

KEY RESOURCES TABLE

REAGENT or RESOURCE	SOURCE	IDENTIFIER
Antibodies		
PE anti-mouse CD45 antibody	Biolegend	Clone no. 30-F11
APC anti-mouse CD3ε antibody	Biolegend	Clone no. 145-2C11
FITC anti-mouse CD8a antibody	Biolegend	Clone no. 53-6.7
PerCP/Cyanine5.5 anti-mouse CD223 (LAG-3) antibody	Biolegend	Clone no. C9B7W
PE/Cyanine7 anti-mouse CD279 antibody	Biolegend	Clone no. 29F.1A12
Brilliant Violet 421 anti-mouse CD366 (Tim-3) antibody	Biolegend	Clone no. B8.2C12
Brilliant Violet 421 anti-mouse Ki-67 antibody	Biolegend	Clone no.16A8
Brilliant Violet 421 anti-mouse IFN-γ antibody	Biolegend	Clone no. XMG1.2
PE anti-mouse F4/80 antibody	Biolegend	Clone no. BM8
Alexa Fluor® 700 anti-mouse/human CD11b antibody	Biolegend	Clone no. M1/70
APC anti-mouse CD206 antibody	Thermo Fisher Scientific	Clone no. MR6F3
APC anti-mouse iNOS antibody	Thermo Fisher Scientific	Clone no. CXNFT
APC anti-mouse CD3 antibody	Thermo Fisher Scientific	Clone no. 145-2C11
FITC anti-mouse CD45 antibody	Biolegend	Clone no. 30-F11
PerCP/Cyanine5.5 anti-mouse NK1.1 antibody	Biolegend	Clone no. PK136
FITC anti-mouse CD4 antibody	Biolegend	Clone no. RM4-5
Brilliant Violet 421 anti-mouse CD8 antibody	Biolegend	Clone no. 53-6.7
Brilliant Violet 421 anti-mouse Ly6G antibody	Biolegend	Clone no. 1A8
PE-Cyanine 7 anti-mouse Ly6C antibody	Biolegend	Clone no. HK1.4
APC anti-mouse IL10 antibody	Biolegend	Clone no. JES5-16E3
Brilliant Violet 421 anti-mouse CD45.1 antibody	Biolegend	Clone no. A20
APC-Cyanine 7 anti-mouse CD45.2 antibody	Biolegend	Clone no. 104
PE/Cyanine7 anti-mouse CD19 antibody	Biolegend	Clone no. 6D5
Brilliant Violet 510 anti-mouse CD11b antibody	Biolegend	Clone no. M1/70
Anti-mouse CD16/32 antibody	Biolegend	Clone no. 93
Anti-mouse CD45 antibody	Biolegend	Clone no. 30-F11
Anti-mouse CD3ε Antibody	Biolegend	Clone no. 145-2C11
Anti-mouse CD103 antibody	Biolegend	Clone no. 2E7
Anti-mouse CD95(Fas) antibody	Biolegend	Clone no. SA367H8
Anti-mouse MHC II(I-A/I-E) antibody	Biolegend	Clone no. M5/114.15.2
Anti-mouse CD44 antibody	Biolegend	Clone no. IM7
Anti-mouse Gr-1(Ly-6G/Ly-6C) antibody	Biolegend	Clone no. RB6-8C5
Anti-mouse CD206(MMR) antibody	Biolegend	Clone no. C068C2

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REAGENT or RESOURCE	SOURCE	IDENTIFIER
Anti-mouse Ly6C antibody	Biolegend	Clone no. HK1.4
Anti-mouse Ly6G antibody	Biolegend	Clone no. 1A8
Anti-mouse CX3CR1 antibody	Biolegend	Clone no. SA011F11
Anti-mouse CD127(IL-7R α) antibody	Biolegend	Clone no. A7R34
Anti-mouse CD19 antibody	Biolegend	Clone no. 6D5
Anti-mouse CD278(ICOS) antibody	Biolegend	Clone no. C398.4A
Anti-mouse SiglecF antibody	BD Biosciences	Clone no. E50-2440
Anti-mouse Ki67 antibody	eBioscience	Clone no. SolA15
Anti-mouse CD11c antibody	Biolegend	Clone no. N418
Anti-mouse CD39 antibody	Biolegend	Clone no. 5F2
Anti-mouse TIGIT(VSTM3) antibody	R&D Systems	Clone no. 2190A
Anti-mouse CD45R(B220) antibody	Biolegend	Clone no. RA3-6B2
Anti-mouse F4/80 antibody	BioRAD	Clone no. C1:A3-1
Anti-mouse TCR β antibody	Biolegend	Clone no. H57-597
Anti-mouse iNOS antibody	eBioscience	Clone no. CXNFT
Anti-mouse PD-L1 antibody	Biolegend	Clone no. 10F.9G2
Anti-mouse CD25 antibody	Biolegend	Clone no. 3C7
Anti-mouse CD192(CCR2) antibody	R&D Systems	Clone no. 475301
Anti-mouse CD64(Fc γ RI) antibody	Biolegend	Clone no. X54-5/7.1
Anti-mouse TCR γ/δ antibody	Biolegend	Clone no. GL3
Anti-mouse CD49b antibody	Biolegend	Clone no. DX5
Anti-mouse CD27 antibody	Biolegend	Clone no. LG.3A10
Anti-mouse CD62L antibody	Biolegend	Clone no. MEL-14
Anti-mouse T-bet antibody	Biolegend	Clone no. 4B10
Anti-mouse CD69 antibody	Biolegend	Clone no. H1.2F3
Anti-mouse PD-1(PD-1) antibody	Biolegend	Clone no. 29F.1A12
Anti-mouse CD172a (SIRP α) antibody	Biolegend	Clone no. P84
Anti-mouse Gata3 antibody	eBioscience	Clone no. TWAJ
Anti-mouse KLRG1 antibody	eBioscience	Clone no. 2F1
Anti-mouse CD366(Tim-3) antibody	Biolegend	Clone no. RMT3-23
Anti-mouse CD4 antibody	Biolegend	Clone no. RM4-5
Anti-mouse CD8 antibody	Biolegend	Clone no. 53-6.7
Anti-mouse CD11b antibody	Biolegend	Clone no. M1/70
InVivoMab anti-mouse PD-1	Bio X Cell	Cat no. BE0146
InVivoMab rat IgG2a isotype control	Bio X Cell	Cat no. BE0089
InVivoPlus anti-mouse CD8 α	Bio X Cell	Cat no. BP0117
InVivoPlus rat IgG2b I sotype control	Bio X Cell	Cat no. BP0090
InVivoMab anti-mouse CD28	Bio X Cell	Cat no. BE0015
InVivoMab anti-mouse CD3	Bio X Cell	Cat no. BE0002
InVivoMab anti-mouse CSF1R	Bio X Cel	Cat no. BE0213
InVivoMab anti-mouse CD16/CD32	Bio X Cel	Cat no. BE0307

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REAGENT or RESOURCE	SOURCE	IDENTIFIER
Anti-human MS4A4A antibody	Abcam	Cat no. ab67134
Anti-mouse MS4A4A mAb	This paper	Clone no. 3G7
Anti-human MS4A4A antibody	Sigma-Aldrich	Cat no. HPA029323
Anti-mouse MS4A4A antibody	ABclonal	Cat no. A18334
Anti-human CD68 antibody	Abcam	Cat no. ab213363
Anti-mouse AKT antibody	Proteintech	Cat no.10176-2-AP
Anti-mouse phospho-AKT (Ser473) antibody	Proteintech	Cat no. 66444-1
Anti-mouse STAT6 antibody	Proteintech	Cat no. 51073-1-AP
Anti-mouse phospho-STAT6 (Y641) antibody	Abcam	Cat no. ab263947
Anti-mouse STAT3 antibody	Proteintech	Cat no.10253-2-AP
Anti-mouse phospho-STAT3 (Y705) antibody	ABclonal	Cat no. AP0070
Anti-mouse alpha Tubulin antibody	Proteintech	Cat no.11224-1-AP
Anti-mouse/human β -actin antibody	Proteintech	Cat no. 20536-1-AP
Anti-mouse F4/80 antibody	Cell Signaing Technology	Cat no. 70076S
Anti-mouse CD206 antibody	Cell Signaing Technology	Cat no. 24595S
Anti-mouse CD8 antibody	Abcam	Cat no. ab209775
Anti-mouse CD206 antibody	Proteintech	Cat no.18704-1-AP
Anti-mouse/human GFP antibody	Cell Signaing Technology	Cat no. 2956S
Anti-human CD31 antibody	Proteintech	Cat no. 66065-2-Ig
Anti-human MPO antibody	Proteintech	Cat no. 22225-1-AP
Anti-human SMA antibody	Proteintech	Cat no. 14395-1-AP
Anti-human EPCAM antibody	Proteintech	Cat no. 21050-1-AP
Anti-human CD11c antibody	Proteintech	Cat no. 60258-1-Ig
Anti-mouse Arg1 antibody	Proteintech	Cat no. 16001-1-AP
Anti-mouse/human CD3 antibody	Proteintech	Cat no. 17617-1-AP
Chemicals		
Collagenase IV	Sigma-Aldrich	Cat no. C4-22-1G
DNase I	Sigma-Aldrich	Cat no. D5025
Puromycin dihydrochloride	Sigma-Aldrich	Cat no. P883
Azoxymethane	Sigma-Aldrich	Cat no. A5486
Dextran sodium sulfate	MP Biomedicals	Cat no. 0216011080
Recombinant Murine IL-2	PeptoTech	Cat no. 212-12
Phorbol 12-myristate 12-acetate (PMA)	InvivoGen	Cat no. tlr-pma
Recombinant Human IL-4	PeptoTech	Cat no. 200-04
Recombinant Murine IL-4	PeptoTech	Cat no. 214-14
Recombinant Human IL-13	PeptoTech	Cat no. 200-13
Recombinant Murine IL-13	PeptoTech	Cat no. 210-13
Recombinant Human IFN- γ	PeptoTech	Cat no. 300-02
Recombinant Murine IFN- γ	PeptoTech	Cat no. 315-05
Dactolisib (BEZ235)	Selleck	Cat no. S1009

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REAGENT or RESOURCE	SOURCE	IDENTIFIER
AS1517499	Selleck	Cat no. S8685
PI3K α inhibitors (HS-173)	Selleck	Cat no. S7356
PI3K δ inhibitors (IPI-3063)	Selleck	Cat no. S7335
PI3K β inhibitors (IPI-3063)	Selleck	Cat no. S7335
PI3K γ inhibitors (IPI-549)	Selleck	Cat no. S8330
CFSE	eBioscience	Cat no. 65-0850-84
ACK Lysis Buffer	Leagene	Cat no. CS0001
Fixation Buffer	Biolegend	Cat no. 420801
Cell Staining Buffer	Biolegend	Cat no. 420201
RPMI-1640	GIBCO	Cat no. C11875
DMEM	GIBCO	Cat no. C11995500BT
Monocyte attachment medium	PromoCell	Cat no. C-28051
Macrophage Detachment Solution DXF	PromoCell	Cat no. C-41330
Macrophages Base Medium	PromoCell	Cat no. C-28057
Histopaque®-1077 (1.077g/ml)	Sigma-Aldrich	Cat.no. S-10771
PrimeScript™ RT reagent Kit	Takara	Cat no. RR037A
SYBR Green 2xTaq mix	Takara	Cat no. RR820A
Critical commercial assays		
Mouse TGF- β 1 Precoated ELISA Kit	Dakewe	Cat no.1217102
Mouse IL-10 Precoated ELISA Kit	Dakewe	Cat no.1211002
4-color multiple fluorescent immunohistochemical staining kit	Absin	Cat no. abs50012
TIANprep Mini Plasmid Kit	TIANGEN	Cat no. DP103
Advanced DNA RNA Transfection Reagent	Zeta Life	Cat no. AD600075
Cell Activation Cocktail (with Brefeldin A)	Biolegend	Cat no. 423303
Intracellular Staining Permeabilization Wash Buffer (10X)	Biolegend	Cat no. 421002
FOXP3 Fix/Perm Buffer Set	Biolegend	Cat no. 42140
Clophosome® -Neutral Liposomal Clodronate for Macrophage Depletion	FormuMax	Cat no. F70101C-N
Experimental models: Cell lines		
SW480	Fang Yuan et al., 2019	N/A
HT29	Fang Yuan et al., 2019	N/A
LoVo	Fang Yuan et al., 2019	N/A
RKO	Fang Yuan et al., 2019	N/A
THP-1	the Department of Pathology, Southern Medical University	N/A
HEK-293T	the Department of Pathology, Southern Medical University	N/A

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Experimental models: Cell lines	SOURCE	IDENTIFIER
L929	the Department of Pathology, Southern Medical University	N/A
J774A.1	the Department of Pathology, Southern Medical University	N/A
RAW264.7	the Department of Pathology, Southern Medical University	N/A
MC38	Mingdao Lin et al., 2021	N/A
CT26	Mingdao Lin et al., 2021	N/A
B16F10	the Department of Pathology, Southern Medical University	N/A
Experimental models: Organisms/strains		
Mouse: C57BL/6J	Laboratory Animal Center, Southern Medical University.	N/A
Mouse: BALB/c	Laboratory Animal Center, Southern Medical University.	N/A
Oligonucleotides		
siRNA targeting sequence: Ms4a4a #1: 5'- CCUUGGGAUUGUGCAGAUUTT -3'	GENECHEM Biotech	N/A
siRNA targeting sequence: Ms4a4a #2: 5'- GCAGCCUAGGCUUGAACAUUTT -3'	GENECHEM Biotech	N/A
In vivo siRNA targeting sequence: Ms4a4a #1: 5'- CCUUGGGAUUGUGCAGAUUTT -3'	RiboBio	N/A
In vivo siRNA targeting sequence: Ms4a4a #2: 5'- GCAGCCUAGGCUUGAACAUUTT -3'	RiboBio	N/A
Primers for qRT-PCR, see Table S2	This paper	N/A
Recombinant DNA		
pLent-EF1a-FH-CMV-Puro-Ms4a4a	Vigene Biosciences	N/A
pLent-EF1a-FH-CMV-Puro-MS4A4A	Vigene Biosciences	N/A
Software and Algorithms		
GraphPad Prism 8	GraphPad Software	https://www.graphpad.com/scientific-software/prism/
ImageJ	NIH	https://imagej.nih.gov/ij/
FlowJo	BD Biosciences	https://www.flowjo.com/solutions/flowjo/downloads