

Supplementary Material

This file contains 3 supplementary figures (Figures S1-S3) and 3 supplementary tables (Tables S1-S3).

Supplementary Figure S1. (A) Amino acid sequence alignment highlighting the level of polymorphism for each gene across 14 *P. falciparum* isolates. (B) Amino acid sequences for each antigenic construct. Polymorphic residues are highlighted in red. (C) Amino acid sequence alignment of *mSPDBL1* and *mSPDBL2* allelic DBL region sequences showing regions of high conservation between the two genes. Symbol key: [*] denotes fully conserved residues, [!] denotes strongly similar conservative change (>0.5 in the Gonnet PAM 250 matrix), [.] denotes weakly similar conservative change (≤0.5 in the Gonnet PAM 250 matrix) (42-43).

Supplementary Figure S1A

MSPDBL1 (PF3D7_1035700)

	10	20	30	40	50	60	
Pf10_0348_3D7_ref seq	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	MKKIYSIFFSLFILNLHIYIKNIKCNLDLINYNDNLNRNGLLNNSLDLTNGLNKKDNSFID					
Pf10_0348_3D7					
Pf10_0348_RO33					
Pf10_0348_Fcr3					
Pf10_0348_Wellcome					
Pf10_0348_T996					
Pf10_0348_T9102					
Pf10_0348_K1					
Pf10_0348_Dd2					
Pf10_0348_D10					
Pf10_0348_Fcc2					
Pf10_0348_Palo_Alto					
Pf10_0348_HB3					
Pf10_0348_7G8					
Pf10_0348_D6					

	70	80	90	100	110	120	
Pf10_0348_3D7_ref seq	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	SKIEEHENKSYQNKDNNISIVGQDVPITSVYSSKIINANDLEGNSIDDTKGLSVTNSGFD					
Pf10_0348_3D7					
Pf10_0348_RO33	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....D.....					
Pf10_0348_Fcr3	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....D.....					
Pf10_0348_Wellcome	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....D.....					
Pf10_0348_T996	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....D.....					
Pf10_0348_T9102	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....D.....					
Pf10_0348_K1	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....D.....					
Pf10_0348_Dd2	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....D.....					
Pf10_0348_D10	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....D.....					
Pf10_0348_Fcc2	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....D.....					
Pf10_0348_Palo_Alto	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....D.....					
Pf10_0348_HB3	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....D.....					
Pf10_0348_7G8	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....D.....					
Pf10_0348_D6	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....D.....					

	130	140	150	160	170	180	
Pf10_0348_3D7_ref seq	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	DGSAFGGGLPFGYSPLQGNHNKCPDENFCKGIKNVLSCPPKNSTGRNGDWISVAVKESS					
Pf10_0348_3D7					
Pf10_0348_RO33	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....A.....T.....					
Pf10_0348_Fcr3	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....R.....					
Pf10_0348_Wellcome	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....R.....					
Pf10_0348_T996					
Pf10_0348_T9102	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....A.....					
Pf10_0348_K1	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....A.....					
Pf10_0348_Dd2	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....A.....					
Pf10_0348_D10	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....A.....					
Pf10_0348_Fcc2	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....A.SN.RNFL					
Pf10_0348_Palo_Alto	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....K..N..Q..PN..L..F..TK...A.SN.RNFL					
Pf10_0348_HB3	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....K..N..Q..PN..L.DF..TK...A.SN.RNFL					
Pf10_0348_7G8	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....K..N..Q..PN..L.DF..TK...A.SN.RNFL					
Pf10_0348_D6	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....N.....					

	190	200	210	220	230	240	
Pf10_0348_3D7_ref seq	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	TTNKGVLVPPRRTKLCLR.NINKVWHRIKDEKNFKEEFVKVALGESNALMKHYKEKNLNA					
Pf10_0348_3D7					
Pf10_0348_RO33					
Pf10_0348_Fcr3					
Pf10_0348_Wellcome					
Pf10_0348_T996	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....K.....Q.....					
Pf10_0348_T9102	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....K.....Q.....					
Pf10_0348_K1					
Pf10_0348_Dd2					
Pf10_0348_D10					
Pf10_0348_Fcc2	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....V.....KQM.F.I...NFPELK.T.GK.ENFIYSS.GS.AKQ.I.L.GNNTEK.					
Pf10_0348_Palo_Alto	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....V.....KQM.F.I...NFPELK.T.GK.ENFIYSS.GS.AKQ.I.L.GNNTEK.					
Pf10_0348_HB3	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....V.....KQM.F.I...NFPELK.T.GK.ENFIYSS.GS.AKQ.I.L.GNNTEK.					
Pf10_0348_7G8	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....V.....KQM.F.I...NFPELK.T.GK.ENFIYSS.GS.AKQ.I.L.GNNTEK.					
Pf10_0348_D6	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|	.....KQM.F.I...NFPELK.T.GK.ENFIYSS.GS.AKQ.I.L.GNNTEK.					

	490	500	510	520	530	540
Pf10_0348_3D7_ref seq	LDQ	RGNITTSQGN	SHRATVVQVDQ	TNRLDNVNSVT	QRGNNNNNNN	LERGLGSGALPGTN
Pf10_0348_3D7						
Pf10_0348_RO33		A				
Pf10_0348_Fcr3		A				
Pf10_0348_Wellcome		A				
Pf10_0348_T996		A				
Pf10_0348_T9102		A				
Pf10_0348_K1		A				
Pf10_0348_Dd2		A				
Pf10_0348_D10	N	A				
Pf10_0348_Fcc2		A				
Pf10_0348_Palo_Alto		A				
Pf10_0348_HB3	N	A				
Pf10_0348_7G8	N	A				
Pf10_0348_D6		A				

	550	560	570	580	590	600
Pf10_0348_3D7_ref seq	IITEEKYSLE	LILKLT	SKDEEDI	IKHNEDVRE	EIEEQQED	IEEDEEEL
Pf10_0348_3D7						
Pf10_0348_RO33						
Pf10_0348_Fcr3						
Pf10_0348_Wellcome						
Pf10_0348_T996						
Pf10_0348_T9102						
Pf10_0348_K1						
Pf10_0348_Dd2						
Pf10_0348_D10						
Pf10_0348_Fcc2						
Pf10_0348_Palo_Alto						
Pf10_0348_HB3						
Pf10_0348_7G8						
Pf10_0348_D6						

	610	620	630	640	650	660
Pf10_0348_3D7_ref seq		TK	EDDEEK	NETND	TED	TDD
Pf10_0348_3D7						
Pf10_0348_RO33						
Pf10_0348_Fcr3						
Pf10_0348_Wellcome						
Pf10_0348_T996			TED			
Pf10_0348_T9102						
Pf10_0348_K1					E	
Pf10_0348_Dd2					E	
Pf10_0348_D10					E	
Pf10_0348_Fcc2						
Pf10_0348_Palo_Alto						
Pf10_0348_HB3						
Pf10_0348_7G8						
Pf10_0348_D6			TED			

	670	680	690	700	710	720
Pf10_0348_3D7_ref seq	ISKV	DEDSYR	ILSVSY	KDNNEV	KVAESIV	KKLFS
Pf10_0348_3D7						
Pf10_0348_RO33						
Pf10_0348_Fcr3						
Pf10_0348_Wellcome						
Pf10_0348_T996						
Pf10_0348_T9102						
Pf10_0348_K1						
Pf10_0348_Dd2						
Pf10_0348_D10						
Pf10_0348_Fcc2						
Pf10_0348_Palo_Alto						
Pf10_0348_HB3						
Pf10_0348_7G8						
Pf10_0348_D6						

MSPDBL2 (PF3D7_1036300)

	10	20	30	40	50	60
Pf10_0355_3D7_ref seq	MIYILSIVFYIFFLHIDIYVNIYSTCFVNVNEGPNLRRNNIINDELKGGKAYNNTIDANNO					
Pf10_0355_3D7					
Pf10_0355_RO33					
Pf10_0355_Fcr3					
Pf10_0355_Wellcome					
Pf10_0355_T996					
Pf10_0355_T9102					
Pf10_0355_K1					
Pf10_0355_Dd2					
Pf10_0355_D10					
Pf10_0355_Fcc2					
Pf10_0355_Palo_Alto					
Pf10_0355_HB3					
Pf10_0355_7G8					
Pf10_0355_D6					

	70	80	90	100	110	120
Pf10_0355_3D7_ref seq	NIEYNKLNKHNVNSSHISKFSDIMDQEDKGDNENSHDIKFEE.KKNINKSLDAESNYGIN					
Pf10_0355_3D7					
Pf10_0355_RO33					
Pf10_0355_Fcr3				V	
Pf10_0355_Wellcome				V	
Pf10_0355_T996				V	
Pf10_0355_T9102					
Pf10_0355_K1				V	
Pf10_0355_Dd2					
Pf10_0355_D10					
Pf10_0355_Fcc2			Y		
Pf10_0355_Palo_Alto					
Pf10_0355_HB3					
Pf10_0355_7G8					
Pf10_0355_D6			Y		

	130	140	150	160	170	180
Pf10_0355_3D7_ref seq	EISITGNDNSNSDNQNI.F.PDGSELAGGIPRSIYTINLG.FNKCPTEEICKDFSNLPOC					
Pf10_0355_3D7					
Pf10_0355_RO33		AP	SN	P	V.K.GP
Pf10_0355_Fcr3	IT.GAR.NG.IS	D.AFG	L.F.D	SHLE.NHY	DKNF.NGIQ.V.N
Pf10_0355_Wellcome	IT.GAR.NG.IS	D.AFG	L.F.D	SHLE.NHY	DKNF.NGIQ.V.N
Pf10_0355_T996	IT.GAR.NG.IS	D.AFG	L.F.D	SHLE.NHY	DKNF.NGIQ.V.N
Pf10_0355_T9102	IT.GAR.NG.IS	D.AFG	L.F.D	SHLE.NHY	DKNF.NGIQ.V.N
Pf10_0355_K1	IT.GAR.NG.IS	D.AFG	L.F.D	SHLE.NHY	DKNF.NGIQ.V.N
Pf10_0355_Dd2	AP	SN	P	V.K	GP
Pf10_0355_D10					
Pf10_0355_Fcc2					
Pf10_0355_Palo_Alto					
Pf10_0355_HB3	AP	SN	P	V.K	GP
Pf10_0355_7G8					
Pf10_0355_D6					

	190	200	210	220	230	240
Pf10_0355_3D7_ref seq	RKNVHE.RNNWLGSSVKNFSSDNKGVLPVPRRQSLCLRITLQDFRTKKKKEGDFEKFIY					
Pf10_0355_3D7					
Pf10_0355_RO33	D	S.N.K	Y	F	N.A.NK
Pf10_0355_Fcr3	PLKDFTGTKGD	AS.N.R	LTV	KQM.F	NINN.PKL.T.K.N
Pf10_0355_Wellcome	PLKDFTGTKGD	AS.N.R	LTV	KQM.F	NINN.PKL.T.K.N
Pf10_0355_T996	PLKDFTGTKGD	AS.N.R	LTV	KQM.F	NINN.PKL.T.K.N
Pf10_0355_T9102	PLKDFTGTKGD	AS.N.R	LTV	KQM.F	NINN.PKL.T.K.N
Pf10_0355_K1	PLKDFTGTKGD	AS.N.R	LTV	KQM.F	NINN.PKL.T.K.N
Pf10_0355_Dd2	D	S.N.K			
Pf10_0355_D10					
Pf10_0355_Fcc2				N.HA	NK
Pf10_0355_Palo_Alto					
Pf10_0355_HB3	D	S.N.K			
Pf10_0355_7G8					
Pf10_0355_D6				N.HA	NK

	250	260	270	280	290	300	
Pf10_0355_3D7_ref seq	.....|.....|.....|.....|.....|.....|.....|	SYASSEARKLRITIHNNLEKAHQAIRYSFADIGNIIRGDDMMDTPTSKETITTYLEKVLKI					
Pf10_0355_3D7	.....|.....|.....|.....|.....|.....|.....|	.....K.....IS..L..K.....K..LL.....NN.K...E...L					
Pf10_0355_RO33	.....|.....|.....|.....|.....|.....|.....|	.S.G...KQ.IKLYG..T...L..MK.G.....VQ.N..I....NK.K...E..GK					
Pf10_0355_Fcr3	.....|.....|.....|.....|.....|.....|.....|	.S.G...KQ.IKLYG..T...L..MK.G.....VQ.N..I....NK.K...E..GK					
Pf10_0355_Wellcome	.....|.....|.....|.....|.....|.....|.....|	.S.G...KQ.IKLYG..T...L..MK.G.....VQ.N..I....NK.K...E..GK					
Pf10_0355_T996	.....|.....|.....|.....|.....|.....|.....|	.S.G...KQ.IKLYG..T...L..MK.G.....VQ.N..I....NK.K...E..GK					
Pf10_0355_T9102	.....|.....|.....|.....|.....|.....|.....|	.....K.....IS..L..K.....K..LL.....NN.K...E...L					
Pf10_0355_K1	.....|.....|.....|.....|.....|.....|.....|	.....K.....IS..L..K.....K..LL.....NN.K...E...L					
Pf10_0355_Dd2	.....|.....|.....|.....|.....|.....|.....|	.....K.....IS..L..K.....K..LL.....NN.K...E...L					
Pf10_0355_D10	.....|.....|.....|.....|.....|.....|.....|	.....K.....IS..L..K.....K..LL.....NN.K...E...L					
Pf10_0355_Fcc2	.....|.....|.....|.....|.....|.....|.....|	.....K.....IS..L..K.....K..LL.....NN.K...E...L					
Pf10_0355_Palo_Alto	.....|.....|.....|.....|.....|.....|.....|	.....K.....IS..L..K.....K..LL.....NN.K...E...L					
Pf10_0355_HB3	.....|.....|.....|.....|.....|.....|.....|	.....K.....IS..L..K.....K..LL.....NN.K...E...L					
Pf10_0355_7G8	.....|.....|.....|.....|.....|.....|.....|	.....K.....IS..L..K.....K..LL.....NN.K...E...L					
Pf10_0355_D6	.....|.....|.....|.....|.....|.....|.....|	.....K.....IS..L..K.....K..LL.....NN.K...E...L					

	310	320	330	340	350	360	
Pf10_0355_3D7_ref seq	.....|.....|.....|.....|.....|.....|.....|	YNENNDKPKDAKKWWTENRRHHVWEAMMCGYQSAQKDNQCTGYGNIDDIPOFLRWFREWGT					
Pf10_0355_3D7	.....|.....|.....|.....|.....|.....|.....|	.....H.K..E.T.....Y.....NEK..E.V.....					
Pf10_0355_RO33	.....|.....|.....|.....|.....|.....|.....|	HYK.VND....T..IQ.K.R..D.....YEK..K.....Y.....I					
Pf10_0355_Fcr3	.....|.....|.....|.....|.....|.....|.....|	HYK.VND....T..IQ.K.R..D.....YEK..K.....Y.....I					
Pf10_0355_Wellcome	.....|.....|.....|.....|.....|.....|.....|	QYK.VND....T..IQ.K.R..D.....YEK..K.....Y.....I					
Pf10_0355_T996	.....|.....|.....|.....|.....|.....|.....|	.....H.K..E.T.....Y.....NEK..E.V.....					
Pf10_0355_T9102	.....|.....|.....|.....|.....|.....|.....|	.....H.K..E.T.....Y.....NEK..E.V.....					
Pf10_0355_K1	.....|.....|.....|.....|.....|.....|.....|	.....H.K..E.T.....Y.....NEK..E.V.....					
Pf10_0355_Dd2	.....|.....|.....|.....|.....|.....|.....|	.....H.K..E.T.....Y.....NEK..E.V.....					
Pf10_0355_D10	.....|.....|.....|.....|.....|.....|.....|	.....H.K..E.T.....Y.....NEK..E.V.....					
Pf10_0355_Fcc2	.....|.....|.....|.....|.....|.....|.....|	.....H.K..E.T.....Y.....NEK..E.V.....					
Pf10_0355_Palo_Alto	.....|.....|.....|.....|.....|.....|.....|	.....H.K..E.T.....Y.....NEK..E.V.....					
Pf10_0355_HB3	.....|.....|.....|.....|.....|.....|.....|	.....H.K..E.T.....Y.....NEK..E.V.....					
Pf10_0355_7G8	.....|.....|.....|.....|.....|.....|.....|	.....H.K..E.T.....Y.....NEK..E.V.....					
Pf10_0355_D6	.....|.....|.....|.....|.....|.....|.....|	.....H.K..E.T.....Y.....NEK..E.V.....					

	370	380	390	400	410	420	
Pf10_0355_3D7_ref seq	.....|.....|.....|.....|.....|.....|.....|	YVCEESEKNMNTLKAVCFPPKQPRTEANPALTVHENEMCSSTLKKYEEWYNKRKTEWTEQS					
Pf10_0355_3D7	.....|.....|.....|.....|.....|.....|.....|	.....N..K.....L..T.S.M..TQKGT.....N.....N.....					
Pf10_0355_RO33	.....|.....|.....|.....|.....|.....|.....|	.....N..K.....L..T.S.M..TQKGT.....N.....N.....					
Pf10_0355_Fcr3	.....|.....|.....|.....|.....|.....|.....|	.....N..K.....L..T.S.M..TQKGT.....N.....N.....					
Pf10_0355_Wellcome	.....|.....|.....|.....|.....|.....|.....|	.....N..K.....L..T.S.M..TQKGT.....N.....N.....					
Pf10_0355_T996	.....|.....|.....|.....|.....|.....|.....|	.....N..K.....L..T.S.M..TQKGT.....N.....N.....					
Pf10_0355_T9102	.....|.....|.....|.....|.....|.....|.....|	.....N..K.....L..T.S.M..TQKGT.....N.....N.....					
Pf10_0355_K1	.....|.....|.....|.....|.....|.....|.....|	.....N..K.....L..T.S.M..TQKGT.....N.....N.....					
Pf10_0355_Dd2	.....|.....|.....|.....|.....|.....|.....|	.....N..K.....L..T.S.M..TQKGT.....N.....N.....					
Pf10_0355_D10	.....|.....|.....|.....|.....|.....|.....|	.....N..K.....L..T.S.M..TQKGT.....N.....N.....					
Pf10_0355_Fcc2	.....|.....|.....|.....|.....|.....|.....|	.....N..K.....L..T.S.M..TQKGT.....N.....N.....					
Pf10_0355_Palo_Alto	.....|.....|.....|.....|.....|.....|.....|	.....N..K.....L..T.S.M..TQKGT.....N.....N.....					
Pf10_0355_HB3	.....|.....|.....|.....|.....|.....|.....|	.....N..K.....L..T.S.M..TQKGT.....N.....N.....					
Pf10_0355_7G8	.....|.....|.....|.....|.....|.....|.....|	.....N..K.....L..T.S.M..TQKGT.....N.....N.....					
Pf10_0355_D6	.....|.....|.....|.....|.....|.....|.....|	.....N..K.....L..T.S.M..TQKGT.....N.....N.....					

	430	440	450	460	470	480	
Pf10_0355_3D7_ref seq	.....|.....|.....|.....|.....|.....|.....|	IKYNNDKINYTDIKTLSPSEYLIEKCECKCTKKNLQDVFELTFDYGKALLEKLLKKEESPV					
Pf10_0355_3D7	.....|.....|.....|.....|.....|.....|.....|	.....K..TK.K..EN...N..K.....E..H...H.....K..EE...A					
Pf10_0355_RO33	.....|.....|.....|.....|.....|.....|.....|	.....K..TK.K..EN...N..K.....E..H...H.....K..EE...A					
Pf10_0355_Fcr3	.....|.....|.....|.....|.....|.....|.....|	.....K..TK.K..EN...N..K.....E..H...H.....K..EE...A					
Pf10_0355_Wellcome	.....|.....|.....|.....|.....|.....|.....|	.....K..TK.K..EN...N..K.....E..H...H.....K..EE...A					
Pf10_0355_T996	.....|.....|.....|.....|.....|.....|.....|	.....K..TK.K..EN...N..K.....E..H...H.....K..EE...A					
Pf10_0355_T9102	.....|.....|.....|.....|.....|.....|.....|	.....K..TK.K..EN...N..K.....E..H...H.....K..EE...A					
Pf10_0355_K1	.....|.....|.....|.....|.....|.....|.....|	.....K..TK.K..EN...N..K.....E..H...H.....K..EE...A					
Pf10_0355_Dd2	.....|.....|.....|.....|.....|.....|.....|	.....K..TK.K..EN...N..K.....E..H...H.....K..EE...A					
Pf10_0355_D10	.....|.....|.....|.....|.....|.....|.....|	.....K..TK.K..EN...N..K.....E..H...H.....K..EE...A					
Pf10_0355_Fcc2	.....|.....|.....|.....|.....|.....|.....|	.....K..TK.K..EN...N..K.....E..H...H.....K..EE...A					
Pf10_0355_Palo_Alto	.....|.....|.....|.....|.....|.....|.....|	.....K..TK.K..EN...N..K.....E..H...H.....K..EE...A					
Pf10_0355_HB3	.....|.....|.....|.....|.....|.....|.....|	.....K..TK.K..EN...N..K.....E..H...H.....K..EE...A					
Pf10_0355_7G8	.....|.....|.....|.....|.....|.....|.....|	.....K..TK.K..EN...N..K.....E..H...H.....K..EE...A					
Pf10_0355_D6	.....|.....|.....|.....|.....|.....|.....|	.....K..TK.K..EN...N..K.....E..H...H.....K..EE...A					

	490	500	510	520	530	540
Pf10_0355_3D7_ref seq	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_3D7	SNSVNALPEPGQITLPPDPSLKQTTOQENQPVVETPVTTAVINEHQGQTEPNKGDNNNRE					
Pf10_0355_RO33	.D..RTST.S.P..V..S..N.....G..K.L..V.M.....D..TD..SG.T.					
Pf10_0355_Fcr3	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_Wellcome	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_T996	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_T9102	.D..RTST.S.P..V..S..N.....G..K.L..V.M.....D..TD..SG.T.					
Pf10_0355_K1	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_Dd2	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_D10	.D..RTST.S.P..V..S..N.....G..K.L..V.M.....D..TD..SG.T.					
Pf10_0355_Fcc2	.D..RTST.S.P..V..S..N.....G..K.L..V.M.....D..TD..SG.T.					
Pf10_0355_Palo_Alto	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_HB3	.D..RTST.S.P..V..S..N.....G..K.L..V.M.....D..TD..SG.T.					
Pf10_0355_7G8	.D..RTST.S.P..V..S..N.....G..K.L..V.M.....D..TD..SG.T.					
Pf10_0355_D6	.D..RTST.S.P..V..S..N.....G..K.L..V.M.....D..TD..SG.T.					

	550	560	570	580	590	600
Pf10_0355_3D7_ref seq	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_3D7	NHESNVGSIQEVNQGSVSEESHSKTIDPSKIDDRLELSSGSSSLEQHSKEDVKKGCAL					
Pf10_0355_RO33	HNK.....S....					
Pf10_0355_Fcr3	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_Wellcome	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_T996	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_T9102	HNK.....S....					
Pf10_0355_K1	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_Dd2	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_D10	HNK.....S....					
Pf10_0355_Fcc2	HNK.....S....					
Pf10_0355_Palo_Alto	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_HB3	HNK.....ST...					
Pf10_0355_7G8	HNK.....S....					
Pf10_0355_D6	HNK.....S....					

	610	620	630	640	650	660
Pf10_0355_3D7_ref seq	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_3D7	VPLSLSDIEQIANESEDVLEIEIEEINTDGEIEYITEEIEKEDIEEETEEDIEEET....					
Pf10_0355_RO33	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_Fcr3	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_Wellcome	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_T996	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_T9102	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_K1	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_Dd2	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_D10	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_Fcc2	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_Palo_Alto	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_HB3	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_7G8	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_D6	.....|.....|.....|.....|.....|.....|.....|				

	670	680	690	700	710	720
Pf10_0355_3D7_ref seq	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_3D7	EEETEETEEEADEETVKEIEDKPEQEIKNKSLEEKQIDKNTDTSEKKGFNSEKDEKAR					
Pf10_0355_RO33	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_Fcr3	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_Wellcome	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_T996	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_T9102	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_K1	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_Dd2	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_D10	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_Fcc2	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_Palo_Alto	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_HB3	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_7G8	.....|.....|.....|.....|.....|.....|.....|				
Pf10_0355_D6	.....|.....|.....|.....|.....|.....|.....|				

	250	260	270	280	290	300
PFD1160w_3D7_ref_seq_exon_1	.....|.....|.....|.....|.....|.....|.....|	NKEENSPTTEEITTEYNPVMSEMGVGTIIAHSEPGPKTVNTEVRNVLRSDGKISDQGSQKSP				
PFD1160w_3D7	.....|.....|.....|.....|.....|.....|.....|	.....		
PFD1160w_RO33	.....|.....|.....|.....|.....|.....|.....|	.....		
PFD1160w_Fcr3	.....|.....|.....|.....|.....|.....|.....|	.....		
PFD1160w_Wellcome	.....|.....|.....|.....|.....|.....|.....|	.....		
PFD1160w_T996	.....|.....|.....|.....|.....|.....|.....|	.....S.....				
PFD1160w_T9102	.....|.....|.....|.....|.....|.....|.....|	.....A.....G.....EI..				
PFD1160w_K1	.....|.....|.....|.....|.....|.....|.....|	.....S.....G.....				
PFD1160w_Dd2	.....|.....|.....|.....|.....|.....|.....|	.....S.....G.....				
PFD1160w_D10	.....|.....|.....|.....|.....|.....|.....|	.....S.....G.....				
PFD1160w_FCC2	.....|.....|.....|.....|.....|.....|.....|	.....		
PFD1160w_Palo_Alto	.....|.....|.....|.....|.....|.....|.....|	.....		
PFD1160w_HB3	.....|.....|.....|.....|.....|.....|.....|	.....		
PFD1160w_7G8	.....|.....|.....|.....|.....|.....|.....|	.....		
PFD1160w_D6	.....|.....|.....|.....|.....|.....|.....|	.....		

	310	320	330	340	350	360
PFD1160w_3D7_ref_seq_exon_1	.....|.....|.....|.....|.....|.....|.....|	PKELSNKQMTPAQRKNVPHFVERRRGYGNSHVRGNALKKISNGDDNYKSPSSNYIEVDCAE				
PFD1160w_3D7	.....|.....|.....|.....|.....|.....|.....|	.....		
PFD1160w_RO33	.....|.....|.....|.....|.....|.....|.....|	.....		
PFD1160w_Fcr3	.....|.....|.....|.....|.....|.....|.....|	.....D.				
PFD1160w_Wellcome	.....|.....|.....|.....|.....|.....|.....|	.....D.				
PFD1160w_T996	.....|.....|.....|.....|.....|.....|.....|	.....		
PFD1160w_T9102	.....|.....|.....|.....|.....|.....|.....|	.....A.....D.				
PFD1160w_K1	.....|.....|.....|.....|.....|.....|.....|	.....S.....				
PFD1160w_Dd2	.....|.....|.....|.....|.....|.....|.....|	.....		
PFD1160w_D10	.....|.....|.....|.....|.....|.....|.....|	.....		
PFD1160w_FCC2	.....|.....|.....|.....|.....|.....|.....|	.....		
PFD1160w_Palo_Alto	.....|.....|.....|.....|.....|.....|.....|	.....S.....				
PFD1160w_HB3	.....|.....|.....|.....|.....|.....|.....|	.....		
PFD1160w_7G8	.....|.....|.....|.....|.....|.....|.....|	.....D.				
PFD1160w_D6	.....|.....|.....|.....|.....|.....|.....|	.....		

	370	380	390	400	410	420
PFD1160w_3D7_ref_seq_exon_1	.....|.....|.....|.....|.....|.....|.....|	DKYFLLLEDGTNQSENSCKTRYNYFVSNVDYDGTGSAIYSTDQVPSREEIKSPDSLSTLDAR				
PFD1160w_3D7	.....|.....|.....|.....|.....|.....|.....|	.....		
PFD1160w_RO33	.....|.....|.....|.....|.....|.....|.....|	.....P.....V.....				
PFD1160w_Fcr3	.....|.....|.....|.....|.....|.....|.....|	.....FL.....D.....RM.....A.....				
PFD1160w_Wellcome	.....|.....|.....|.....|.....|.....|.....|	.....FL.....D.....RM.....A.....				
PFD1160w_T996	.....|.....|.....|.....|.....|.....|.....|	.....P.....S.....				
PFD1160w_T9102	.....|.....|.....|.....|.....|.....|.....|	.....FL.....				
PFD1160w_K1	.....|.....|.....|.....|.....|.....|.....|	.....FL.....I.D.....RM.....A.....				
PFD1160w_Dd2	.....|.....|.....|.....|.....|.....|.....|	.....P.....D.....NS.				
PFD1160w_D10	.....|.....|.....|.....|.....|.....|.....|	.....P.....D.....NS.				
PFD1160w_FCC2	.....|.....|.....|.....|.....|.....|.....|	.....P.....V.....				
PFD1160w_Palo_Alto	.....|.....|.....|.....|.....|.....|.....|	.....P.....I.D.....RM.....A.....				
PFD1160w_HB3	.....|.....|.....|.....|.....|.....|.....|	.....P.....D.....NS.				
PFD1160w_7G8	.....|.....|.....|.....|.....|.....|.....|	.....P.....S.....				
PFD1160w_D6	.....|.....|.....|.....|.....|.....|.....|	.....P.....D.....NS.				

	430	440	450	460	470	480
PFD1160w_3D7_ref_seq_exon_1	.....|.....|.....|.....|.....|.....|.....|	GSTHNLNVSNEGNPLEGGEEKNNVKISEQNGRNLES SVGTDKGS DKNEEEVAATCDPNDR				
PFD1160w_3D7	.....|.....|.....|.....|.....|.....|.....|	.....		
PFD1160w_RO33	.....|.....|.....|.....|.....|.....|.....|	.....G.....L.....I.....G				
PFD1160w_Fcr3	.....|.....|.....|.....|.....|.....|.....|	.....T.....VEK.....G...G				
PFD1160w_Wellcome	.....|.....|.....|.....|.....|.....|.....|	.....T.....VEK.....G...G				
PFD1160w_T996	.....|.....|.....|.....|.....|.....|.....|	.....KR.....G.....T.N..V.....I...G				
PFD1160w_T9102	.....|.....|.....|.....|.....|.....|.....|	.....		
PFD1160w_K1	.....|.....|.....|.....|.....|.....|.....|	.....T.N.....G...G				
PFD1160w_Dd2	.....|.....|.....|.....|.....|.....|.....|	V.....KR.....G.....VEK.....G...G				
PFD1160w_D10	.....|.....|.....|.....|.....|.....|.....|	V.....KR.....G.....VEK.....G...G				
PFD1160w_FCC2	.....|.....|.....|.....|.....|.....|.....|	.....		
PFD1160w_Palo_Alto	.....|.....|.....|.....|.....|.....|.....|	.....T.N.....				
PFD1160w_HB3	.....|.....|.....|.....|.....|.....|.....|	V.....				
PFD1160w_7G8	.....|.....|.....|.....|.....|.....|.....|	.....KR.....G.....T.N..V.....D.				
PFD1160w_D6	.....|.....|.....|.....|.....|.....|.....|	V.....G.....T.N..V.....I...A				

	490	500	510	520	530	540	
PFD1160w_3D7_ref_seq_exon_1	NCFDGRYINVVDYIRGLLKGKRSRSGDGRSNIKHIIISNNFDDSNMIFPTTFNFDFDILKAEEE					
PFD1160w_3D7	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|					
PFD1160w_RO33	..I.ANQ.P.E.L.N.SR.E...L.S.MA.F.T.GGN.IFSS.G.L...VRPAR.						
PFD1160w_Fcr3	D.I.ANQ.P.E.L.K.SR.E...L.S.MA.F.TH.GGN.IFSS.G.L...VRPAR.						
PFD1160w_Wellcome	D.I.ANQ.P.E.L.K.SR.E...L.S.MA.F.TH.GGN.IFSS.G.L...VRPAR.						
PFD1160w_T996	A.I.ANQ.P.E.L.N.....						
PFD1160w_T9102	.V.VTK.S.E.L.N.SR.E...L.S.MAQF.TH.G.H.IFSS.D.LY...VRPAK.						
PFD1160w_K1	D.I.ANQ.P.E.L.N.R.E...L.S.MA.F.T.GGN.IFSS.D.LY...VRPAR.						
PFD1160w_Dd2	D.I.ANQ.P.E.L.K.SR.E...L.S.MA.F.TH.GGN.IFSS.D.L...VRPAKG						
PFD1160w_D10	D.I.ANQ.P.E.L.K.SR.E...L.S.MA.F.TH.GGN.IFSS.D.L...VRPAKG						
PFD1160w_FCC2	D.....F.....						
PFD1160w_Palo_Alto	.....					
PFD1160w_HB3	D.....F.....						
PFD1160w_7G8	.V.ANQ.A.E.L.N.SR.E...L.S.MAQF.TH.G.H.IFSS.D.LY.....						
PFD1160w_D6	D...ANQ.LL.FK.SE.G.L.S.MERLTLKY.R.N.IFSS.G.L...VRPAK.						

	550	560	570	580	590	600	
PFD1160w_3D7_ref_seq_exon_1	VLPVNNSDIIYGHEEVEETTQEGASIFEKHSHTSSQONDSSASGNKYRMLSTTMELPNQQ					
PFD1160w_3D7	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|					
PFD1160w_RO33	..ESK.K.HE.Q.M...E...I.R.R...N.AGT.DYM.I...F.EK						
PFD1160w_Fcr3	..ESK.K.HE.Q.M...E...I.R.R...N.ADT.DYM.I.....						
PFD1160w_Wellcome	..ESK.K.HE.Q.M...E...I.R.R...N.ADT.DYM.I.....						
PFD1160w_T996	.....					
PFD1160w_T9102	..ESK.K.HE.Q.M...E...I.R...N.AGT.DYM.I.....						
PFD1160w_K1	..ESK.K.HE.Q.M...E...I.R.R...N.AGT.DYM.I...F.EK						
PFD1160w_Dd2	..ESK.N.HE.Q.M.....						
PFD1160w_D10	..ESK.N.HE.Q.M.....						
PFD1160w_FCC2	.....I.R.....S.....					
PFD1160w_Palo_Alto	..H.....Q.M.....						
PFD1160w_HB3	.....I.R.....					
PFD1160w_7G8	.....					
PFD1160w_D6	..ESK.K.HE.Q.....I.R.R...N.AGT.DYI...I.F.EK						

	610	620	630	640	650	660	
PFD1160w_3D7_ref_seq_exon_1	EVFGLYSPVSRRTLDSAMSFRLRSIISLSSAPVSRSEGOQSKESKRVEISTTVQDPIGYRTSP					
PFD1160w_3D7	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|					
PFD1160w_RO33	.T.....Q.F.R.LN...VFIS.S...Q.K.....KG.....						
PFD1160w_Fcr3	.....KN.FNS.S...Q.K.....QLAQ.....G.....					
PFD1160w_Wellcome	.....KN.FNS.S...Q.K.....QLAQ.....G.....					
PFD1160w_T996	.....FGR.LN.....F.....					
PFD1160w_T9102	.....KR.FIS.S...Q.K.....QLAQ.....G.....					
PFD1160w_K1	.T.....Q.F.R.LN...VFIS.S...Q.K.....QLAQ.....RG...KN.S						
PFD1160w_Dd2	.....KN.FNS.S...QRQ.....QLAQ.....G.....					
PFD1160w_D10	.....KN.FNS.S...QRQ.....QLAQ.....G.....					
PFD1160w_FCC2	.....Q.FGR.LN.....F.....					
PFD1160w_Palo_Alto	.....F.....					
PFD1160w_HB3	.....FG.N.....F.....					
PFD1160w_7G8	.....N.....F.....K.....QLAQ.....					
PFD1160w_D6	.T.....Q.FG.V...KN.FIS.S...Q.K.....QLAQ.P.M.KG...KN.S						

	670	680	690	700	710	720	
PFD1160w_3D7_ref_seq_exon_1	LQMNHAHSVAGINVSILSMLGLSSGQVRRSGGQGSETYIVGTSQSGFHKNEVIPSIDK					
PFD1160w_3D7	.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|.....|					
PFD1160w_RO33	.....					
PFD1160w_Fcr3	.....					
PFD1160w_Wellcome	.....					
PFD1160w_T996	.....					
PFD1160w_T9102	.....					
PFD1160w_K1	.....					
PFD1160w_Dd2	.....					
PFD1160w_D10	.....					
PFD1160w_FCC2	.....					
PFD1160w_Palo_Alto	.....					
PFD1160w_HB3	.....					
PFD1160w_7G8	.....					
PFD1160w_D6	.....					

```

                                730      740      750      760
                                .....|.....|.....|.....|.....|.....|.....|.....
PFD1160w_3D7_ref_seq_exon_1 SGKTQIVSNEKGGIFSKGITSMSSLPVALVTFVFLFMFLVFNK
PFD1160w_3D7                .....
PFD1160w_RO33               .....
PFD1160w_Fcr3               .....
PFD1160w_Wellcome           .....
PFD1160w_T996               .....
PFD1160w_T9102              .....
PFD1160w_K1                 .....
PFD1160w_Dd2                .....
PFD1160w_D10                .....
PFD1160w_FCC2               .....
PFD1160w_Palo_Alto          .....
PFD1160w_HB3                .....
PFD1160w_7G8                .....
PFD1160w_D6                 .....
```

Supplementary Figure S1B

MSPDBL1 (Gene id: PF3D7_1035700; also referred to as MSP3.4)

Allelic antigens

3D7

NHNKCPDENFCKGIKNVLSPPKNSTGRNGDWISVAVKESSTNKGVLVPPRRTKLCLRNINKVWHRIKDEKNFKEEFVKVALGESNALMKHYKEKNLNALTAIKYGFSDMGDIKGT
DLIDYQITKNINRALDKILRNETSNDKIKKRVDDWWEANKSAFWDAFMCGYKVHIGNKPCPEHDNMDRIPQYLRWFREWGTYVCSEYKKNKFEDVIKLCNIQQFTNQDSDQLLEISKKD
KCKEALKHYEEWVNRRRPEWKGQCDKFEKEKSKYEDTKSITAEKYLKEICSECDCKYKDLNDFKEF

7G8

NHNKCPDKNFCNGIQNVPCPLKDFGTGKGDWASSNVRNFLTVMKGVLPVPPRRKQMCFRININFPKPKKTEGKFENFIYSSAGSEAKQLIKLYGNNTKALQAMKYGFADIGNIVQ
GNDMIDTPTSNTKTYLEEVLGKQYKNVNDPKDAKTWWIQNKHRVWDAMMCGYQYEKKNKCTGYGNIYDIPQYLRWFREWGTYVCSEYKKNKFEDVIKLCNIQQFTNQDSDQL
LEISKDKCKEALKHYEEWVNRRRPEWKGQCDKFEKEKSKYEDTKSITAEKYLKEICSECDCKYKDLNDFKEF

Fcc2

NHNKCPDENFCKGIKNVLSPPKNSTGRNGDWASSNVRNFLTVMKGVLPVPPRRKQMCFRININFPKPKKTEGKFENFIYSSAGSEAKQLIKLYGNNTKALQAMKYGFADIGNIVQ
GNDMIDTPTSNTKTYLEEVLGKQYKNVNDPKDAKTWWIQNKHRVWDAMMCGYKVHIGNKPCPEHDNMDRIPQYLRWFREWGTYVCSEYKKNKFENVIKLCNVRQITNQDSDQL
LEISKDKCKGALKHYEEWVNRRRPEWKGQCDKFEKEKSKYEDTKSITAEIYLKEICSECDCKYKDLNDFKEF

Palo Alto

NHNKCPDKNFCNGIQNVPCPLKNFTGTGKGDWASSNVRNFLTVMKGVLPVPPRRKQMCFRININFPKPKKTEGKFENFIYSSAGSEAKQLIKLYGNNTKALQAMKYGFADIGNIVQ
GNDMIDTPTSNTKTYLEEVLGKQYKNVNDPKDAKTWWIQNKHRVWDAMMCGYKVHIGNKPCPEHDNMDRIPQYLRWFREWGTYVCSEYKKNKFENVIKLCNVRQITNQDSDQL
LEISKDKCKGALKHYEEWVNRRRPEWKGQCDKFEKEKSKYEDTKSITAEIYLKEICSECDCKYKDLNDFKEF

D6

NHNKCPDENFCKGIKNVLSPPKNSTGRNGDWISVNVKESSTTNKGVLVPPRRKQMCFRININNFPKLLKTEGKFENFIYSSAGSEAKQLIKLYGNNTEKAHQAIRYSFADIGNIIRGDD
MMDTPTSKEITITYLEKVLKIYNEENNPKPKDAKKWWTENRHHVWEAMMCGYQSAQKDNQCTGYGNIDDIPQYLRWFREWGTYVCSEYKNKFEDVIKLCNIQQFTNQDDSQLLEIS
KEDKCKGALKHYEEWVNRRRPEWKGQCDKFEKEKSKYEDTKSRTAEIYLKQKCECDCKYKDLDNFTFKEF

MSPDBL1 (Gene id: PF3D7_1035700; also referred to as MSP3.4)

Conserved antigens (minimal polymorphism)

N-terminal

DSNLRNGLLNNSLDLTNGLNNDNSFIDSKIEEHENKSYQNKDNNISIVGQDVPITSVYSSKIINANDLEGNSIDDTKGLSVTNSGFDDGSAFGGGLPFSGYSPLQ

C-terminal

QRGNITTSQGNSHRATVVQQVDQTNRLDNVNSVTQRGNNNNYNNNLERGLG

MSPDBL2 (Gene id: PF3D7_1036300; also referred to as MSP3.8)

Allelic antigens

3D7

FNKCPTEEICKDFSNLPQCRKNVHERNNWLGSSVKNFSSDNKGVLPVPRRQSLCLRITLQDFRTKKKKEGDFEKFIYSYASSEARKLRTIHNNNLEKAHQAIR
YSFADIGNIIRGDDMMDTPTSKETITYLEKVLKIYNENNDKPKDAKKWWTENRHHVWEAMMCGYQSAQKDNQCTGYGNIDDIPQFLRWFREWGTYVC
EESEKNMNTLKAVCFPKQPRTEANPALTVHENEMCSSTLKKYEEWYNKRKTEWTEQSIKYNNDKINYTDIKTLSPSEYLIEKCPECKCTKKN

T9/96

HYKCPDKNFCNGIQNVPNCPLKDFTGTKGDWASSNVRNFLT VNKGVLVPRRQKMCFRININFPKLLKTEGKFENFIYSSAGSEAKQLIKLYGNNTKAL
QAMKYGFADIGNIVQGNMIDTPTSNTKTYLEEVLGKQYKNVNDPKDAKTWWIQNKHVVWDAMMCGYQYEKKDNKCTGYGNIYDIPQFLRWFREW
GTYVCEESEKNMNTLKAVCFPKQPRTEANPALTVHENEMCSSTLKKYEEWYNKRKTEWTEQSIKYNNDKINYTDIKTLSPSEYLIEKCPECKCTKKN

Conserved antigens

N-terminal

STCFVVNEGNPNLRNNIINDDELK GKAYNNTIDANNQNIENK NLKHNVNSSHISKFSDIMDQEDKGD

C-terminal

SNVGSIQEVNQGSVSEESHKIDPSKIDDRLELSSGSSSLEQHSKEDVKKG

SURFIN4.2 (Gene id: PF3D7_0424400)

Allelic antigens

3D7A

RGN**A**LKKISNGDDNYKSPSSNYIEVDCAEDK**Y**FLLLEDGTNQSENSCKT**K**YNYFVSNDYDGTGSAIYSTDQV**P**S**R**EEIKSP**D**SLSTLDARGSTHNLNVSNEG

3D7B

RSG**S**DGR**S**NIKH**I**IS**N**NF**D**DS**N**MIF**P**TF**N**FD**F**DL**K**AEEVLP**V**NS**D**I**I**Y**G**HE**V**EE**T**Q**E**GAS**I**FE**K**HS**H**TSS**Q**Q**N**DS**S**AS**G**N**K**Y**R**MLSTTMELPN**Q**Q**E**V**F**GLY**S**P

K1A

RGN**S**LKKISNGDDNYKSPSSNYIEVDCAEDK**F**LLEDGTNQSENSCKT**I**YDYFVSNDYDGTGSAIYSTDQV**P**R**M**EEIKSP**A**SLSTLDARGSTHNLNVSNEG

K1B

RSG**L**DG**S**SN**M**A**H**F**I**ST**N**F**G**GN**I**F**S**ST**D**N**L**Y**F**DI**V**R**P**AREVLP**E**SK**S**K**I**I**H**E**H**Q**E**M**E**ETT**E**EGAS**I**I**E**RS**R**TSS**Q****N**ND**A**GT**S**D**Y**M**Y**R**I**LSTTM**E**F**P**NE**K**ET**F**GLY**S**P

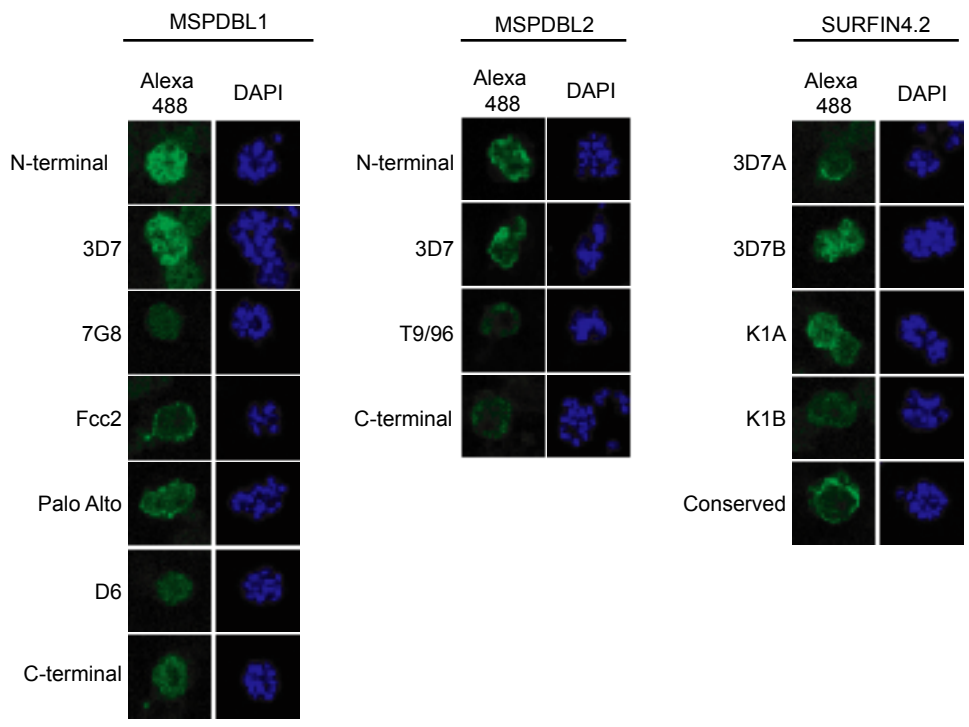
Conserved antigen

DYIFLDEQKEDVCLDEAKNDILSKESFDDVLIKVVVDREINREINGKING

Supplementary Figure S1C

PF10_0348_3D7	NHNKCPDENFCCKGKIKNVLSCPPKNSTGRNGDWISVAVKESSTTNKGVLPVPPRRTKLCLR-	59
PF10_0348_D6	NHNKCPDENFCCKGKIKNVLSCPPKNSTGRNGDWISVNVKESSTTNKGVLPVPPRRKQMCFRI	60
PF10_0348_Fcc2	NHNKCPDENFCCKGKIKNVLSCPPKNSTGRNGDWASSNVRNFLTVMKGVLPVPPRRKQMCFRI	60
PF10_0348_Palo	NHNKCPDKNFCNGIQNVPCPLKNFTGTGKGDWASSNVRNFLTVMKGVLPVPPRRKQMCFRI	60
PF10_0348_7G8	NHNKCPDKNFCNGIQNVPCPLKDFGTGKGDWASSNVRNFLTVMKGVLPVPPRRKQMCFRI	60
PF10_0355_3D7	-FNKCPTEEICKDFSNLPQCRKN--VHERNNWLGSVKNFSSDNKGVLPVPPRRQSLCLR	57
PF10_0355_T996	-HYKCPDKNFCNGIQNVPCPLKDFGTGKGDWASSNVRNFLTVMKGVLPVPPRRKQMCFRI	59
	. *** :::*::*::*::* . * : . ..:* . *:: : ***** .:*:*	
PF10_0348_3D7	NINKVWHRIKDEKNFKEEFVKVALGESNALMKHYKEKNLNALTAIKYGFSDMGDIKGTD	119
PF10_0348_D6	NINNFPKLKKTEGKFENFIYSSAGSEAKQLIKLYGNNTKAHQAIRYSFADIGNIIRGDD	120
PF10_0348_Fcc2	NINNFPELKKTEGKFENFIYSSAGSEAKQLIKLYGNNTKALQAMKYGFADIGNIVQGND	120
PF10_0348_Palo	NINNFPELKKTEGKFENFIYSSAGSEAKQLIKLYGNNTKALQAMKYGFADIGNIVQGND	120
PF10_0348_7G8	NINNFPKLKKTEGKFENFIYSSAGSEAKQLIKLYGNNTKALQAMKYGFADIGNIVQGND	120
PF10_0355_3D7	TLQDFRTKKKKEGDFEKFYISYASSEARKLRTIHNNNLEKAHQAIRYSFADIGNIIRGDD	117
PF10_0355_T996	NINNFPKLKKTEGKFENFIYSSAGSEAKQLIKLYGNNTKALQAMKYGFADIGNIVQGND	119
 * * .:*:: : . * .:*.. * . : : : * *::*:*:*:*:*:* * *	
PF10_0348_3D7	LIDYQITKNINRALDKILRN-ETSNDKIKKRVDDWEANKSAFWDAFMCGYKVHIGNKPCP	178
PF10_0348_D6	MMDTPTSKETITYLEKVLKIYNENNDKPKDAKKWWTENRHHVWEAMMCGYQSAQKDNQCT	180
PF10_0348_Fcc2	MIDTPTSNTKTKTYLEEVVLGKQYKKNVNDPKDAKTWWIQNKHRVWDAMMCGYKVHIGNKPCP	180
PF10_0348_Palo	MIDTPTSNTKTKTYLEEVVLGKQYKKNVNDPKDAKTWWIQNKHRVWDAMMCGYKVHIGNKPCP	180
PF10_0348_7G8	MIDTPTSNTKTKTYLEEVVLGKQYKKNVNDPKDAKTWWIQNKHRVWDAMMCGYQYKKNKCT	180
PF10_0355_3D7	MMDTPTSKETITYLEKVLKIYNENNDKPKDAKKWWTENRHHVWEAMMCGYQSAQKDNQCT	177
PF10_0355_T996	MIDTPTSNTKTKTYLEEVVLGKQYKKNVNDPKDAKTWWIQNKHRVWDAMMCGYQYKKNKCT	179
	::* ::: *:::* . . . * . ** * : .:*:*:*:*: :: *	
PF10_0348_3D7	EHDNMDRIPQYLRWFREWGTYVCESEYKKNKFEDVIKLCNIQQFTNQDSDQLLEISKDKCK	238
PF10_0348_D6	GYGNIDDI PQYLRWFREWGTYVCESEYKKNKFEDVIKLCNIQQFTNQDSDQLLEISKDKCK	240
PF10_0348_Fcc2	EHDNMDRIPQYLRWFREWGTYVCESEYKKNKFENVIELCNVRQITNQDSDQLLEISKDKCK	240
PF10_0348_Palo	EHDNMDRIPQYLRWFREWGTYVCESEYKKNKFENVIELCNVRQITNQDSDQLLEISKDKCK	240
PF10_0348_7G8	GYGNIYDIPQYLRWFREWGTYVCESEYKKNKFEDVIKLCNIQQFTNQDSDQLLEISKDKCK	240
PF10_0355_3D7	GYGNIDDI PQFLRWFREWGTYVCESESEKNMNTLKAVCFPPKQPRTEAN-PALTVHENEMCS	236
PF10_0355_T996	GYGNIYDIPQFLRWFREWGTYVCESESEKNMNTLKAVCFPPKQPRTEAN-PALTVHENEMCS	238
	::* : **:*:*:*:*:*:* * : : : : : * * * : : * : : : * .	
PF10_0348_3D7	EALKHYEEWVNRRRPEWKGQCDKFEKEKSKYEDTKSITAELYLKEICSECDCKYKDLNT	298
PF10_0348_D6	GALKHYEEWVNRRRPEWKGQCDKFEKEKSKYEDTKSRTAEIYLKQKSECDCKYKDLNT	300
PF10_0348_Fcc2	GALKHYEEWVNRRRPEWKGQCDKFEKEKSKYEDTKSRTAEIYLKEICSECDCKYKDLNT	300
PF10_0348_Palo	GALKHYEEWVNRRRPEWKGQCDKFEKEKSKYEDTKSRTAEIYLKEICSECDCKYKDLNT	300
PF10_0348_7G8	EALKHYEEWVNRRRPEWKGQCDKFEKEKSKYEDTKSITAELYLKEICSECDCKYKDLNT	300
PF10_0355_3D7	STLKKYEEWYNKRKTEWTEQSIKYNNDKINYTDIKTLPSEYLIKCEPECKCTKKN----	292
PF10_0355_T996	STLKKYEEWYNKRKTEWTEQSIKYNNDKINYTDIKTLPSEYLIKCEPECKCTKKN----	294
	::*:*:*:* *:*:*:* * . *:::* * * * : . . * * : *:*:* * . *	
PF10_0348_3D7	FKEF 302	
PF10_0348_D6	FKEF 304	
PF10_0348_Fcc2	FKEF 304	
PF10_0348_Palo	FKEF 304	
PF10_0348_7G8	FKEF 304	
PF10_0355_3D7	----	
PF10_0355_T996	----	

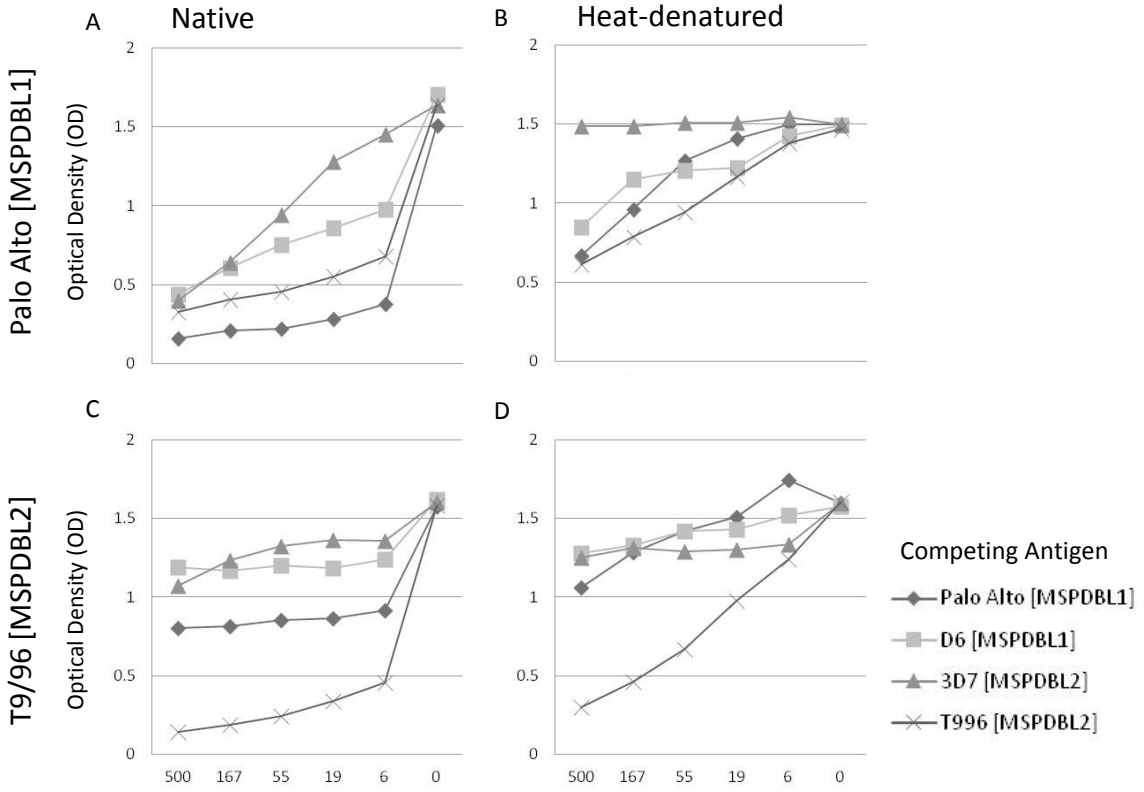
Supplementary Figure S2. Examples of parasites stained in immunofluorescence assay (IFA) with murine sera raised to each of the 16 recombinant antigens. Antibodies in the murine reacted with fixed 3D7 mature stage parasites, and a single serum sample (1/500 dilution) from each group of five mice per antigen was selected for illustration. Antibodies elicited to the MSPDBL1 and SURFIN4.2 recombinant antigens reacted with the majority of mature stage schizonts, whereas the MSPDBL2 antigen was expressed in only a minority of mature stage schizonts (as previously described in detail by Amambua-Ngwa *et al.* with additional IFA data (18)). Antigen specific reactivity is shown in green (Alex Fluor 488) with the nuclei of schizonts in the same field stained with DAPI (Blue).



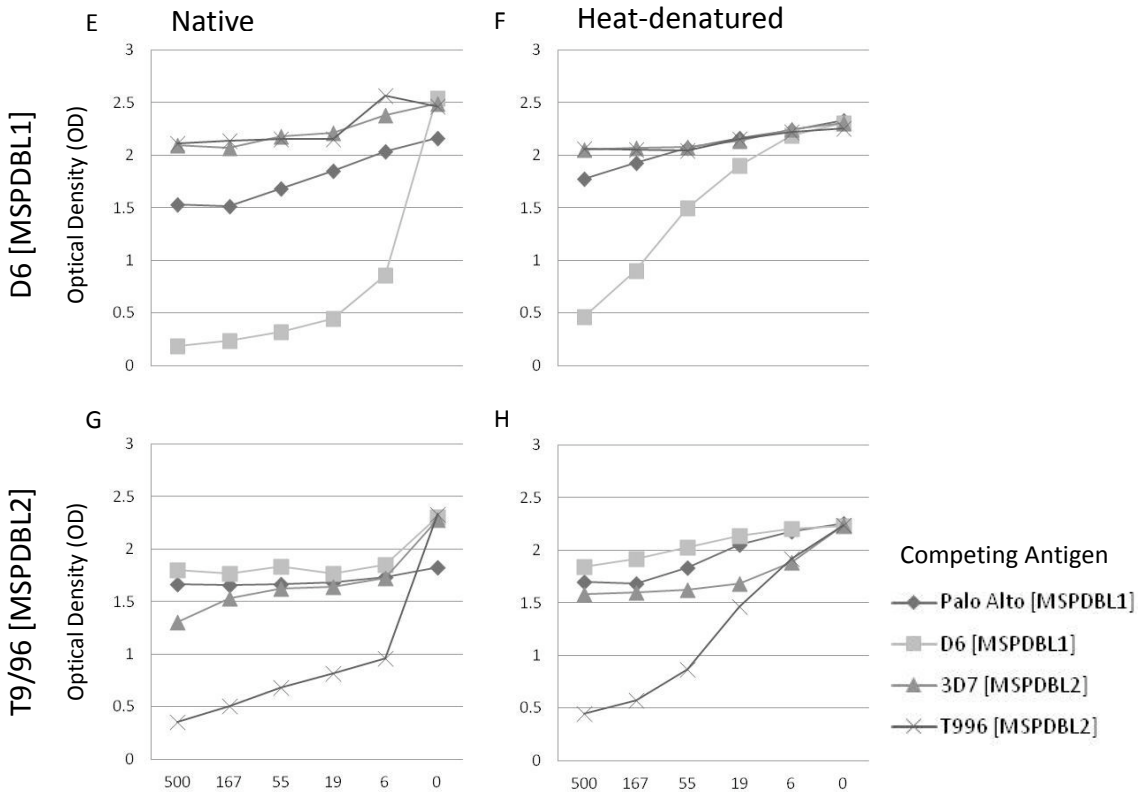
Supplementary Figure S3.

Competition ELISAs to test for the presence of cross-reactive, conformational and linear epitopes in recombinant antigens. Serum samples from Gambian adults (G16 and G31) were used to screen non-denatured and heat-denatured MSPDBL1 and MSPDBL2 antigens, using an approach previously described in the study of other antigens (12). Heat-denatured samples were boiled at 95⁰C for 10 min and allowed to cool to room temperature. Non-denatured and heat-denatured proteins were then incubated at a series of diluted amounts with sera for 5 hours at room temperature. Panels A, C, E and G, show that serum reactivity against Palo Alto [MSPDBL1] and T9/96 [MSPDBL2] (serum G16,) and D6 [MSPDBL1] and T9/96 [MSPDBL2] (serum G31) is always fully competed by homologous antigen and partially competed by particular heterologous antigens to differing extents indicating some cross reactivity as well as allele specificity. Panels B, D, F and H, show that heat denaturation of the soluble antigens substantially reduces the competition for antibody binding with the homologous and heterologous coating antigens.

Serum G16



Serum G31



Competing antigen amount (ng)

Coating antigen

Supplementary Table S1 A. Tabulated Pearson's correlates from pairwise analysis for the full panel of 16 antigens for Chonyi. Blue shading highlights Pearson's cross-correlation values (>0.6, $P < 0.0001$) for within antigen comparisons with the exception of *mispdbl1* and *mispdbl2*, where cross-correlation are between the DBL domain of each antigen.

		PF10_0348							PF10_0355					PFD1160w			
		N-term	C-term	3D7	7G8	Fcc2	Palo Alto	D6	N-term	C-term	3D7	T996	Cons	3D7A	3D7B	K1A	K1B
PF10_0348	N-term	1.00															
	C-term	0.22	1.00														
	3D7	0.41	0.21	1.00													
	7G8	0.46	0.19	0.84	1.00												
	Fcc2	0.40	0.16	0.81	0.91	1.00											
	Palo Alto	0.38	0.12	0.79	0.91	0.96	1.00										
	D6	0.39	0.17	0.81	0.89	0.93	0.88	1.00									
PF10_0355	N-term	0.38	0.20	0.26	0.31	0.31	0.30	0.32	1.00								
	C-term	0.20	0.20	0.20	0.26	0.25	0.24	0.25	0.71	1.00							
	3D7	0.40	0.23	0.61	0.72	0.72	0.71	0.75	0.41	0.28	1.00						
	T996	0.45	0.23	0.73	0.89	0.90	0.93	0.85	0.36	0.26	0.83	1.00					
	Cons	0.18	0.06	0.14	0.16	0.18	0.17	0.17	0.22	0.22	0.20	0.19	1.00				
PFD1160w	3D7A	0.23	0.12	0.18	0.22	0.21	0.19	0.22	0.34	0.18	0.29	0.24	0.15	1.00			
	3D7B	0.30	0.12	0.25	0.27	0.27	0.24	0.26	0.36	0.29	0.31	0.27	0.10	0.30	1.00		
	K1A	0.32	0.18	0.21	0.26	0.24	0.23	0.25	0.36	0.22	0.30	0.29	0.18	0.81	0.29	1.00	
	K1B	0.22	0.15	0.22	0.20	0.18	0.16	0.20	0.13	0.09	0.23	0.18	0.08	0.18	0.39	0.17	1.00

Supplementary Table S1 B. Tabulated Pearson's correlates from pairwise analysis for the full panel of 16 antigens for Ngerenya. Blue shading highlights Pearson's cross-correlation values (>0.6, P < 0.0001) for within antigen comparisons with the exception of *mispdbl1* and *mispdbl2*, where cross-correlation are between the DBL domain of each antigen.

		PF10_0348							PF10_0355					PFD1160w			
		N-term	C-term	3D7	7G8	Fcc2	Palo Alto	D6	N-term	C-term	3D7	T996	Cons	3D7A	3D7B	K1A	K1B
PF10_0348	N-term	1.00															
	C-term	0.07	1.00														
	3D7	0.32	0.12	1.00													
	7G8	0.30	0.15	0.82	1.00												
	Fcc2	0.27	0.10	0.77	0.89	1.00											
	Palo Alto	0.26	0.10	0.75	0.91	0.95	1.00										
PF10_0355	D6	0.21	0.15	0.73	0.79	0.87	0.81	1.00									
	N-term	0.08	0.55	0.13	0.16	0.10	0.12	0.15	1.00								
	C-term	0.03	0.01	0.03	-0.03	-0.03	-0.02	0.01	0.27	1.00							
	3D7	0.21	0.13	0.57	0.66	0.71	0.71	0.65	0.20	0.03	1.00						
	T996	0.31	0.09	0.65	0.85	0.86	0.92	0.70	0.15	-0.01	0.79	1.00					
PFD1160w	Cons	0.15	0.06	0.12	0.15	0.16	0.16	0.17	0.13	0.08	0.14	0.19	1.00				
	3D7A	0.14	0.14	0.17	0.17	0.12	0.14	0.11	0.25	0.11	0.12	0.15	0.21	1.00			
	3D7B	0.09	0.10	0.17	0.14	0.13	0.15	0.12	0.20	0.08	0.09	0.11	0.17	0.70	1.00		
	K1A	0.22	0.12	0.17	0.18	0.15	0.16	0.14	0.17	0.06	0.08	0.14	0.26	0.78	0.70	1.00	
	K1B	0.12	0.14	0.12	0.12	0.08	0.08	0.11	0.26	0.11	0.07	0.08	0.17	0.82	0.78	0.74	1.00

Supplementary Table S2. Association between the presence of serum IgG to the panel of 16 antigens in children aged <11 years and parasite slide positive in October 2000 in Chonyi village and the occurrence of an episode of clinical malaria over the following 6 months

^a Proportion of children acquiring malaria who were:					
Antigen	IgG positive	IgG negative	Univariate	^b Multivariate	<i>P</i> -value
			RR (95% CI)	RR (95% CI)	
^c <i>Chonyi village (<11 years and parasite slide positive n = 119)</i>					
<u>PF10_348</u>					
N-term	35% (15/43)	33% (25/176)	1.06 (0.63 - 1.79)	1.26 (0.77 - 2.07)	0.358
C-term	36% (5/14)	33% (35/105)	1.07 (0.50 - 2.28)	1.28 (0.55 - 2.91)	0.567
3D7	30% (29/96)	48% (11/23)	0.63 (0.37 - 1.07)	1.31 (0.78 - 2.18)	0.307
7G8	29% (30/104)	67% (10/15)	0.43 (0.27 - 0.69)	0.84 (0.50 - 1.39)	0.487
Fcc2	30% (33/111)	88% (7/8)	0.34 (0.23 - 0.50)	0.69 (0.43 - 1.13)	0.144
Palo Alto	29% (31/106)	69% (9/13)	0.42 (0.26 - 0.68)	0.83 (0.52 - 1.32)	0.429
D6	30% (32/108)	73% (8/11)	0.41 (0.26 - 0.65)	0.75 (0.49 - 1.15)	0.186
<u>PF10_0355</u>					
N-term	18% (3/17)	36% (37/102)	0.49 (0.17 - 1.41)	0.73 (0.29 - 1.82)	0.500
C-term	26% (8/31)	36% (32/88)	0.71 (0.37 - 1.37)	1.04 (0.56 - 1.92)	0.899
3D7	23% (22/97)	82% (18/22)	0.28 (0.18 - 0.42)	0.51 (0.28 - 0.93)	0.029*
T996	31% (36/115)	100% (4/4)	0.31 (0.24 - 0.41)	0.61 (0.35 - 1.05)	0.075
<u>PF10_160w</u>					
C-term	30% (16/53)	36% (24/66)	0.83 (0.49 - 1.40)	1.02 (0.63 - 1.66)	0.933
3D7A	6% (1/17)	38% (39/102)	0.15 (0.02 - 1.05)	0.25 (0.04 - 1.73)	0.159
3D7B	17% (4/23)	38% (36/96)	0.46 (0.18 - 1.18)	0.76 (0.31 - 1.86)	0.552
K1A	29% (9/31)	35% (31/88)	0.82 (0.44 - 1.53)	1.12 (0.61 - 2.05)	0.721
K1B	42% (5/12)	33% (35/107)	1.27 (0.62 - 2.63)	1.32 (0.70 - 2.46)	0.391

RR, Risk Ratio; CI, Confidence Interval

^a Number of individuals developing malaria/the total number of individuals that were IgG positive or negative. ^b The incidence Risk Ratio was estimated from multivariate analysis after adjusting for age and reactivity to *Plasmodium falciparum* schizont extract in generalized linear models. ^c Analysis focused on individuals who were parasitaemic at the time of serum sampling in October 2000.

Supplementary Table S3. Association between the presence of serum IgG to the panel of 16 antigens in children aged <11 years and parasite slide positive in October 2000 in Ngerenya village and the occurrence of an episode of clinical malaria over the following 6 months

^a Proportion of children acquiring malaria who were:					
Antigen	IgG positive	IgG negative	Univariate	^b Multivariate	<i>P</i> -value
			RR (95% CI)	RR (95% CI)	
^c Ngerenya village (<11 years and parasite slide positive n = 61)					
<u>PF10_348</u>					
N-term	29% (2/7)	48% (26/54)	0.59 (0.18 - 2.00)	0.63 (0.25 - 1.59)	0.326
C-term	0% (0/1)	47% (28/60)	nd	nd	nd
3D7	38% (11/29)	53% (17/32)	0.71 (0.40 - 1.27)	0.82 (0.48 - 1.41)	0.480
7G8	28% (7/25)	58% (21/36)	0.48 (0.24 - 0.96)	0.55 (0.27 - 1.12)	0.100
Fcc2	39% (12/31)	53% (16/30)	0.73 (0.41 - 1.27)	0.84 (0.51 - 1.40)	0.510
Palo Alto	32% (12/38)	70% (16/23)	0.45 (0.26 - 0.78)	0.53 (0.32 - 0.89)	0.017*
D6	35% (7/20)	51% (21/41)	0.68 (0.35 - 1.34)	0.76 (0.39 - 1.47)	0.409
<u>PF10_0355</u>					
N-term	50% (1/2)	46% (27/59)	1.09 (0.26 - 4.54)	0.93 (0.48 - 1.81)	0.831
C-term	42% (11/26)	49% (17/35)	0.87 (0.49 - 1.54)	1.06 (0.63 - 1.79)	0.825
3D7	24% (8/33)	71% (20/28)	0.34 (0.18 - 0.65)	0.38 (0.18 - 0.82)	0.014*
T996	36% (12/33)	57% (16/28)	0.64 (0.36 - 1.11)	0.85 (0.48 - 1.51)	0.578
<u>PFD1160w</u>					
C-Term	45% (5/11)	46% (23/50)	0.99 (0.48 - 2.03)	0.85 (0.47 - 1.53)	0.582
3D7A	33% (2/6)	47% (26/55)	0.71 (0.22 - 2.83)	0.77 (0.33 - 1.80)	0.539
3D7B	25% (1/4)	47% (27/57)	0.53 (0.09 - 2.99)	0.54 (0.14 - 2.05)	0.367
K1A	33% (2/6)	47% (26/55)	0.71 (0.22 - 2.28)	0.76 (0.32 - 1.80)	0.534
K1B	33% (2/6)	47% (26/55)	0.71 (0.22 - 2.28)	0.77 (0.33 - 1.80)	0.545

RR, Risk Ratio; CI, Confidence Interval; nd, not determined (insufficient datapoints to calculate)

^a Number of individuals developing malaria/the total number of individuals that were IgG positive or negative. ^b The incidence Risk Ratio was estimated from multivariate analysis after adjusting for age and reactivity to *Plasmodium falciparum* schizont extract in generalized linear models. ^c Analysis focused on individuals who were parasitaemic at the time of serum sampling in October 2000.