

Supplemental Information

Complex Genetic Architecture Underlies

Regulation of Influenza-A-Virus-Specific

Antibody Responses in the Collaborative Cross

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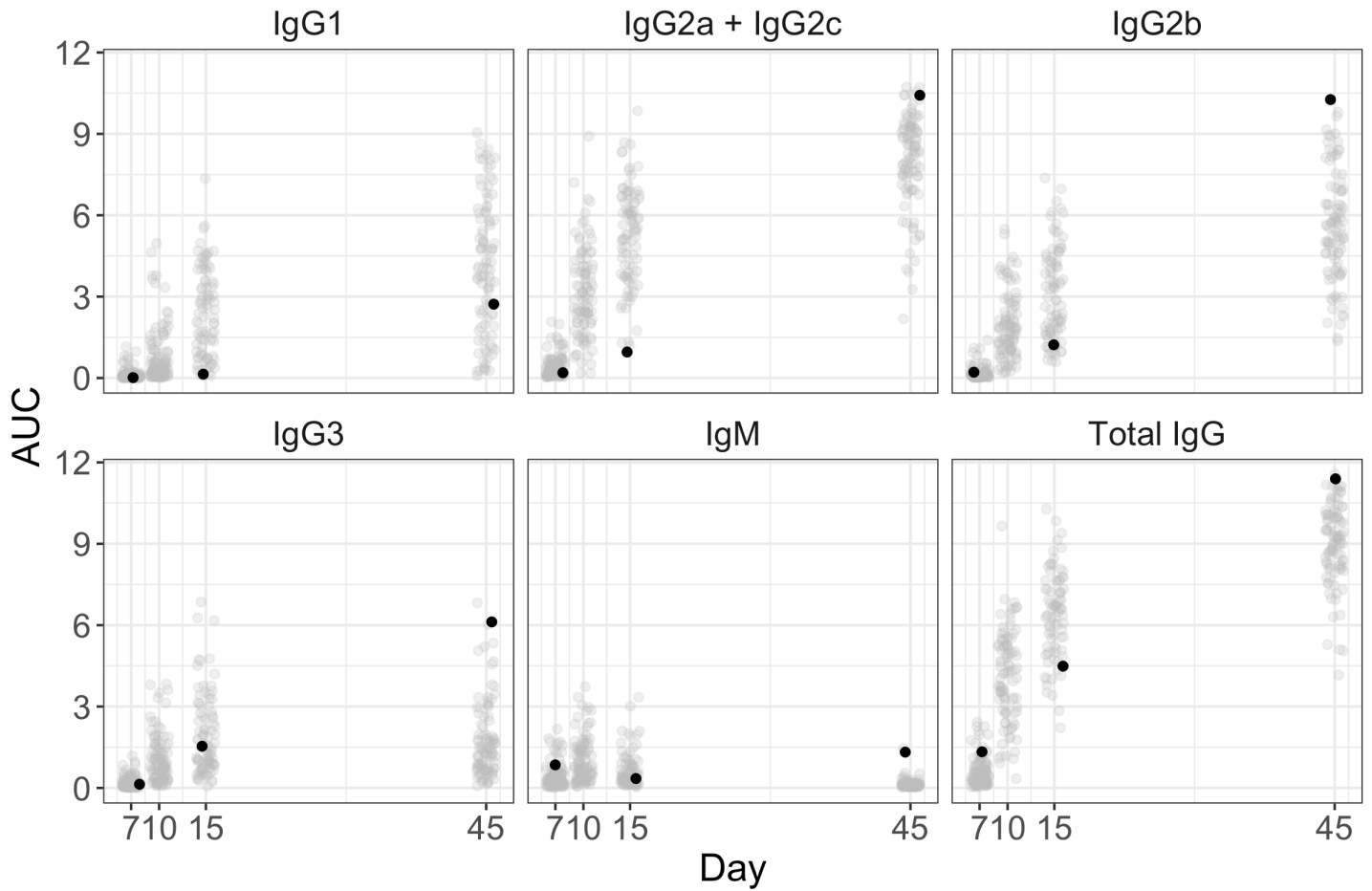


Figure S1. CC-F1s varied significantly in overall levels and kinetics of the IAV-specific antibody response. CC003xCC062 (black) represents a notable outlier, showing significantly higher antibody levels at day 45-post infection compared to the rest of the F1s (grey) for all antibody types besides IgG1, despite low-to-normal responses at earlier timepoints (day 10 = no data). Points represent mean values for CC-F1s, with approximately 3 mice per CC-F1. Related to Figure 1.

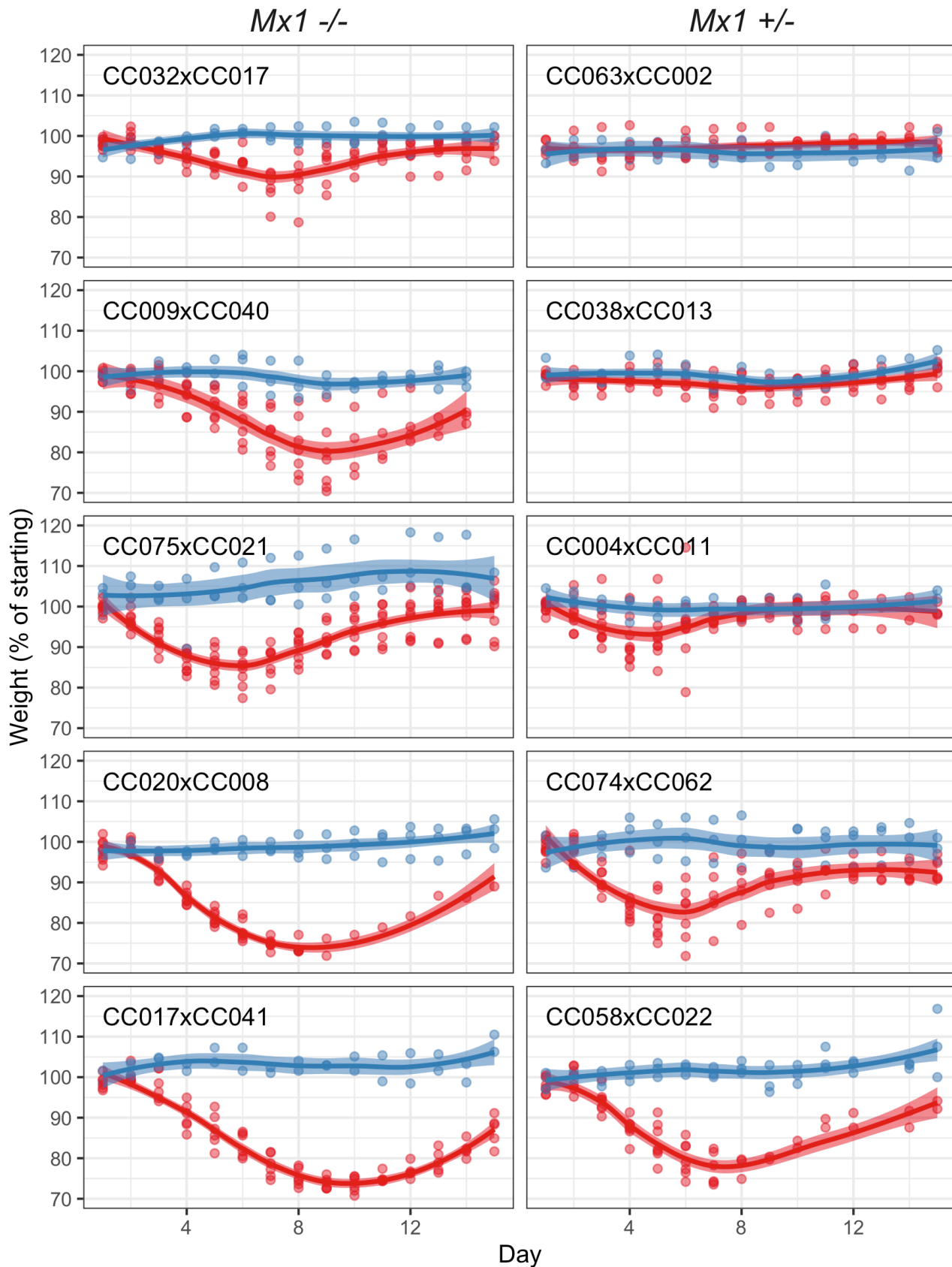


Figure S2. CC-F1 population exhibits broad variation in IAV-induced weight loss. While the IAV resistance gene *Mx1* is the strongest genetic driver of overall susceptibility to IAV, and *Mx1*-deficient animals showed increased weight loss overall, the F1 population showed significant variation in both the magnitude and kinetics of weight loss that was not solely dependent on *Mx1* haplotype (red = IAV infected, blue = mock treatment). Points represent individual mice, with weight loss trajectories fitted by Loess curves. Related to Figure 1.

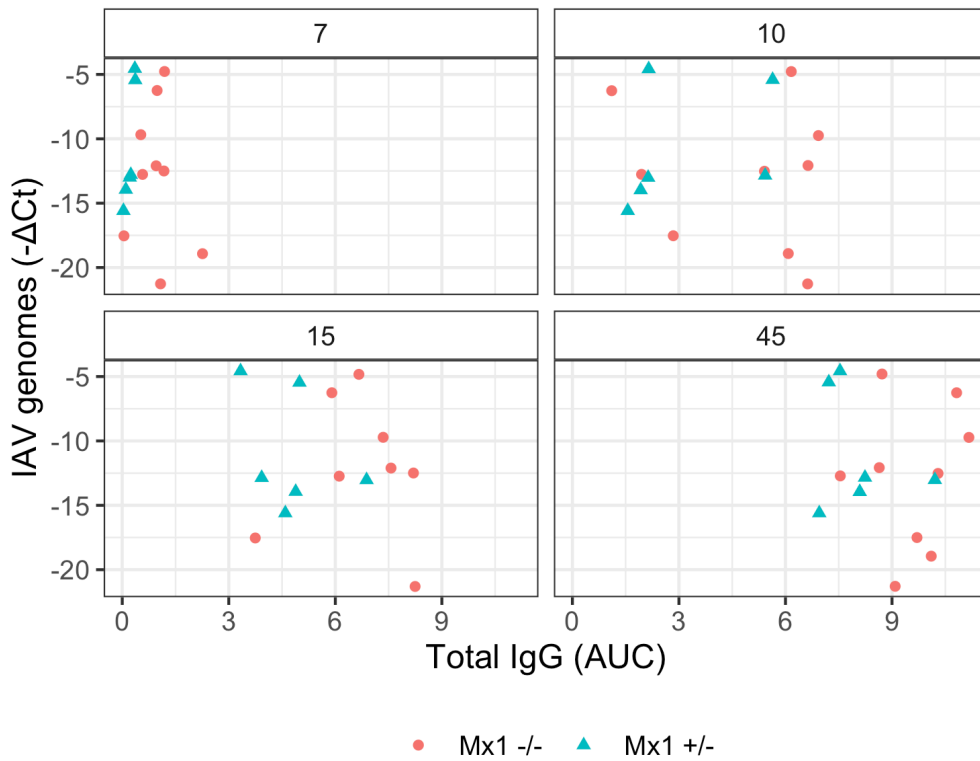


Figure S3. IAV viral load is not associated with IgG response. Lung viral load at day 2 post-infection was measured by RT-PCR (normalized to 18S) for a subset of CC-F1s selected for having either high or low antibody response at day 10 post-infection and compared to antibody response across days 7, 10, 15, and 45 (separate figure panels). Points represent mean values for CC-F1s, with approximately 3 mice per CC-F1. Related to Figure 1.

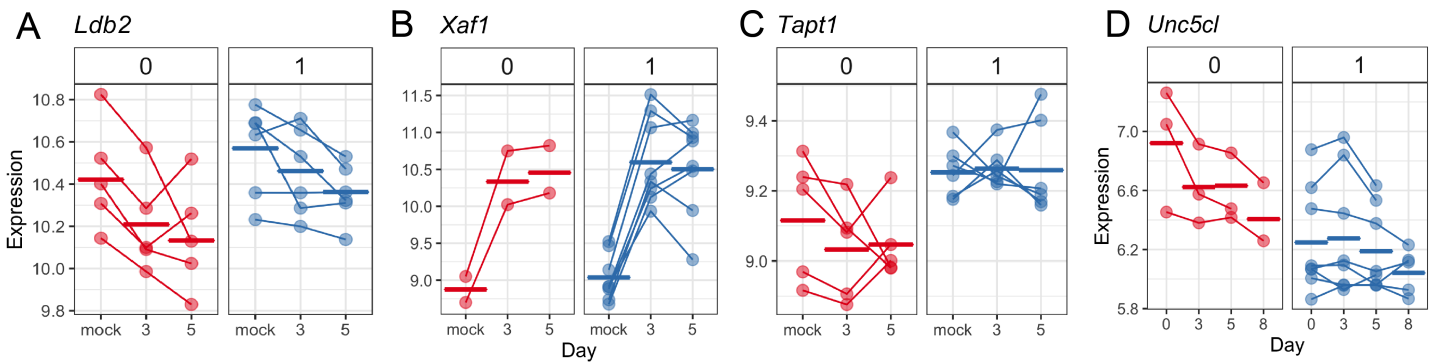


Figure S4. Highlighted genes under *Ari* loci show haplotype- and/or IAV-specific differential expression. Candidate genes under *Ari1-4* were evaluated for differential expression in the context of IAV infection and between haplotype groups using lung and blood transcriptional datasets from 11 CC strains infected with IAV H3N2 (Y-axis; log₂ transformed and normalized read counts). Each connected point represents the mean value for an individual CC strain, with 3-4 mice per strain. Numbers and color refer to haplotype groups (0/red = low, 1/blue = high) for each QTL. A) *Ldb2*, a candidate under *Ari4*, shows both IAV-induced and haplotype-specific differential expression in the lung (0 = A/J, 129S1/SvImJ, CAST/EiJ, WSB/EiJ, 1 = C57BL/6J, NOD/ShiLtJ, NZO/HILtJ, PwK/PhJ). B) *Xaf1*, under *Ari2*, shows IAV-induced differential expression but not haplotype-specific differential expression in the lung (0 = WSB/EiJ, 1 = else). C) *Tapt1*, a candidate under *Ari4*, shows haplotype-specific differential expression but not IAV-induced differential expression in the lung (0 = A/J, 129S1/SvImJ, CAST/EiJ, WSB/EiJ, 1 = C57BL/6J, NOD/ShiLtJ, NZO/HILtJ, PwK/PhJ). D) *Unc5cl*, a candidate under *Ari1*, shows both IAV-induced and haplotype-specific differential expression in the blood (0 = NOD/ShiLtJ, WSB/EiJ, 1 = else). Related to figure 5.

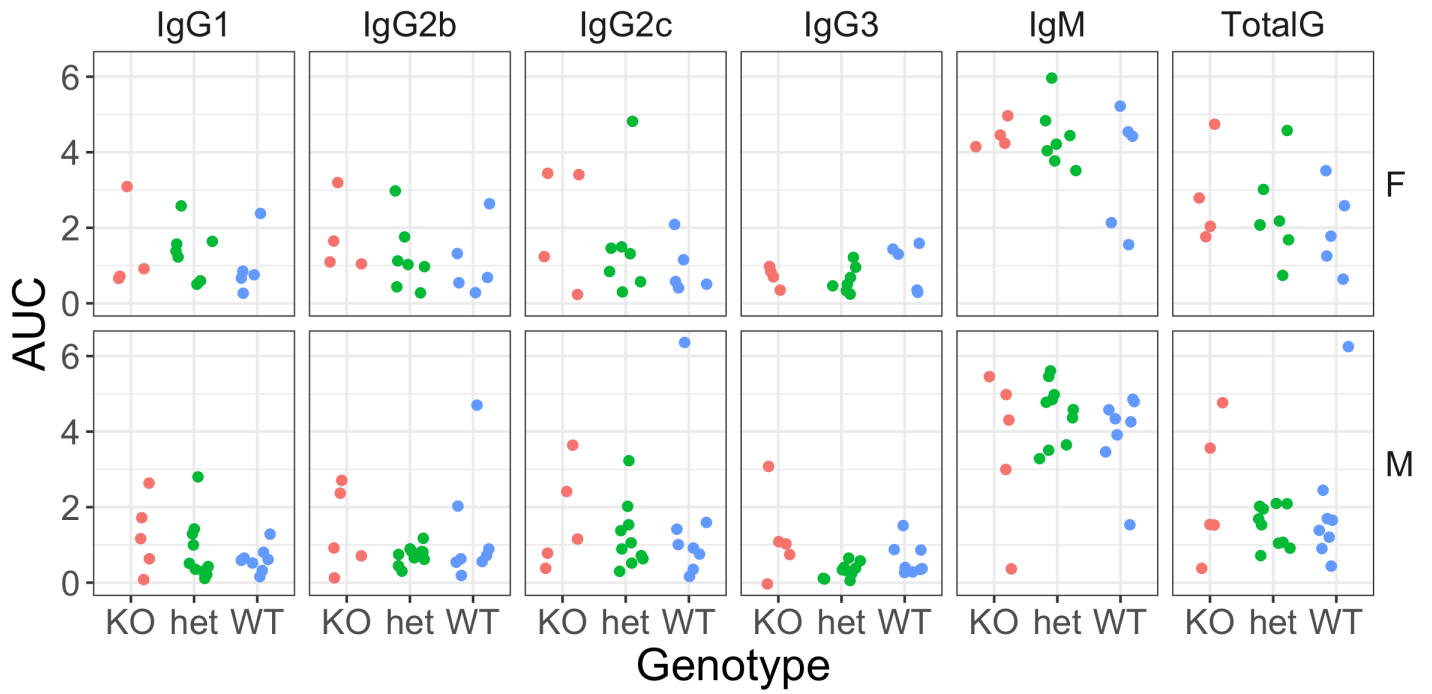


Figure S5. *Nlrp1b* does not show a significant effect on antibody response to IAV. *Nlrp1b* was investigated as a candidate under *Ari2*. *Nlrp1b*^{+/-} mice were bred to produce an experimental cohort. No significant difference was observed in the antibody response between *Nlrp1b*^{-/-} mice and littermate controls at 10 days post-infection. (x-axis: KO = *Nlrp1b*^{-/-}, het = *Nlrp1b*^{+/-}, WT = *Nlrp1b*^{+/+}). Points represent individual mice, and are color coded by genotype and separated by sex. Related to table 2.

Table S1. Phenotypic heritability and QTL associations for individual timepoints and antibody types. P-values represent for associations between each phenotype and haplotype groups for *Ari1-4* and *Mx1* (*: $p < 0.1$, **: $p < 0.05$, *** $p < 0.01$). Related to figure 3, figure 4, and table 1.

Isotype	Day	Heritability	<i>Ari1</i>	<i>Ari2</i>	<i>Ari3</i>	<i>Ari4</i>	<i>Mx1</i>
IgG1	7	40.9%	1.5E-02 **	5.3E-02 *	5.0E-01	7.0E-01	8.2E-04 ***
IgG2a+IgG2c	7	29.5%	1.4E-03 ***	5.8E-03 ***	1.3E-02 **	9.3E-01	5.3E-02 *
IgG2b	7	25.9%	1.1E-01	5.4E-02 *	8.3E-02 *	1.5E-01	1.6E-01
IgG3	7	36.7%	5.0E-02 **	2.3E-03 ***	8.1E-03 ***	2.1E-01	6.0E-05 ***
IgM	7	56.1%	3.9E-01	2.4E-01	4.9E-02 **	4.4E-01	2.7E-01
Total IgG	7	46.5%	5.6E-02 *	3.3E-03 ***	1.2E-03 ***	7.8E-01	6.0E-02 *
IgG1	10	43.9%	3.4E-05 ***	8.4E-03 ***	2.7E-01	4.1E-01	3.8E-02 **
IgG2a+IgG2c	10	41.7%	3.0E-02 **	1.3E-03 ***	6.4E-02 *	5.4E-01	2.6E-01
IgG2b	10	33.7%	1.7E-02 **	1.8E-03 ***	2.7E-01	1.1E-01	8.2E-01
IgG3	10	32.0%	4.8E-01	1.8E-06 ***	1.1E-01	7.7E-01	9.1E-03 ***
IgM	10	46.5%	6.0E-02 *	1.4E-01	5.5E-02 *	7.8E-02 *	6.0E-02 *
Total IgG	10	46.6%	1.5E-02 **	3.6E-03 **	3.8E-01	5.7E-01	1.4E-01
IgG1	15	40.2%	4.2E-02 **	2.4E-01	2.1E-01	3.3E-01	4.6E-01
IgG2a+IgG2c	15	44.7%	5.8E-03 ***	1.1E-01	3.8E-02 **	1.0E-02 **	3.1E-01
IgG2b	15	49.2%	3.0E-01	7.8E-01	1.8E-01	5.4E-04 ***	1.9E-01
IgG3	15	39.8%	9.4E-01	1.1E-01	1.6E-01	2.8E-01	1.3E-02 **
IgM	15	39.1%	2.6E-03 ***	3.8E-02 **	2.6E-05 ***	1.3E-03 ***	3.6E-02 **
Total IgG	15	44.0%	3.4E-02 **	1.8E-02 **	2.8E-02 **	7.0E-03 ***	3.5E-01
IgG1	45	46.5%	3.3E-02 **	3.9E-01	4.1E-01	3.1E-01	4.6E-02 **
IgG2a+IgG2c	45	61.4%	3.9E-01	1.2E-02 **	6.3E-01	6.8E-01	9.5E-02 *
IgG2b	45	61.6%	5.3E-01	2.1E-01	1.2E-01	2.9E-01	4.1E-01
IgG3	45	46.0%	7.0E-01	6.3E-02 *	4.7E-01	8.7E-01	1.3E-01
IgM	45	52.3%	3.3E-01	8.9E-01	4.0E-01	9.8E-01	6.0E-01
Total IgG	45	71.8%	6.5E-01	1.5E-02 **	3.8E-01	5.0E-01	3.6E-01

Table S2. Associations between maximal IAV-induced weight loss and antibody levels (not tested before day 10). (*: $p < 0.1$, **: $p < 0.05$, *** $p < 0.01$). Related to figure 1.

Isotype	Day	p-value
IgG1	10	2.90E-02 **
IgG2a+IgG2c	10	5.16E-01
IgG2b	10	4.64E-01
IgG3	10	5.94E-01
IgM	10	3.48E-04 ***
Total IgG	10	2.06E-01
IgG1	15	1.60E-02 **
IgG2a+IgG2c	15	8.72E-01
IgG2b	15	4.49E-01
IgG3	15	3.15E-01
IgM	15	2.27E-01
Total IgG	15	7.36E-01
IgG1	45	1.04E-03 ***
IgG2a+IgG2c	45	3.08E-01
IgG2b	45	1.03E-01
IgG3	45	5.61E-01
IgM	45	6.88E-01
Total IgG	45	3.67E-02 **

Table S3. All QTL ($p < 0.2$) mapped for antibody magnitude. Related to figure 2 and table 1.

Name	Day	Phenotype	Chr	p-value	Start (Mb)	Max (Mb)	End (Mb)
<i>Ari1</i>	7	IgG2a+IgG2c	17	7.65E-02	47	52.6	54.4
<i>Ari2</i>	10	IgG3	11	2.80E-02	69.1	71.7	72.6
<i>Ari3</i>	15	IgM	8	8.15E-02	108.7	109.4	113.1
<i>Ari4</i>	15-45	IgG2b	5	3.95E-02	36.8	38.7	45.3
<i>Ari5</i>	15	IgG1	16	8.00E-02	40	40.6	44.7
<i>Ari6</i>	15	IgG2b	7	9.65E-02	109.1	114.3	115.5
<i>Ari7</i>	45	IgG3	9	7.35E-02	7.8	13.5	22.3
<i>Ari8</i>	15-45	Total IgG	15	9.45E-02	51.6	53.2	55
<i>Ari9</i>	7	IgG2a+IgG2c	16	1.97E-01	3.1	4.7	26.7
<i>Ari10</i>	10	IgG1	5	1.34E-01	52.2	53.1	53.5
<i>Ari11</i>	10	IgG2a+IgG2c	5	1.53E-01	58.6	73.7	81.6
<i>Ari12</i>	10	IgG3	12	1.71E-01	112.5	117.7	120
<i>Ari13</i>	15	Total IgG	15	2.10E-01	28.9	34.5	36.6
<i>Ari14</i>	45	IgG1	1	1.85E-01	160.1	165	165.4
<i>Ari15</i>	45	IgG2a+IgG2c	5	1.71E-01	130.9	132.6	135.5
<i>Ari16</i>	45	IgG3	5	1.77E-01	127.2	133.6	134.9
<i>Ari17</i>	45	Total IgG	5	1.09E-01	130.9	134.8	148.7
<i>Ari18</i>	45	Total IgG	14	1.65E-01	103.3	105.6	109.4
<i>Ari19</i>	10-15	IgG2b	14	1.66E-01	114	117.8	118.6
<i>Ari20</i>	15-45	IgG1	7	1.55E-01	41.7	50.2	56
<i>Ari21</i>	15-45	IgG2a+IgG2c	X	1.04E-01	45.2	47.4	48
<i>Ari22</i>	15-45	IgG2b	X	1.42E-01	139.1	140	141.2
<i>Ari23</i>	7-10	IgG2a+IgG2c	2	1.86E-01	16	24	27

Table S4. *Ari* loci associations with IAV-induced weight loss parameters (*Mxl*-corrected). Related to figure 3 and table 1.

	<i>Ari1</i>	<i>Ari2</i>	<i>Ari3</i>	<i>Ari4</i>
Day 4	8.40E-01	2.14E-01	2.08E-01	9.19E-01
Day 7	1.34E-01	3.26E-01	2.54E-01	3.16E-01
Lowest	3.84E-01	1.57E-01	5.82E-01	5.92E-01

Table S5. Summary counts of mapped QTL ($p < 0.2$) across timepoints and antibody types. Related to figure 2.

Day	IgM	IgG1	IgG2a+ IgG2c	IgG2b	IgG3	Total IgG	Sum
7	0	0	2	0	0	0	2
7-10 ratio	0	0	1	0	0	0	1
10	0	1	1	0	2	0	4
10-15 ratio	0	0	0	1	0	0	1
15	1	1	0	1	0	1	4
15-45 ratio	0	1	1	2	0	1	5
45	0	1	1	0	2	2	6
Sum	1	4	6	4	4	4	

Table S6. *Ari* loci associations with SARS- and CHIKV- specific antibody. P-values for associations between each phenotype and each *Ari1-4* haplotypes. (Re = 4 days post-rechallenge) (*: $p < 0.1$, **: $p < 0.05$, *** $p < 0.01$). Related to figure 3 and table 1.

Isotype	Virus	Day	<i>Ari1</i>	<i>Ari2</i>	<i>Ari3</i>	<i>Ari4</i>
IgG1	SARS	7	9.58E-01	7.33E-03 ***	9.10E-01	9.36E-01
IgG2a+IgG2c	SARS	7	9.57E-01	1.40E-02 **	5.36E-01	9.46E-06 ***
IgG2b	SARS	7	4.47E-01	1.14E-02 **	1.41E-01	9.61E-02 *
IgG3	SARS	7	6.58E-01	4.69E-04 ***	5.97E-02 *	1.69E-03 ***
IgM	SARS	7	8.37E-01	2.29E-02 **	3.86E-01	1.37E-04 ***
Total IgG	SARS	7	9.25E-01	7.06E-02 *	9.05E-02 *	3.77E-04 ***
IgG1	SARS	15	8.37E-01	8.51E-01	2.37E-01	1.51E-01
IgG2a+IgG2c	SARS	15	4.16E-01	1.36E-01	7.00E-01	3.76E-03 ***
IgG2b	SARS	15	8.06E-01	3.72E-01	7.68E-01	6.81E-01
IgG3	SARS	15	6.74E-01	4.01E-01	4.64E-01	2.95E-03 ***
IgM	SARS	15	8.82E-01	4.80E-02 **	2.53E-01	2.56E-02 **
Total IgG	SARS	15	8.21E-01	7.51E-01	8.75E-01	7.62E-03 ***
IgG1	SARS	29	1.08E-01	4.73E-02 **	7.87E-01	1.16E-01
IgG2a+IgG2c	SARS	29	3.36E-01	1.76E-02 **	8.19E-01	1.85E-02 **
IgG2b	SARS	29	6.63E-01	2.02E-01	5.33E-01	2.77E-01
IgG3	SARS	29	4.18E-01	7.62E-02 *	3.51E-01	4.47E-02 **
IgM	SARS	29	7.08E-01	9.40E-03 ***	4.21E-01	9.67E-02 *
Total IgG	SARS	29	5.90E-01	1.14E-01	5.76E-01	3.52E-02 **
IgG1	SARS	Re	5.35E-01	7.68E-01	7.17E-01	6.14E-02 *
IgG2a+IgG2c	SARS	Re	2.64E-01	1.17E-02 **	5.93E-01	1.76E-01
IgG2b	SARS	Re	8.27E-01	3.76E-01	4.16E-01	4.85E-01
IgG3	SARS	Re	6.86E-01	1.27E-01	1.64E-01	2.05E-02 **
IgM	SARS	Re	4.66E-01	8.45E-03 ***	2.91E-02 **	6.18E-02 *
Total IgG	SARS	Re	5.82E-01	5.86E-02 *	5.17E-01	1.34E-01
IgG	CHIKV	7	9.49E-01	4.16E-01	3.13E-03 ***	6.17E-01
IgM	CHIKV	7	3.67E-01	7.06E-01	1.52E-02 **	1.44E-01
FRNT50	CHIKV	7	6.52E-01	5.48E-01	1.17E-03 ***	2.33E-01

Table S7. All genetic elements under QTL with SNPs above association testing thresholds. Related to figure 3, figure 5, table 1, and table 2.

QTL	Genetic feature	Biotype
<i>Ari1</i>	<i>1700008K24Rik</i>	lncRNA
<i>Ari1</i>	<i>Gm14871</i>	processed_pseudogene
<i>Ari1</i>	<i>Gm16555</i>	lncRNA
<i>Ari1</i>	<i>Gm19585</i>	lncRNA
<i>Ari1</i>	<i>Gm24071</i>	snoRNA
<i>Ari1</i>	<i>Gm25201</i>	snRNA
<i>Ari1</i>	<i>Gm27217</i>	lncRNA
<i>Ari1</i>	<i>Kcnh8</i>	protein_coding
<i>Ari1</i>	<i>Kif6</i>	retained_intron, protein_coding, nonsense_mediated_decay
<i>Ari1</i>	<i>Mdfr</i>	lncRNA, protein_coding, retained_intron
<i>Ari1</i>	<i>n-R5s28</i>	rRNA
<i>Ari1</i>	<i>Plcl2</i>	protein_coding
<i>Ari1</i>	<i>Tbc1d5</i>	lncRNA, protein_coding
<i>Ari1</i>	<i>Unc5cl</i>	protein_coding, nonsense_mediated_decay
<i>Ari2</i>	<i>4930401O10Rik</i>	lncRNA
<i>Ari2</i>	<i>4933427D14Rik</i>	protein_coding, nonsense_mediated_decay, lncRNA
<i>Ari2</i>	<i>6330403K07Rik</i>	protein_coding, nonsense_mediated_decay
<i>Ari2</i>	<i>9230020A06Rik</i>	lncRNA
<i>Ari2</i>	<i>C1qbp</i>	protein_coding, retained_intron
<i>Ari2</i>	<i>Derl2</i>	protein_coding, nonsense_mediated_decay, retained_intron
<i>Ari2</i>	<i>Dhx33</i>	protein_coding, nonsense_mediated_decay, retained_intron, lncRNA
<i>Ari2</i>	<i>Fbxo39</i>	protein_coding
<i>Ari2</i>	<i>Ggt6</i>	protein_coding
<i>Ari2</i>	<i>Gm12321</i>	processed_pseudogene
<i>Ari2</i>	<i>Gm12322</i>	processed_pseudogene
<i>Ari2</i>	<i>Gm12324</i>	lncRNA
<i>Ari2</i>	<i>Gm12325</i>	lncRNA
<i>Ari2</i>	<i>Gm12326</i>	lncRNA
<i>Ari2</i>	<i>Gm15377</i>	processed_pseudogene
<i>Ari2</i>	<i>Gm16013</i>	lncRNA
<i>Ari2</i>	<i>Gm19967</i>	lncRNA
<i>Ari2</i>	<i>Gm22297</i>	snRNA
<i>Ari2</i>	<i>Gm22927</i>	snoRNA
<i>Ari2</i>	<i>Gm23266</i>	snoRNA
<i>Ari2</i>	<i>Gm23311</i>	snoRNA
<i>Ari2</i>	<i>Gm33351</i>	lncRNA
<i>Ari2</i>	<i>Gm43951</i>	protein_coding
<i>Ari2</i>	<i>Gm48818</i>	processed_pseudogene
<i>Ari2</i>	<i>Mis12</i>	protein_coding
<i>Ari2</i>	<i>Mybbp1a</i>	retained_intron, protein_coding
<i>Ari2</i>	<i>Nlrp1a</i>	protein_coding
<i>Ari2</i>	<i>Nlrp1b</i>	protein_coding, nonsense_mediated_decay
<i>Ari2</i>	<i>Nlrp1c-ps</i>	transcribed_unprocessed_pseudogene, lncRNA

<i>Ari2</i>	<i>Nup88</i>	protein_coding, retained_intron, nonsense_mediated_decay
<i>Ari2</i>	<i>Pitpnm3</i>	protein_coding, retained_intron
<i>Ari2</i>	<i>Rabep1</i>	protein_coding, retained_intron
<i>Ari2</i>	<i>Rpain</i>	protein_coding, nonsense_mediated_decay, retained_intron
<i>Ari2</i>	<i>Rpl23a-ps2</i>	processed_pseudogene
<i>Ari2</i>	<i>Scimp</i>	protein_coding
<i>Ari2</i>	<i>Slc13a5</i>	protein_coding
<i>Ari2</i>	<i>Spns3</i>	lncRNA, protein_coding
<i>Ari2</i>	<i>Wscd1</i>	protein_coding, retained_intron, lncRNA
<i>Ari2</i>	<i>Xafl</i>	protein_coding, nonsense_mediated_decay, retained_intron
<i>Ari3</i>	<i>9430091E24Rik</i>	lncRNA
<i>Ari3</i>	<i>Aars</i>	protein_coding, retained_intron
<i>Ari3</i>	<i>Adat1</i>	protein_coding
<i>Ari3</i>	<i>Aplg1</i>	retained_intron, protein_coding
<i>Ari3</i>	<i>Atxn1l</i>	protein_coding, lncRNA
<i>Ari3</i>	<i>Bcar1</i>	protein_coding, retained_intron
<i>Ari3</i>	<i>Cfdp1</i>	protein_coding
<i>Ari3</i>	<i>Chst5</i>	protein_coding
<i>Ari3</i>	<i>Clec18a</i>	lncRNA, nonsense_mediated_decay, protein_coding
<i>Ari3</i>	<i>Cntnap4</i>	protein_coding, retained_intron, lncRNA
<i>Ari3</i>	<i>Cog4</i>	protein_coding, lncRNA, nonsense_mediated_decay, retained_intron
<i>Ari3</i>	<i>Ctrb1</i>	protein_coding
<i>Ari3</i>	<i>Ddx19b</i>	protein_coding
<i>Ari3</i>	<i>Dhodh</i>	protein_coding, retained_intron, lncRNA, nonsense_mediated_decay
<i>Ari3</i>	<i>Dhx38</i>	protein_coding
<i>Ari3</i>	<i>Fa2h</i>	lncRNA, protein_coding, retained_intron
<i>Ari3</i>	<i>Gabarapl2</i>	protein_coding, retained_intron
<i>Ari3</i>	<i>Glg1</i>	protein_coding, nonsense_mediated_decay
<i>Ari3</i>	<i>Gm17720</i>	protein_coding
<i>Ari3</i>	<i>Gm22193</i>	snoRNA
<i>Ari3</i>	<i>Gm22664</i>	misc_RNA
<i>Ari3</i>	<i>Gm22827</i>	snRNA
<i>Ari3</i>	<i>Gm23163</i>	miRNA
<i>Ari3</i>	<i>Gm23193</i>	miRNA
<i>Ari3</i>	<i>Gm23627</i>	snRNA
<i>Ari3</i>	<i>Gm23853</i>	snRNA
<i>Ari3</i>	<i>Gm25321</i>	snRNA
<i>Ari3</i>	<i>Gm26832</i>	lncRNA
<i>Ari3</i>	<i>Gm26994</i>	lncRNA
<i>Ari3</i>	<i>Gm45712</i>	processed_pseudogene
<i>Ari3</i>	<i>Gm45904</i>	lncRNA
<i>Ari3</i>	<i>Gm6793</i>	processed_pseudogene
<i>Ari3</i>	<i>Hp</i>	lncRNA, protein_coding
<i>Ari3</i>	<i>Hydin</i>	protein_coding, retained_intron
<i>Ari3</i>	<i>Ist1</i>	retained_intron, lncRNA, protein_coding
<i>Ari3</i>	<i>Kars</i>	protein_coding, retained_intron, lncRNA

<i>Ari3</i>	<i>Mir7076</i>	miRNA
<i>Ari3</i>	<i>Mkl1</i>	protein_coding, lncRNA
<i>Ari3</i>	<i>Mtss11</i>	protein_coding, lncRNA
<i>Ari3</i>	<i>Pdpr</i>	protein_coding, nonsense_mediated_decay
<i>Ari3</i>	<i>Pkd113</i>	protein_coding, retained_intron
<i>Ari3</i>	<i>Pmfbp1</i>	lncRNA, protein_coding
<i>Ari3</i>	<i>Rfwd3</i>	protein_coding
<i>Ari3</i>	<i>Sf3b3</i>	protein_coding, retained_intron
<i>Ari3</i>	<i>Snord71</i>	snoRNA
<i>Ari3</i>	<i>St3gal2</i>	protein_coding, lncRNA
<i>Ari3</i>	<i>Terf2ip</i>	protein_coding, retained_intron
<i>Ari3</i>	<i>Tmem170</i>	protein_coding
<i>Ari3</i>	<i>Tmem231</i>	nonsense_mediated_decay, protein_coding
<i>Ari3</i>	<i>Txnl4b</i>	protein_coding
<i>Ari3</i>	<i>Vac14</i>	nonsense_mediated_decay, protein_coding
<i>Ari3</i>	<i>Zfhx3</i>	protein_coding
<i>Ari3</i>	<i>Zfp1</i>	protein_coding, nonsense_mediated_decay
<i>Ari3</i>	<i>Zfp612</i>	protein_coding, retained_intron
<i>Ari3</i>	<i>Zfp821</i>	protein_coding, retained_intron
<i>Ari3</i>	<i>Znrf1</i>	protein_coding, nonsense_mediated_decay, lncRNA
<i>Ari4</i>	<i>4930431F12Rik</i>	lncRNA
<i>Ari4</i>	<i>C1qtnf7</i>	protein_coding
<i>Ari4</i>	<i>Cc2d2a</i>	retained_intron, protein_coding
<i>Ari4</i>	<i>Fgfbp1</i>	protein_coding
<i>Ari4</i>	<i>Gm10205</i>	pseudogene
<i>Ari4</i>	<i>Gm15866</i>	lncRNA
<i>Ari4</i>	<i>Gm42982</i>	lncRNA
<i>Ari4</i>	<i>Gm42983</i>	TEC
<i>Ari4</i>	<i>Gm42984</i>	lncRNA
<i>Ari4</i>	<i>Gm43183</i>	TEC
<i>Ari4</i>	<i>Gm43184</i>	TEC
<i>Ari4</i>	<i>Gm5292</i>	processed_pseudogene
<i>Ari4</i>	<i>Ldb2</i>	protein_coding, lncRNA, retained_intron
<i>Ari4</i>	<i>Prom1</i>	protein_coding, retained_intron, nonsense_mediated_decay
<i>Ari4</i>	<i>Tapt1</i>	nonsense_mediated_decay, retained_intron, protein_coding