879
VRC16.01	IGHV3-23	2658	19767	8705
VRC-PG05	IGHV3-7	2634	16492	14298
PGT151	IGHV3-30	3784	6013	3911
VRC34	IGHV1-2	7151	18158	9054
35O22	IGHV1-18	3004	1514	2500
8ANC195	IGHV1-69	11115	10453	6862

Table S2. Structural details for MPER antibodies in complex with HIV-1 Env.

Category	Class	Antibody with most informative structure	Most informative PDB	Experiment method	Resolution (Å)	Env component	Epitope Residues
N-term MPER	2F5	2F5	1TJI	X-ray	2.20	MPER peptide	E657, Q658, E659, L661, E662, L663, D664, K665, W666, A667, L669, W670
C-term MPER	10E8	10E8	4G6F	X-ray	2.10	MPER peptide	S668, L669, W670, N671, W672, F673, T676, N677, L679, W680, I682, R683
	4E10	4E10	4XCF	X-ray	1.43	MPER peptide	N671, W672, W673, D674, I675, T676, N677, W678, L679, W680, K683
	DH511	DH511	5U3O	X-ray	1.76	MPER peptide	K669, W670, N671, W672, F673, D674, I675, T676, N677, L679, W680, I682, R683
	Z13e1	Z13e1	3FN0	X-ray	1.80	MPER peptide	W670, N671, W672, F673, D674, I675, T676, N677