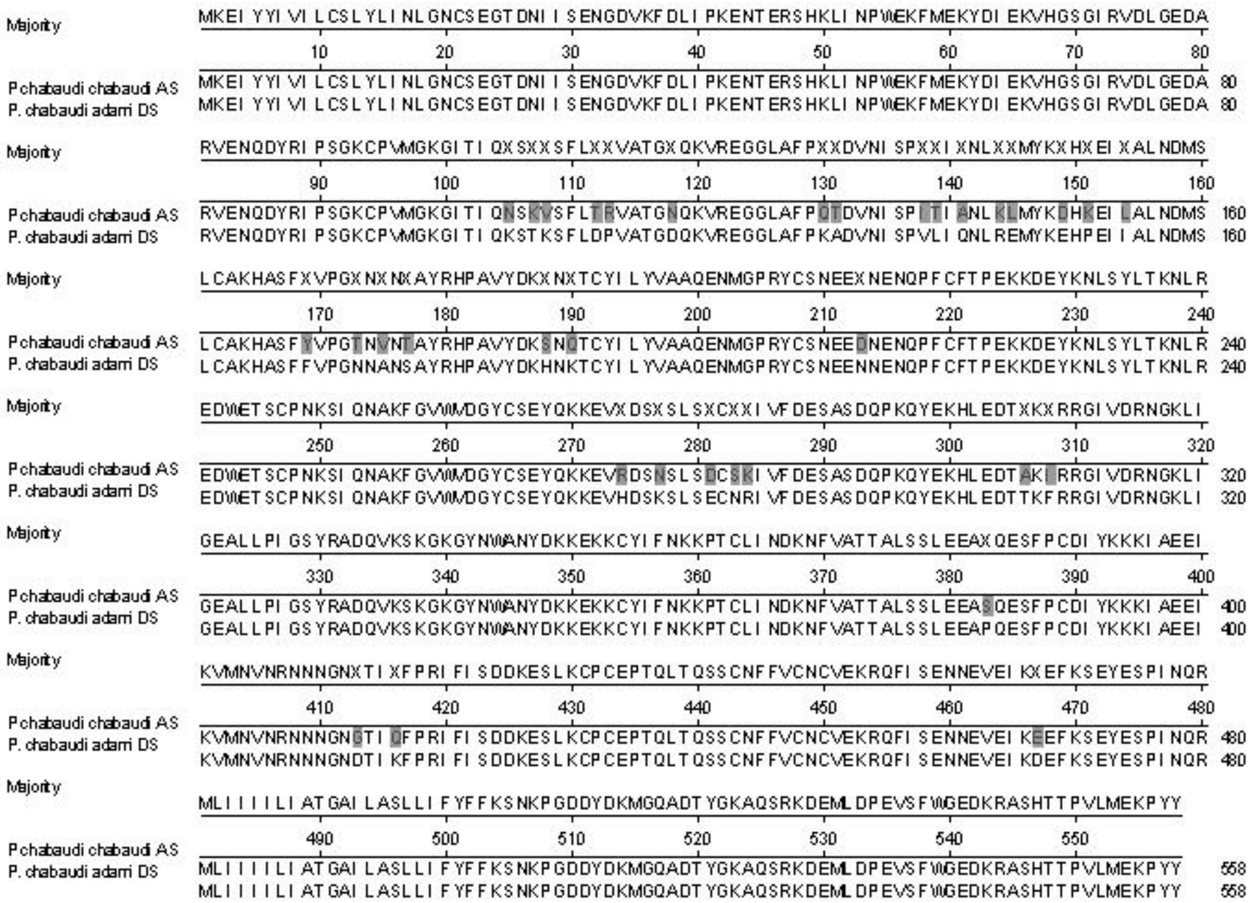
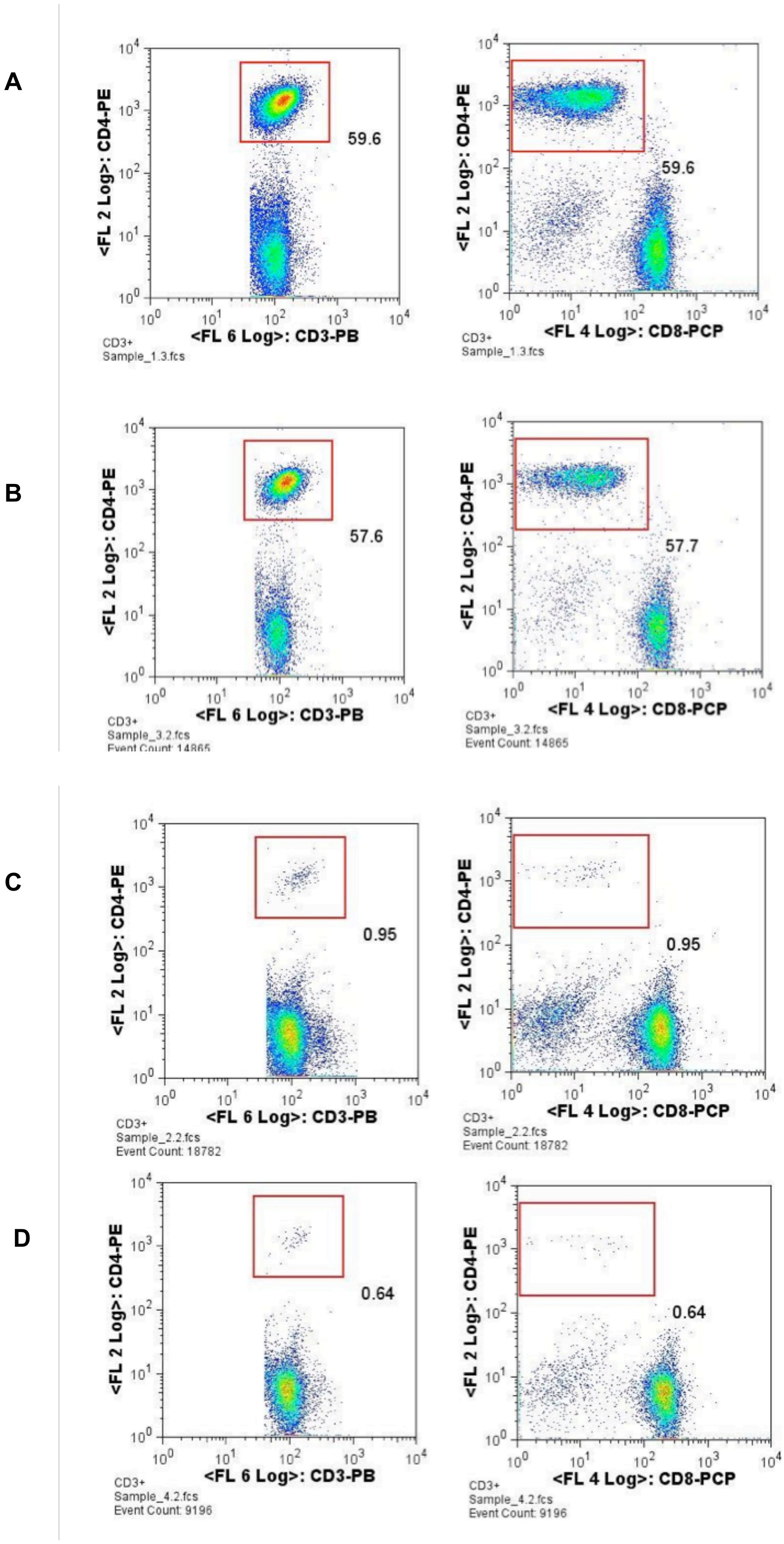


Supplemental Figure 1: Sequence comparison of PccAS AMA1

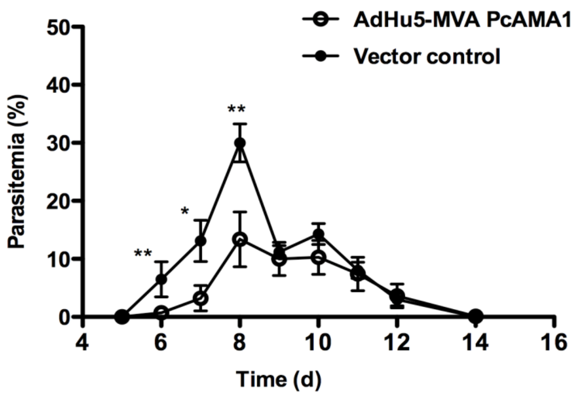
The sequence of PccAS AMA1 was aligned (by Clustal W method) to that of related parasite *P. chabaudi adami* DS. The sequence differs by 34 αα (shown in grey).


A
B
C
D
<FL 2 Log>: CD4-PE
<FL 6 Log>: CD3-PB
<FL 4 Log>: CD8-PCP
59.6
59.6
57.6
57.7
0.95
0.95
0.64
0.64
CD3+
Sample_1.3.fcs
Sample_3.2.fcs
Event Count: 14865
Sample_2.2.fcs
Event Count: 18782
Sample_4.2.fcs
Event Count: 9196

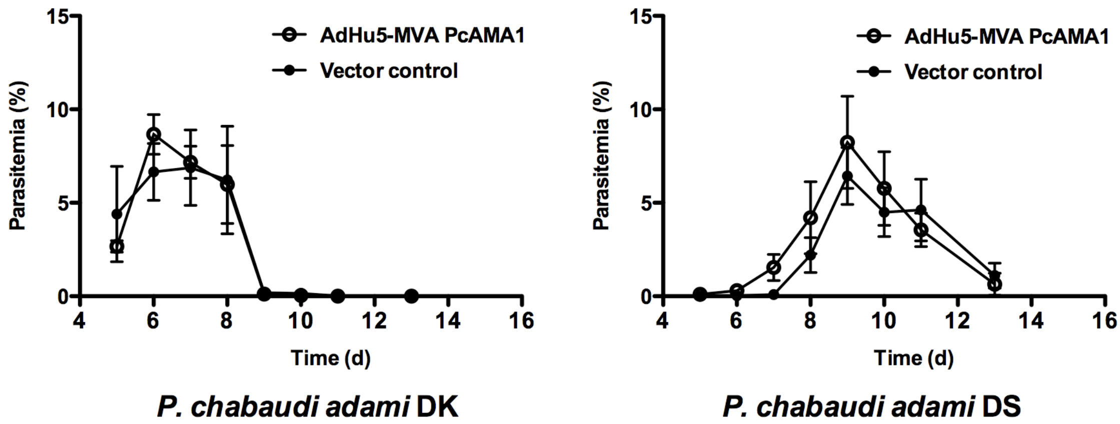
Supplemental Figure 2: *In vivo* CD4$^+$ T cell depletion using anti-CD4 GK1.5 mAb.

Two groups of BALB/c mice (*n*=6) were immunised with 5 x 10^{10} vp AdHu5-PcAMA1 and boosted 8 weeks later with 1 x 10^7 pfu MVA-PcAMA1. CD4$^+$ T cells were depleted in one group of naïve and one group of vaccinated mice with anti-CD4 GK1.5 mAb. The mice received 200μg of depleting anti-CD4 mAb intraperitoneally (i.p.) on days -2, -1 and day of challenge (day 0). Seven days after challenge the PMBCs were isolated from a blood sample and surface stained for CD3 (clone 145-2C11), CD4 (clone LT34) and CD8α (clone 53-6.7). Cells were analyzed by flow cytometry for % CD3$^+$ CD4$^+$ T cells (left panel) in the depleted and non-depleted samples, and the CD4$^+$ and CD8$^+$ T cells were plotted against each other (right panel). The figure shows representative flow plots for vaccinated non-depleted (A), naïve non-depleted (B), vaccinated depleted (C) and naïve depleted (D). There was still > 98% depletion at day 7 post challenge.

A



B



Supplemental Figure 3: (A) Comparison of efficacy after immunization of BALB/c mice with control viral vaccines and those recombinant for PcAMA1 (B) Efficacy of the AdHu5-MVA PcAMA1 vaccination regime against challenge with heterologous parasite strains.

Mice were primed with 1 x 10^{10} vp AdHu5-PcAMA1 or non-recombinant AdHu5 control and boosted 8 weeks later with 1 x 10^{7} pfu MVA-PcAMA1 or MVA expressing GFP. Two weeks after the boost mice were challenged i.v. with (A) 10^{5} PccAS pRBC or (B) *P. chabaudi adami* DK or *P. chabaudi adami* DS). Parasitemia was monitored from day 5 by Giemsa-stained thin blood smears and results are expressed as the % infected RBCs (mean ± SEM). The difference in parasitemia between the groups was taken as the measure of vaccine efficacy. As seen with naïve mice, there was a significant difference in parasitemia between the control and PcAMA1 immunized mice by Mann-Whitney test (* $P \leq 0.05$ and ** $P \leq 0.01$) (A). There was no significant difference in parasitemia between the vector control and PcAMA1 immunized mice when challenged with heterologous *P. chabaudi* parasites (B).

POOL	PEPTIDE #	αα SEQUENCE	αα POSITION
Pool 7	Pcc 1	CSEGTDNIISENGDV	21-35
	Pcc 2	DNIISENGDVKFDLI	26-40
	Pcc 3	ENGDVKFDLIPKENT	31-45
	Pcc 4	KFDLIPKENTERSHK	36-50
	Pcc 5	PKENTERSHKLINPW	41-55
	Pcc 6	ERSHKLINPWEKFME	46-60
	Pcc 17	ITIQNSKVSFLTRVA	101-115
	Pcc 18	SKVSFLTRVATGNQK	106-120
	Pcc 19	LTRVATGNQKVREGG	111-125
Pool 8	Pcc 20	TGNQKVREGGLAFPQ	116-130
	Pcc 21	VREGGLAFPQTDVNI	121-135
	Pcc 22	LAFPQTDVNIAPITI	126-141
	Pcc 23	TDVNIAPITIANLKL	131-145
	Pcc 24	APITIANLKLMYKDH	136-150
	Pcc 27	KEILALNDMSLCAKH	151-165
	Pcc 28	LNDMSLCAKHASFYV	156-170
	Pcc 31	PGTNVNTAYRHPAVY	171-185
	Pcc 32	NTAYRHPAVYDKSNQ	176-190
	Pcc 33	HPAVYDKSNQACYIL	181-195
	Pcc 34	DKSNQACYILYVAAQ	186-200
Pool 9	Pcc 35	ACYILYVAAQENMGP	191-205
	Pcc 36	YVAAQENMGPRYCSN	196-210
	Pcc 37	ENMGPRYCSNEEDNE	201-215
	Pcc 38	RYCSNEEDNENQPFC	206-220
	Pcc 39	EEDNENQPFCFTPEK	211-225
	Pcc 40	NQPFCFTPEKKDEYK	216-230
	Pcc 41	FTPEKKDEYKNLAYL	221-235
	Pcc 42	KDEYKNLAYLTKNLR	226-240
	Pcc 43	NLAYLTKNLREDWET	231-245
	Pcc 44	TKNLREDWETSCPNK	236-250
Pool 10	Pcc 45	EDWETSCPNKAIQNA	241-255
	Pcc 46	SCPNKAIQNAKFGVW	246-260
	Pcc 47	AIQNAKFGVWVDGYC	251-265
	Pcc 48	KFGVWVDGYCSEYQK	256-270
	Pcc 49	VDGYCSEYQKKEVRD	261-275
	Pcc 50	SEYQKKEVRDSNSLS	266-280
	Pcc 51	KEVRDSNSLSDCSKI	271-285
	Pcc 52	SNSLSDCSKIVFDES	276-290
	Pcc 53	DCSKIVFDESASDQP	281-295
	Pcc 54	VFDESASDQPKQYEK	286-300
Pool 11	Pcc 55	ASDQPKQYEKHLEDT	301-315
	Pcc 56	KQYEKHLEDTAKIRR	306-320
	Pcc 57	HLEDTAKIRRGIVDR	311-325
	Pcc 58	AKIRRGIVDRNGKLI	316-330
	Pcc 59	GIVDRNGKLIGEALL	321-335
	Pcc 60	NGKLIGEALLPIGSY	326-340
	Pcc 61	GEALLPIGSYRADQV	331-345
	Pcc 62	PIGSYRADQVKSKGK	336-350
	Pcc 63	RADQVKSKGKGYNWA	341-355
	Pcc 64	KSKGKGYNWANYDKK	346-360
Pool 12	Pcc 65	GYNWANYDKKEKKCY	351-365
	Pcc 66	NYDKKEKKCYIFNKK	356-370

	Pcc 67	EKKCYIFNKKPTCLI	361-375
	Pcc 68	IFNKKPTCLINDKNF	366-380
	Pcc 69	PTCLINDKNFVATTA	371-385
	Pcc 70	NDKNFVATTALSSLE	376-390
	Pcc 71	VATTALSSLEEASQE	381-395
	Pcc 72	LSSLEEASQESFPCD	386-400
	Pcc 73	EASQESFPCDIYKKK	401-415
	Pcc 76	IAEEIKVMNVNRNNN	406-420
Pool 13	Pcc 77	KVMNVNRNNNGNGTI	401-415
	Pcc 78	NRNNNGNGTIQFPRI	406-420
	Pcc 81	FISDDKESLKCPCEP	421-435
	Pcc 82	KESLKCPCEPTQLTQ	426-440
	Pcc 83	CPCEPTQLTQSSCNF	431-445
	Pcc 84	TQLTQSSCNFFVCNC	436-450
	Pcc 87	VEKRQFISENNEVEI	451-465
	Pcc 88	FISENNEVEIKEEFK	456-470
	Pcc 89	NEVEIKEEFKSEYES	461-470
	Pcc 90	KEEFKSEYESPINQ	466-480

Supplemental Table 1: PccAS peptide pools P7 to P13 covering the entire ectodomain of PccAS AMA1.

The table shows the seven peptide pools tested by ICS (Figure 3) and the αα sequence of each peptide. Each pool contains 10 peptides (each 15mers) and covers the remainder of the entire ectodomain of PccAS AMA1 (not covered by peptides shown in Table 1).