## Supplementary Information

## B cell-intrinsic epigenetic modulation of the antibody response by dietary fiber-derived short-chain fatty acids

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Supplementary Figure 1. Administration of dietary fiber and/or exogenous SCFAs alter gut butyrate and propionate concentrations. Acetate does not alter Aicda and Prdm1 expression, CSR or plasma cell differentiation. a, C57BL/6 mice, after weaning, were fed a fiber or no-fiber diet, and given SCFA-water (SCFAs) or plain water (Nil) starting at the age of 5 weeks. Concentrations of butyrate and propionate in the feces, as well as acetate, butyrate and propionate in the spleen, colon and mesenteric lymph nodes were measured by mass spectrometry 21 days later. Fecal and spleen SCFA data are means and SE from 3 mice in each group. Colon SCFA data are means and SE from two mice in each group. MLN SCFA data are from pooled samples of five mice of each group. b,c, Mouse B cells were stimulated with LPS plus IL-4, in the presence of increased concentration of acetate (0, 1250, 2500 or 5000 µM). The expression of Aicda and Prdm1 transcripts was analyzed 72 h post stimulation by qRT-PCR and normalized to Gapdh transcripts. Data are from three independent experiments (mean and SE) (b). The proportions of IgG1<sup>+</sup> B cells and CD138<sup>+</sup> plasmablasts/plasma cells were analyzed 96 h post stimulation by flow cytometry. Data are one representative of three independent experiments yielding comparable results (c). d, Gating strategy to analyze class-switched B cells and plasma cells in *in vitro* stimulated cells presented on (c). The same strategy was used for similar analysis presented on Fig. 7b,d-f, 5a-d,f and Supplementary Fig. 6a,b, 9a, 10c,d and 11b. The source data are provided in a Source Data file.



**Supplementary Figure 2. Gating strategy for flow cytometry analysis. a**, Gating strategy to analyze *ex vivo* class switched B cells, germinal center B cells and plasma cells presented in Fig. 1e. The same strategy was used for similar analysis presented in Fig. 4h. b. Gating strategy to analyze intracellular AID expression presented in Fig. 2b. The same strategy was used for similar analysis presented on Fig. 4b, 10d and Supplementary Fig. 13c. c, Gating strategy to analyze fecal bacteria-bound antibodies presented in Fig. 2d,e. d, Gating strategy to analyze intracellular AID and Blimp1 expression presented in Fig. 3h. e, Gating strategy to analyze *ex vivo* class-switched B cells and plasma cells presented in Fig. 4c.



Supplementary Figure 3. SCFAs do not alter B and T cell numbers, B cell proliferation and viability or GC formation. a,b, C57BL/6 mice fed fiber diet were given SCFA-water (SCFAs) or plain water (Nil) starting at the age of 5 weeks and injected with NP<sub>16</sub>-CGG (in alum) at the age of 8 weeks. The mice were sacrificed 10 days post-injection. Proportions of CD19<sup>+</sup> B cells, CD3<sup>+</sup> T cells, CD4<sup>+</sup> and CD8<sup>+</sup> T cells, proliferating B cells (BrdU-stained CD19<sup>+</sup> B cells) and viable (7-AAD<sup>-</sup>) CD19<sup>+</sup> B cells in the spleen were analyzed by flow cytometry (a). GCs were visualized by fluorescent microscopy (B220, green; GL-7, orange) (b). c, *Tcrβ<sup>-/-</sup>Tcrδ<sup>-/-</sup>* mice fed fiber diet were given SCFA-water or plain water starting at the age of 5 weeks and injected NP-LPS (in PBS) at the age of 8 weeks. GCs were visualized by fluorescent microscopy (B220, green; GL-7, orange) and H&E staining 10 days post-injection. d, Mouse and human B cells were stimulated with LPS plus IL-4 or CD154 plus IL-4 and IL-21, respectively, for 96 h, in the presence of nil, butyrate (500  $\mu$ M), propionate (2000  $\mu$ M) or butyrate (500  $\mu$ M) plus propionate (2000  $\mu$ M), and analyzed for viable (7-AAD<sup>-</sup>) CD19<sup>+</sup> B cells by flow cytometry. Data are one representative of three independent experiments yielding comparable results. **a**, Gating strategy to analyze *ex vivo* B cell proliferation and T cells presented on Supplementary Fig. 3a. **e**, Gating strategy for (**a**). **f**, Gating strategy for (**d**). Scale bar = 100 µm.



Supplementary Figure 4. SCFAs dampen SHM in the T-independent antibody response to NP-LPS in  $Tcr\beta$ /- $Tcr\delta$ /- mice.  $Tcr\beta$ /- $Tcr\delta$ /- mice fed fiber diet were given SCFA-water (SCFAs) or plain water (Nil) starting at the age of 5 weeks and injected with NP-LPS (in PBS) at the age of 8 weeks. The mice were boost-injected 21 days later with NP-LPS (in PBS). Somatic point-mutations were analyzed in the V<sub>186.2</sub> region of V<sub>186.2</sub>DJ<sub>H</sub>-C $\gamma$ 3 (a,b) and V<sub>186.2</sub>DJ<sub>H</sub>-C $\gamma$ 2b (c,d) transcripts amplified from spleen B cells 7 days after the boost injection. Pie charts depict the proportions of sequences carrying different numbers of point-mutations over the 294 bp V<sub>186.2</sub> segment. Listed below the pie charts is the overall mutation frequency (change/base). Donut charts depict the spectrum of point-mutations (a,c). Histograms depict frequencies of silent and replacement mutations in FR and CDR regions (b,d). Data are from three pairs of fiber fed mice given SCFA-water and plain-water. The source data are provided in a Source Data file.



V186.2DJ<sub>H</sub>-C $\gamma$ 3 (NP-LPS immunized *TCR\beta^{-/-}TCR\delta^{-/-}* mice)

Supplementary Figure 5. Spectrum and distribution of point-mutations in the V<sub>186.2</sub> region of V<sub>186.2</sub>DJ<sub>H</sub>-C $\gamma$ 3 transcripts in the NP-LPS immunized  $Tcr\beta$ -Tcr $\delta$ -mice treated with nil or SCFAs.  $Tcr\beta$ -Tcr $\delta$ -mice fed fiber diet were given SCFA-water (SCFAs) or plain water (Nil) starting at the age of 5 weeks and injected with NP-LPS (in PBS) at the age of 8 weeks. The mice were boost-injected 21 days later with NP-LPS (in PBS). The V<sub>186.2</sub> region of V<sub>186.2</sub>DJ<sub>H</sub>-C $\gamma$ 3 transcripts were amplified from spleen B cells 7 days after the NP-LPS boost injection and analyzed for spectrum and distribution of point-mutations. Data are pooled from three pairs of fiber-fed mice given SCFA-water or plain water (as in Supplementary Figure 5). The source data are provided in a Source Data file.



Supplementary Figure 6. Butyrate and propionate inhibit CSR in a dose-dependent fashion. Mouse B cells were stimulated for 96 h with LPS plus IL-4, LPS plus IL-5, TGF-B, anti-\delta mAb-dextran and RA, in the presence of nil, butyrate (50, 100, 250 or 500  $\mu$ M) or propionate (250, 500, 1000 or 2000  $\mu$ M). **a,b**, The proportions of IgG1<sup>+</sup> and IgA<sup>+</sup> B cells were analyzed by flow cytometry. Data are one representative of three independent experiments yielding comparable results. c,d, IgG1 and IgA titers in culture fluids as analyzed by specific ELISAs. Data are from three independent experiments (mean and SE). p < 0.05, p < 0.01, 0.001 (unpaired *t*-test). The source data are provided in a Source Data file.



**Supplementary Figure 7. Gating strategy for flow cytometry analysis. a**, Gating strategy to analyze intracellular intracellular CD19<sup>+</sup> IgE<sup>+</sup> B cells presented on Fig. 5e. **b**, Gating strategy to analyze CFSE signal in B cells presented on Fig. 5g. **c**, Gating strategy to analyze intracellular AID expression in *in vitro* stimulated B cells presented on Fig. 5k. **d**, Gating strategy to analyze class-switched human B cells and plasma cells presented on Fig. 6a,b. **e**, Gating strategy to analyze IgA+ CH12 B cells presented on Fig. 9f. **f**, Gating strategy to analyze lass-switched plasmablasts presented on Supplementary Fig. 13e.



Supplementary Figure 8. Dose-dependent effect of SCFAs in the modulation of *Aicda* and germline I<sub>H</sub>-C<sub>H</sub> expression and HDAC activity in B cells. a, B cells were stimulated with LPS plus IL-4, or LPS plus TGF- $\beta$  and RA in the presence of increased dose of butyrate or propionate for 60 h. Expression of *Aicda* and germline I $\mu$ -C $\mu$ , I $\gamma$ 1-C $\gamma$ 1 and I $\alpha$ -C $\alpha$  transcripts, as analyzed by qRT-PCR and normalized to *β*-*Actin* transcripts. Data are from 3 independent experiments (mean and SE). b, HDAC activity in B cells stimulated with LPS plus IL-4 in the presence of increased dose of acetate, butyrate or propionate for 48 or 72 h. c, Acetylated histone H3 (H3K9ac) in the *Aicda* regulatory region 4, *Aicda* promoter, *Prdm1* promoter, I $\mu$ , I $\gamma$ 1, I $\gamma$ 3 and I $\alpha$  promoters in B cells stimulated for 60 h with LPS plus IL-4 (*Aicda* regulatory region 4, *Aicda* promoter, *Prdm1* promoter, Im promoter and I $\gamma$ 1 promoter), LPS only (I $\gamma$ 3 promoter) or LPS, plus TGF- $\beta$  and RA (I $\alpha$  promoter), as analyzed by ChIP and qPCR. The source data are provided in a Source Data file.



Supplementary Figure 9. Acetate does not alter butyrate- and propionate-mediated inhibition of CSR and plasma cell differentiation. Mouse B cells were stimulated with LPS plus IL-4, and cultured for 96 h with increased concentration of butyrate (0, 250 or 500  $\mu$ M) or propionate (0, 1000 or 2000  $\mu$ M) without or with acetate (5000  $\mu$ M). The proportions of IgG1<sup>+</sup> B cells were analyzed by flow cytometry. Bottom panels show the gating strategy. Data are one representative of three independent experiments yielding comparable results.



Supplementary Figure 10. Lack of expression of SCFA receptors in human and mouse B cells. Blocking the function of SCFAs as an energy substance by fatty acid β-oxidation inhibitor etomoxir does not affect SCFA-mediated inhibition of CSR and plasma cell differentiation. a, *FFAR2*, *FFAR3*, *GPR109A* and *OLFR78* transcripts in human B cells stimulated for 60 h with CD154, IL-21, and IL-4, and human PBMCs were measured by qRT-PCR and normalized to *HRPT* expression. b, *Ffar2*, *Ffar3*, *Gpr109A* and *Olfr78* transcripts in mouse B cells stimulated with LPS plus IL-4 for 60 h and mouse distal colon cells were measured by qRT-PCR and normalized to *β*-*Actin* expression. Data are mean and SE from three independent experiments. c,d, Mouse B cells were cultured with LPS plus IL-4 in the presence of nil, butyrate (500 µM), propionate (2000 µM) or butyrate (500 µM) plus propionate (2000 µM), without or with etomoxir (25 µM). After 96 h, IgG1<sup>+</sup> B cells (c) and CD138<sup>+</sup> plasmablasts/plasma cells (d) were analyzed by flow cytometry. Data are one representative of three independent experiments yielding comparable results. e, Gating strategy for (c) and (d). The source data are provided in a Source Data file.



Supplementary Figure 11. Dose-dependent effect of HDAC inhibitors SAHA and TSA in the modulation of *Aicda* and germline  $I_H$ - $C_H$  expression, CSR and plasma cell differentiation. B cells were stimulated with LPS plus IL-4 in the presence of increased dose of SAHA or TSA. **a**, Expression of *Aicda* and germline I $\mu$ - $C_\mu$  and I $\gamma$ 1- $C\gamma$ 1 transcripts, as analyzed 60 h post stimulation by qRT-PCR and normalized to  $\beta$ -*Actin* transcripts. Data are from 3 independent experiments (mean and SE). **b**, The proportions of CD19<sup>+</sup> IgG1<sup>+</sup> B cells and CD19lowCD138+ plasma cells were analyzed 96 h post stimulation by flow cytometry. Data are representative of 3 independent experiments yielding comparable results. The source data are provided in a Source Data file.



Supplementary Figure 12. Alignment of the 3' UTRs of *Aicda* and *Prdm1* mRNAs and the targeting miRNAs. The nucleotide changes in the mutant *Aicda* and *Prdm1* 3' UTRs used in luciferase reporter constructs depicted in red.



Supplementary Figure 13. SCFAs reduce autoantibody response and autoimmunity in lupus-prone NZB/W F1 mice. Female NZB/W F1 mice fed fiber diet were given SCFA-water (SCFAs) or plain water (Nil) starting at the age of 14 weeks and sacrificed at 26 weeks of age. **a**, Titers of circulating anti-dsDNA IgM, and anti-dsDNA, anti-RNP/Sm, anti-histone and anti-RNA IgG1 and IgG2a (relative units, RU), as analyzed by specific ELISAs. Each symbol represents an individual mouse (n = 5 per group). \*p < 0.05, \*\*p < 0.01, ns: not significant (unpaired *t*-test). **b**, ANA visualized by indirect immunofluorescence on HEp-2 cells that were incubated with sera (1:400 dilution) from the NZB/WF1 mice using FITC-labeled rat mAbs to mouse IgG and IgG2a. Data are from one of 3 independent experiments yielding comparable results. **c**, AID and Blimp-1 expression as analyzed by intracellular staining followed by flow cytometry. **d**, Spleen surface IgG1, IgG2a, IgG2b and IgG3 B cells, and **e**, intracellular CD19<sup>low/neg</sup>CD138<sup>+</sup>, CD138<sup>+</sup> IgG1<sup>+</sup>, CD138<sup>+</sup> IgG2a<sup>+</sup>, CD138<sup>+</sup> IgG3<sup>+</sup> plasmablasts/plasma cells as analyzed by flow cytometry. Data are one representative of 3 independent experiments yielding comparable results. **f**, Kidney sections stained with H&E (right panels), and kidney sections stained with FITC-labeled rat mAbs to mouse IgG (right panels). Data are one representative of 3 independent experiments. Scale bar = 20 µm (**b**) or 100 µm (**f**). The source data are provided in a Source Data file.



**Supplementary Figure 14. Dose-dependent modulation of** *Aicda* and *Prdm1* expression, CSR, SHM and plasma cell differentiation by SCFAs. SCFAs butyrate and propionate modulate B cell functions through HDAC inhibition activity, which leads to increased histone acetylation of many genes, including the host genes of select miRNAs targeting *Aicda* or *Prdm1*. While *Aicda-* and *Prdm1-*targeting miRNAs induced by SCFAs inhibits *Aicda* and *Prdm1* in a dose-dependent fashion over a wide physiological SCFAs range, the *Aicda-* and *Prdm1-*targeting miRNAs-mediated inhibition of *Aicda* expression by low-dose SCFAs is not robust enough to override the enhancement of CSR/SHM resulting from increased SCFAs-mediated histone acetylation and germline I<sub>H</sub>-C<sub>H</sub> transcription. As for *Prdm1*, low-dose SCFAs merely are not sufficient to significantly dampen this gene expression, and, therefore, Blimp1 expression and plasma cell differentiation.

## Supplementary Table 1. Antibodies used for this study.

Antibody toTypeCompanyCell, NO. (Inc) clone)Assays clone)Mouse B220, FITC-conjugatedRat mAbBioLegend103206FCMMouse IgM, PE-conjugatedRat mAbBioLegend115523 (6D5)FCMMouse IgM, PE-conjugatedRat mAbBioLegend406607FCM, IFMouse IgM, PE-conjugatedRat mAbBD Biosciences55343 (A85-1)ANA, ICMouse IgG1, APC-conjugatedRat mAbBD Biosciences55343 (A85-1)ANA, ICMouse IgG2, FITC-conjugatedRat mAbBD Biosciences553390 (R19-15)ANA, ICMouse IgG3, FITC-conjugatedRat mAbBioLegend405609FCM, IFMouse IgA, FITC-conjugatedRat mAbBioLegend142514 (281-2)FCMMouse IgA, APC-conjugatedRat mAbBioLegend142514 (281-2)FCMMouse DD, APC-conjugatedRat mAbBioLegend10007 (5 F7)FCMMouse CD8, PE-conjugatedRat mAbBioLegend100111FCMMouse DB, PE-conjugatedRat mAbBioLegend100111FCMMouse IgE, FITC-conjugatedRat mAbBioLegend100111FCMMouse IgE, FITC-conjugatedRat mAbBioLegend100211FCMMouse IgE, FITC-conjugatedRat mAbBioLegend302206FCMHuman D19, FITC- conjugatedRat mAbBioLegend302208FCMMouse IgE, InconjugatedRat mAbBioLegend302208FCMMouse IgE, InconjugatedRat mAbBioLe				Cat No. (mAb	
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Mouse Bilmp1, APC- conjugated Mouse AID. FITC- conjugated Mouse CD4, APC- conjugated Rat mAbRabbit pAb Bios Bios Bios Biol.egend100411 100411FCM FCMMouse CD4, APC- conjugated Mouse CD3, PE-conjugated Rabbit mAbRat mAb BD Biosciences100411FCMMouse SD3, PE-conjugated Rabbit mAbRabbit mAbBD Biosciences Biol.egend63234FCMRabbit-lgG (H+L), Alexa Fluor 488- conjugatedGoat mAbCell Signaling Biol.egend4412IFRouse IgE, FITC- conjugated Human CD19, PE-conjugated Human IgM, FITC- conjugated Human IgM, FITC- conjugated Mouse mAbGoat pAbBiol.egend Biol.egend314506FCMHuman IgG, allophycocyanin Human IgG, allophycocyanin Human IgG, allophycocyanin Human IgG, allophycocyanin Human IgM, Biotin- conjugatedFrom Calf thymus Histone from calf Histone from calfMyBioSourceMBS18132ELISAMouse Ig, unconjugatedGoat pAbSouthern Biotech1010-08ELISA, ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISA, ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISA, ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISA, ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISA, ELISPOTMouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISA, ELISPOTMouse IgG1, biotin-conjugatedGoat pAbSouthern Biotech1040-01	Mouse CD138, PE-Cy7-conjugated	Rat mAb	BioLegend	142514 (281-2)	FCM
Mouse AID, FITC- conjugated Mouse CD4, APC-conjugated Mouse CD4, PE-conjugated Rabbit mAbBios Biolegend BD Biosciences S63234FCM FCM FCMMouse IQA, unconjugated Rabbit MabRabbit mAb Rabbit mAbThermo FisherPA-1-30826IFMouse IQA, unconjugated Mouse IgA, unconjugatedGoat mAb Rat mAbCell Signaling ebioscience S0-995-0 (23G3)FCM, IFMouse IgE, FITC-conjugated Human IgM, FITC- conjugated Human IgM, Biotin-conjugated Histone, unconjugatedRat mAb Mouse mAb BiolegendSigma Aldrich BiolegendF259 S02205FCMMuma IgA, FITC- conjugated Human IgM, Biotin- conjugated Human IgM, unconjugatedFrom Calf thymus Histone from calfMyBioSourceMBS318132ELISAMouse IgE, unconjugated Mouse IgE, unconjugatedGoat pAbSouthern Biotech1010-08ELISAMouse IgG, unconjugatedGoat pAbSouthern Biotech1010-08ELISAMouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISAMouse IgA, unconjugatedGoat pAbSouthern Biotech1020-01ELISAMouse IgA, unconjugatedGoat pAbSouthern Biotech1020-01ELISA,Mouse IgA, unconjugatedGoat pAbSouthern Biotech1020-01ELISA,Mouse IgA, unconjugatedGoat pAbSouthern Biotech1020-01ELISA,Mouse IgA, unconjugatedGoat pAbSouthern Biotech1020-01ELISA,Mouse IgA, biotin-conjugatedGoat pAbSouthern Biotech1040-01ELISPOT <td< td=""><td>Mouse Blimp1, APC- conjugated</td><td>Rat mAb</td><td>BioLegend</td><td>150007 (5 E7)</td><td>FCM</td></td<>	Mouse Blimp1, APC- conjugated	Rat mAb	BioLegend	150007 (5 E7)	FCM
Mouse CD4, APC-conjugated Mouse IgA, unconjugated Rabbit mAbBioLegend BD Biosciences So234IO0411 FCM So234FCM FCMMouse IgA, unconjugated Rabbit mAbRabbit mAbBD Biosciences BD Bioscience563234FCM FCMRabbit-IgG (H+L), Alexa Fluor 488- conjugatedGoat mAbCell Signaling BioLegend4412IFMouse IgE, FITC-conjugated Human IgM, FITC- conjugatedRat mAbBioLegend302208FCMHuman IgM, FITC- conjugated Human IgG, allophycocyanin Human IgG, allophycocyanin Histone, unconjugatedMouse mAbBioLegend314506FCMSm/RNP, unconjugated Histone, unconjugatedFom Calf thymus Histone from calfMyBioSourceMBS318132ELISAMouse IgG, unconjugatedGoat pAbSouthern Biotech1010-08ELISPOT ELISA, ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1030-08ELISPOT ELISA, ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1030-08ELISPOT ELISA, ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA, ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA, ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA, ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA, ELISA,Mouse IgG1, biotin-conjugatedGoat pAbSouthern Biotech1004-01 <t< td=""><td>Mouse AID, FITC- conjugated</td><td>Rabbit pAb</td><td>Bioss</td><td>bs-7855R-FITC</td><td>FCM</td></t<>	Mouse AID, FITC- conjugated	Rabbit pAb	Bioss	bs-7855R-FITC	FCM
Mouse CD8, PE-conjugated Mouse IgA, unconjugated Rabbit mAbRabbit mAb Rabbit mAbBD Biosciences Thermo Fisher563234 PA-1-30826FCM IFMouse IgG, IPTC-conjugated Mouse IgG, unconjugatedGoat mAb Rat mAbCell Signaling eBioscience4412IFMouse IgE, PTC-conjugated Human IgM, FITC- conjugated Human IgG, allophycocyanin Human IgG, allophycocyaninMouse mAb Goat pAbBiolegend Sigma Aldrich314506FCMSm/RNP, unconjugated Mouse IgG, unconjugatedFrom Calf thymus Histone from calfMyBioSourceMBS318132ELISAMouse IgG, unconjugatedGoat pAbSouthern Biotech1010-08ELISPOT ELISAMouse IgG, unconjugatedGoat pAbSouthern Biotech1010-08ELISPOT ELISAMouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISAMouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgG1, biotin-conjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgG2a, biotin-conjugatedGoat pAbSouthern Biotech100-01ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech100-01ELISPOT ELISA, <td< td=""><td>Mouse CD4, APC-conjugated</td><td>Rat mAb</td><td>BioLegend</td><td>100411</td><td>FCM</td></td<>	Mouse CD4, APC-conjugated	Rat mAb	BioLegend	100411	FCM
Mouse IgA, unconjugated Rabbit H2G (H+L), Alexa Fluor 488- conjugatedRabbit mAbThermo FisherPA-1-30826IFMouse IgE, FITC-conjugated Human CD19, PE-conjugated Human IgM, FITC- conjugated Human IgG, allophycocyanin Human IgG, allophycocyanin Human IgM, Biotin- conjugatedGoat mAb Rat mAb BiolegendCell Signaling eBioscience4412IFMouse IgE, PITC-conjugated Human IgG, allophycocyanin Human IgG, allophycocyanin Human IgG, allophycocyanin Human IgG, allophycocyanin Human IgG, allophycocyanin Human IgG, allophycocyanin Human IgG, allophycocyanin Histone, unconjugatedFrom Calf thymus Histone from calfMyBioSourceMBS318132ELISASm/RNP, unconjugatedFoom Calf thymus Histone from calfMyBioSourceMBS318132ELISAMouse IgG, unconjugatedGoat pAbSouthern Biotech1010-08ELISPAMouse IgG, unconjugatedGoat pAbSouthern Biotech1030-08ELISPAMouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISA, ELISA, ELISA, ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOTMouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOTMouse IgG1, biotin-conjugatedGoat pAbSouthern Biotech1020-01ELISPOTMouse IgG2a, biotin-conjugatedGoat pAbSouthern Biotech100-08ELISPOTMouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech100-08ELISPOTMouse IgG2a, biotin-conjugatedGoat pAbSouthern B	Mouse CD8. PE-conjugated	Rabbit mAb	BD Biosciences	563234	FCM
Rabbit-IgG (H+L), Alexa Fluor 488- conjugatedGoat mAb Rat mAbCell Signaling eBioscience4412IFMouse IgG, unconjugatedRat mAbBioLegend144607FCM, IFHuman CD19, PE-conjugatedMouse mAbBioLegend302208FCMHuman IgM, FITC- conjugatedMouse mAbBiolegend314506FCMHuman IgA, FITC- conjugatedGoat pAbSigma AldrichF5259FCMHuman IgG, alloptycocyaninMouse mAbBiolegend314506FCMHuman IgM, Biotin- conjugatedGoat pAbSouthern Biotech2022-08FCMSm/RNP, unconjugatedFrom Calf thymus Histone from calfMyBioSourceMBS318132ELISAMouse IgG, unconjugatedGoat pAbSouthern Biotech1010-08ELISPOT ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1030-08ELISPOT ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISA,Mouse IgM, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgM, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgG1, biotin-conjugatedGoat pAbSouthern Biotech1070-08ELISPOT ELISA,Mouse IgG2a, biotin-conjugatedGoat pAbSouthern Biotech1070-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1070-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern B	Mouse IgA, unconjugated	Rabbit mAb	Thermo Fisher	PA-1-30826	IF
conjugated Mouse IgE, FITC-conjugated Rat mAbGell Signaling eBioscience4412IFMouse IgE, FITC-conjugated Human CD19, PE-conjugated Human IgA, FITC- conjugated Human IgA, FITC- conjugated Human IgA, FITC- conjugated Human IgA, Biotegend144607FCM, IFHuman IgA, FITC- conjugated Human IgA, Bioten conjugated Human IgA, Bioten conjugatedMouse mAb Goat pAb Biolegend302208FCMHuman IgA, FITC- conjugated Human IgA, Biotin- conjugatedGoat pAb Goat pAbSigma Aldrich BD BiosciencesF5259FCMSm/RNP, unconjugatedFrom Calf thymus Histone, unconjugatedMyBioSourceMBS318132ELISAHistone, unconjugatedGoat pAbSouthern Biotech1010-08ELISA, ELISA, ELISA,Mouse Ig, unconjugatedGoat pAbSouthern Biotech100-08ELISPOT ELISA, ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA, ELISA,Mouse IgA, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA, ELISA,Mouse IgA, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA, ELISA,Mouse IgA, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA, ELISA,Mouse IgG1, biotin-conjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA, ELISA,Mouse IgG2, biotin-conjugatedGoat pAbSouthern Biotech100-08ELISPOT ELISA, ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biot	Rabbit-IgG (H+L), Alexa Fluor 488-				
Mouse IgE, FITC-conjugated GL7, PE-conjugatedRat mAb Rat mAbeBioscience BioLegend50-995-0 (23G3)FCM, IFHuman CD19, PE-conjugated Human IgA, FITC- conjugatedMouse mAbBioLegend144607FCM, IFHuman IgA, FITC- conjugated Human IgA, allophycozyanin Human IgA, Biotin- conjugatedGoat pAbSigma Aldrich Southern BiotechF5259FCMSm/RNP, unconjugatedFrom Calf thymus Histone from calfMyBioSourceMBS318132ELISAHistone, unconjugatedGoat pAbSouthern Biotech1010-08ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1030-08ELISPOT ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgA, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgA, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgA, unconjugatedGoat pAbSouthern Biotech1040-01ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1080-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1080-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1080-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1080-08ELISPOT ELISA, <td>conjugated</td> <td>Goat mAb</td> <td>Cell Signaling</td> <td>4412</td> <td>IF</td>	conjugated	Goat mAb	Cell Signaling	4412	IF
GL7, PE-conjugatedRat mAbBioLegend144607FCM, IFHuman CD19, PE-conjugatedMouse mAbBioLegend302208FCMHuman IgA, FITC- conjugatedGoat pAbSigma AldrichF5259FCMHuman IgG, allophycocyaninMouse mAbBD Biosciences562025FCMHuman IgM, Biotin- conjugatedGoat pAbSouthern Biotech2022-08ELISASm/RNP, unconjugatedFrom Calf thymusMyBioSourceMBS318132ELISAHistone, unconjugatedGoat pAbSouthern Biotech1010-08ELISA,Mouse Ig, unconjugatedGoat pAbSouthern Biotech1030-08ELISPOTMouse IgG, unconjugatedGoat pAbSouthern Biotech1030-08ELISPOTMouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOTMouse IgA, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOTMouse IgA, unconjugatedGoat pAbSouthern Biotech1040-01ELISPOTMouse IgA, biotin-conjugatedGoat pAbSouthern Biotech1022-08ELISPOTMouse IgG2a, biotin-conjugatedGoat pAbSouthern Biotech1020-01ELISPOTMouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1020-08ELISPOTMouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1080-08ELISPOTMouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech100	Mouse IgE, FITC-conjugated	Rat mAb	eBioscience	50-995-0 (23G3)	FCM
Human CD19, PE-conjugated Human IgM, FITC- conjugated Human IgG, allophycocyanin Human IgM, Biotin- conjugatedMouse mAb Goat pAbBiolegend Sigma Aldrich BD Biosciences Southern Biotech302208 314506FCM FCMSm/RNP, unconjugatedFrom Calf thymus Histone from calfMyBioSourceMBS318132ELISAMouse Ig, unconjugatedGoat pAbSouthern Biotech1010-08ELISPAMouse IgG, unconjugatedGoat pAbSouthern Biotech1030-08ELISPOT ELISA,Mouse IgE, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgE, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgA, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgA, unconjugatedGoat pAbSouthern Biotech1022-08ELISPOT ELISA,Mouse IgA, biotin-conjugatedGoat pAbSouthern Biotech1022-08ELISPOT ELISA,Mouse IgG2a, biotin-conjugatedGoat pAbSouthern Biotech1070-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1080-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1080-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1080-08ELISPOT ELIS	GL7, PE-conjugated	Rat mAb	BioLegend	144607	FCM, IF
Human IgM, FITC- conjugated Human IgA, FITC- conjugated Human IgA, FITC- conjugated Human IgA, Biotecocyanin Human IgM, Biotin- conjugatedMouse mAb Goat pAbBiolegend314506FCMSm/RNP, unconjugatedGoat pAbSouthern Biotech562025FCMSm/RNP, unconjugatedFrom Calf thymus Histone from calfMyBioSourceMBS318132ELISAHistone, unconjugatedGoat pAbSouthern Biotech1010-08ELISAMouse Ig, unconjugatedGoat pAbSouthern Biotech1010-08ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1030-08ELISPOT ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgM, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgM, biotin-conjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgG1, biotin-conjugatedGoat pAbSouthern Biotech1022-08ELISPOT ELISA,Mouse IgG2a, biotin-conjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1020-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1080-08ELISPOT ELISA,Mouse IgG3, biotin-conjugated<	Human CD19, PE-conjugated	Mouse mAb	BioLegend	302208	FCM
Human IgA, FITC- conjugated Human IgA, allophycocyanin Human IgA, Biotin- conjugatedGoat pAb Goat pAbSigma Aldrich BD Biosciences Southern BiotechF5259 562025FCMSm/RNP, unconjugatedFrom Calf thymus Histone from calf thymusMyBioSourceMBS318132ELISAHistone, unconjugatedFrom Calf thymus thymusSigma AldrichH9250ELISAMouse Ig, unconjugatedGoat pAbSouthern Biotech1010-08ELISA, ELISA, ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1030-08ELISPOT ELISA, ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA, ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA, ELISA,Mouse IgM, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA, ELISA, ELISPOT ELISA,Mouse IgM, biotin-conjugatedGoat pAbSouthern Biotech1020-08ELISPOT ELISA, ELISA, ELISPOT ELISA,Mouse IgG1, biotin-conjugatedGoat pAbSouthern Biotech1020-08ELISPOT ELISA, ELISA, ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1000-08ELISPOT ELISA, ELISA, ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1000-08ELISPOT ELISA, ELISA, ELISA, ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1080-08ELISPOT ELISA, ELISA, ELISA, ELISA, ELISA, <td>Human IgM, FITC- conjugated</td> <td>Mouse mAb</td> <td>Biolegend</td> <td>314506</td> <td>FCM</td>	Human IgM, FITC- conjugated	Mouse mAb	Biolegend	314506	FCM
Human IgG, allophycocyanin Human IgM, Biotin- conjugatedMouse mAb Goat pAbBD Biosciences Southern Biotech562025 2022-08FCMSm/RNP, unconjugatedFrom Calf thymus Histone from calfMyBioSourceMBS318132ELISAHistone, unconjugatedGoat pAbSigma AldrichH9250ELISAMouse Ig, unconjugatedGoat pAbSouthern Biotech1010-08ELISPOT ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1030-08ELISPOT ELISPOT ELISA,Mouse IgG, unconjugatedGoat pAbBethylA90-1158ELISPOT ELISA,Mouse IgA, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgA, unconjugatedGoat pAbSouthern Biotech1040-01ELISPOT ELISA,Mouse IgA, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgA, biotin-conjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgG1, biotin-conjugatedGoat pAbSouthern Biotech1070-08ELISPOT ELISA,Mouse IgG2a, biotin-conjugatedGoat pAbSouthern Biotech1070-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1080-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech100-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1100-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAb	Human IgA, FITC- conjugated	Goat pAb	Sigma Aldrich	F5259	FCM
Human IgM, Biolin- conjugatedGoat pAbSouthern Biotech2022-08FCMSm/RNP, unconjugatedFrom Calf thymus Histone from calf thymusMyBioSourceMBS318132ELISAHistone, unconjugatedGoat pAbSigma AldrichH9250ELISAMouse Ig, unconjugatedGoat pAbSouthern Biotech1010-08ELISPOT ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1030-08ELISPOT ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgM, unconjugatedGoat pAbBethylA90-1158ELISPOT ELISA,Mouse IgM, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgA, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgG1, biotin-conjugatedGoat pAbSouthern Biotech1022-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1070-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1070-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1080-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1100-08ELISPOT ELISA,Mouse IgG4, biotin-conjugatedGoat pAbSouthern Biotech1100-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1100-08ELISPOT ELISA, </td <td>Human IgG, allophycocyanin</td> <td>Mouse mAb</td> <td>BD Biosciences</td> <td>562025</td> <td>FCM</td>	Human IgG, allophycocyanin	Mouse mAb	BD Biosciences	562025	FCM
Sm/RNP, unconjugatedFrom Calf thymus Histone from calf thymusMyBioSourceMBS318132ELISAHistone, unconjugatedGoat pAbSouthern Biotech1010-08ELISA, ELISA,Mouse Ig, unconjugatedGoat pAbSouthern Biotech1010-08ELISPOT ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1030-08ELISPOT ELISA,Mouse IgE, unconjugatedGoat pAbBethylA90-1158ELISPOT ELISA,Mouse IgB, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgA, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgA, unconjugatedGoat pAbSouthern Biotech1040-01ELISPOT ELISA,Mouse IgA, biotin-conjugatedGoat pAbSouthern Biotech1040-01ELISPOT ELISA,Mouse IgG1, biotin-conjugatedGoat pAbSouthern Biotech1022-08ELISPOT ELISA,Mouse IgG2a, biotin-conjugatedGoat pAbSouthern Biotech1070-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1080-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1080-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1100-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1100-08ELISPOT ELISA,Mouse IgG4, biotin-conjugatedGoat pAbSouthern Biotech1100-08 </td <td>Human IgM Biotin- conjugated</td> <td>Goat nAb</td> <td>Southern Biotech</td> <td>2022-08</td> <td>FCM</td>	Human IgM Biotin- conjugated	Goat nAb	Southern Biotech	2022-08	FCM
Sm/RNP, unconjugatedFrom Calf thymus Histone from calf thymusMyBioSourceMBS318132ELISAHistone, unconjugatedthymusSigma AldrichH9250ELISA ELISA,Mouse Ig, unconjugatedGoat pAbSouthern Biotech1010-08ELISPOT ELISA,Mouse IgG, unconjugatedGoat pAbSouthern Biotech1030-08ELISPOT ELISA,Mouse IgG, unconjugatedGoat pAbBethylA90-1158ELISPOT ELISA,Mouse IgM, unconjugatedGoat pAbSouthern Biotech1020-01ELISPOT ELISA,Mouse IgM, unconjugatedGoat pAbSouthern Biotech1040-01ELISPOT ELISA,Mouse IgA, unconjugatedGoat pAbSouthern Biotech1040-01ELISPOT ELISA,Mouse IgG1, biotin-conjugatedGoat pAbSouthern Biotech1070-08ELISPOT ELISA,Mouse IgG2a, biotin-conjugatedGoat pAbSouthern Biotech1070-08ELISPOT ELISA,Mouse IgG2b, biotin-conjugatedGoat pAbSouthern Biotech1080-08ELISPOT ELISA,Mouse IgG2b, biotin-conjugatedGoat pAbSouthern Biotech1080-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1100-08ELISPOT ELISA,Mouse IgG, biotin-conjugatedGoat pAbSouthern Biotech1100-08ELISPOT ELISA,Mouse IgG3, biotin-conjugatedGoat pAbSouthern Biotech1100-08ELISPOT ELISA,Mouse IgG, biotin-conjugatedGoat pAbSouthern Biotech1100-08	Haman Igin, Dietin Genjagatea	Courpito	Biotoon		
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	Ovalbumin, biotin-conjugated		GALAB	152060	ELISPOT

EZ link sulfo-NHS-SS-Biotin		Thermo Fisher	21328	ELISA, ELISPOT
Mouse Blimp1	Rabbit mAb	eBioscience	50-166-72 (6D3)	IB
Mouse AID	Mouse mAb	Invitrogen	39-2500 (ZA001)	IB
Mouse acetyl-histone H3				
(H3K9ac/K14ac)	Rabbit mAb	Millipore	17-615	IB
Mouse histone 3	Rat mAb	Biolegend	601901	IB
Mouse β-actin	Mouse mAb	Sigma	A5441 (AC-15)	IB
Mouse B220, FITC-conjugated	Rat mAb	BioLegend	103206	FCM
Mouse CD19, Pacific Blue-		-		
conjugated	Rat mAb	BioLegend	115523 (6D5)	FCM
Mouse IgM, PE-conjugated	Rat mAb	Biolegend	406507	FCM

Abbreviations: mAb, monoclonal antibody; pAb, polyclonal antibody; ANA, anti-nuclear antibody analysis; ELISA, enzyme-linked immunosorbent assay; ELISPOT, enzyme-linked immunosorbent spot; FCM, flow cytometry; IB, immunoblotting; IC, immunocomplex analysis.

## Supplementary Table 2. PCR Primers used for this study.

	Forward primer	Reverse primer
Mouse genes		
Aicda	5'-AGAAAGTCACGCTGGAGACC-3'	5'-CTCCTCTTCACCACGTAGCA-3'
Prdm1	5'-GCTGCTGGGCTGCCTTTGGA-3'	5'-GGAGAGGAGGCCGTTCCCCA-3'
Irf4	5'-AAAGAGCTGACCACGACGAG-3'	5'-AAAGCCCATCTGGAGCCATC-3'
Xbp1	5'-AAGCCCGGATGAGCGAGCTG-3'	5'-ACCCGGCCACCAGCCTTACT-3'
Sdc1	5'-CAGGAAGGAAGTGCTGGGAG-3'	5'-GCTGCCTTCGTCCTTCTTCT-3'
β-Actin	5'-CTAAGGCCAACCGTGAAAG-3'	5'-ACCAGAGGCATACAGGGACA-3'
Gapdh	5'-TTCACCACCATGGAGAAGGC-3'	5'-GGCATGGACTGTGGTCATGA-3'
Cd79b	5'-CCACACTGGTGCTGTCTTCC-3'	5'-GGGCTTCCTTGGAAATTCAG-3'
<u>Human genes</u>		
AICDA	5'-GTCACCTGGTTCACCTCCTG-3'	5'-CTTGCGGTCCTCACAGAAGT-3'
PRDM1	5'-ATCTTGGGGTAAAAGCGGGT-3'	5'-TCCTGCACTACTGGACACAC-3'
β-ACTIN	5'-AGAGCTACGAGCTGCCTGAC-3'	5'-AGCACTGTGTTGGCGTACAG-3'
Germline transcripts		
Mouse		
Ιμ-Ϲμ	5'-ACCTGGGAATGTATGGTTGTGGCTT-3'	5'-GCAGGCAGGGCTAGATATGG-3'
Ιγ1-Cγ1	5'-TCGAGAAGCCTGAGGAATGTG-3'	5'-ATGGAGTTAGTTTGGGCAGCA-3'
Ιγ3-Cγ3	5'-AACTACTGCTACCACCACCACCAG-3'	5'-AGCCAGGGACCAAGGGATAGAC-3'
lγ2b-Cγ2b	5'GATGGGGAGGAGTTGGCAGAT-3'	5'-CGGAGGAACCAGTTGTATC-3'
Ια-Cα	5'-GCTTCCTGGAAAGCAGCAAC-3'	5'-TAATCGTGAATCAGGCAG-3'
Ιε-Cε	5'-CCCCACTTTTAGCTGAGGGC-3'	5'-ACAGGGCTTCAAGGGGTAGA-3'
Human		
Ιγ1-Cγ1	5'-CTTCCAAGCCAACAGGGCAG-3'	5'-ACCTGTGAGGTGGCTGCGTACTT-3'
Ια-Cα	5'-GCCATCAAGGCAGGGCCTGGG-3'	5'-TGCGACGACCACGTTCCCATCTTGGG-3'
Ιε-Cε	5'-GACGGGCCACACCATCC-3'	5'-CGGAGGTGGCATTGGAGG-3'
Mouse post-recombin	nation transcripts	
Ιμ-Cγ1	5'-ACCTGGGAATGTATGGTTGTGGCTT-3'	5'-ATGGAGTTAGTTTGGGCAGCA-3'
Ιμ-Cγ2a	5'-ACCTGGGAATGTATGGTTGTGGCTT-3'	5'-GCTGGGCCAGGTGCTCGAGGTT-3'
Iμ-Cγ2b	5'-ACCTGGGAATGTATGGTTGTGGCTT-3'	5'-CGGAGGAACCAGTTGTATC-3'
Ιμ-Ϲγ3	5'-ACCTGGGAATGTATGGTTGTGGCTT-3'	5'-AGCCAGGGACCAAGGGATAGAC-3'
Ιμ-Cα	5'-ACCTGGGAATGTATGGTTGTGGCTT-3'	5'-TAATCGTGAATCAGGCAG-3'
Ιμ-Cε	5'-ACCTGGGAATGTATGGTTGTGGCTT-3'	5'-ACAGGGCTTCAAGGGGTAGA-3'
Human mature transo	<u>pripts</u>	
$V_H D J_H - C \gamma 1$	5'-CAGGTGCAGCTGGTGSARTCTGG-3'	5'-ACCTGTGAGGTGGCTGCGTACTT-3'
$V_H D J_H - C \alpha$	5'-CAGGTGCAGCTGGTGSARTCTGG-3'	5'-TGCGACGACCACGTTCCCATCTTGGG-3'
$V_H D J_H - C \epsilon$	5'-CAGGTGCAGCTGGTGSARTCTGG-3'	5'-CGGAGGTGGCATTGGAGG-3'
Mature miRNA and si	n/snoRNA forward primers (used with Qiagen miScript L	<u> Jniversal Primer as reverse primer)</u>
miR-155-5p	5'-TTAATGCTAATTGTGATAGG-3'	
miR-181b-5p	5'-AACATTCATTGCTGTCGGTG-3	
miR-26a-5p	5'-TTCAAGTAATCCAGGATAGGCT-3'	
miR-125a-5p	5'-TCCCTGAGACCCTTTAACCTGTGA-3'	
miR-30c-5p	5'-TGTAAACATCCTACACTCTCAGC-3'	
miR-182-5p	5'-TTTGGCAATGGTAGAACTCACACCG-3'	
miR-200c-5p	5'-TAATACTGCCGGGTAATGATGGA-3'	

Mir-let7a-5p	5'-TGAGGTAGTAGGTTGTATAGTT-3'	
miR-19a/b-3p	5'-TGTGCAAATCTATGCAAAACTG-3'	
miR-20a-5p	5'-AAAGTGCTTATAGTGCAGGTAG-3'	
miR-25-3p	5'-CATTGCACTTGTCTCGGTCTG-3'	
miR-24-3p	5'-TGGCTCAGTTCAGCAGGAACAG-3'	
miR-106-5p	5'-CAAAGTGCTAACAGTGCAGGTAG-3'	
miR-27b	5'-TTCACAGTGGCTAAGTTCTGC-3'	
miR-186	5'-CAAAGAATTCTCCTTTTGGGCT-3'	
miR-206-3p	5'-TGGAATGTAAGGAAGTGTGTGG-3'	
miRNA host gene (H	IG) promoter ChIP	
mir-155-HG	5'-AAGGTCATGAGTTCAAGGCCAGC-3'	5'-TGTGCATGTGTGCATGAGTGCCT-3'
mir-181b-HG	5'-TGTGCATGTGTGCATGAGTGCCT-3'	5'-ACTGCAAGGACGCATGTAGGTCA-3'
mir-26a-HG	5'-CGTCGGAAACACAAACACCC-3'	5'-GTGGCCCCTCCTTACTATGC-3'
mir-125a-HG	5'-GGGCTCAGATTGCCAAGACA-3'	5'-GTTCTCCTCCACCCCATAGC-3'
mir-30c-HG	5'-AACCTGACAGGGAAAGCTCTG -3'	5'-CTCATCCCGAGTGACCTGTG-3'
mir-182-HG	5'-GGAAATGAGGTGGCCCTTGA-3'	5'-CCAGATGACCTCTGACCTGC-3'
mir-200c-HG	5'-AAGAAGGGGCTTCCAGGTTA-3'	5'-GGAAGTGTCCCAAATGACG-3'
let-7a-HG	5'-GAAATGTTTGTGTGTGGTAGTCAG-3'	5'-TCAGGGAATAAGGTTGCCTATCGC-3'
Mirc1	5'-TTGTTGCCCTCAGGACCTTG -3'	5'-CTTTCCGAGCCCCATTCCAA-3'
Mirc3	5'-GCCAGGTCAATAAGCCCAGT-3'	5'-GCCAGGTCAATAAGCCCAGT-3'
miR-106HG	5'-CTGAACGCCACCTTTACCCT-3'	5'-TCTTAGCTGTGGAAGGGGGA-3'
Mirc22	5'-CTCCATGTCTCCACAGTCGC-3'	5'-GTTCCTGCTGAACTGAGCCA-3'
miR-186HG	5'-GGGCCACTGAACCGTGAG-3'	5'-CCCTGACAAGAAGTGAGCGT-3'
miR-206HG	5'-AACAGCTGCCAGTGTCCATT-3'	5'-GCCCAGGCGCTATTGTACTT-3'
<u>Aicda, Prdm1</u> and I <sub>⊦</sub>	<u>↓ ChIP</u>	
Aicda promoter	5'-GGAGGCAGAIGIIGGAIACC-3'	5'-ATATCGGTCTCCAGCGTGAC-3'
Aicda region 4	5'-AAATCGGGGAATGCAGAAGT-3'	5'-TCCTCGGGTCACTATTTTTGG-3'
Prdm1 promoter	5'-ACTCCAGGACTACACAGCGA-3'	5'-GGATCGCTAGCTTCCTGTCG-3'
Iµ promoter	5'-TGAAACACTCTGTCCAGCCC-3'	5'-GAGGACCTCTCCAGTTTCGG-3'
lγ1 promoter	5'-CCCCAGAATGAAGGGGAACC-3'	5'-CAGCCTTTGTCCCAGAGAGG-3'
lγ3 promoter	5'-ATCCACGTGATGCAGCTTGA-3'	5'-AATGCTACCCCACACCCATC-3'
$I\alpha$ promoter	5'-CGCATCTCTGTCTCAGGGTC-3'	5'-CTTGCCTCCACGTCATGTCT-3'
Somatic mutations		
V <sub>186.2</sub> DJ <sub>H</sub> -Cγ1	5'-CATGCTCTTCTTGGCAGCAACAGC-3'	5'-GTGCACACCGCTGGACAGGGATCC-3'
$V_{186.2}DJ_{H}$ -C $\gamma 2b$	5'-CATGCTCTTCTTGGCAGCAACAGC-3'	5'-CGGAGGAACCAGTTGTATC-3'
V <sub>186.2</sub> DJ <sub>H</sub> -Cγ3	5'-CATGCTCTTCTTGGCAGCAACAGC-3'	5'-ACCAAGGGATAGACAGATGGGG-3'