

Supplementary table 1: Reagents used in the study

REAGENT or RESOURCE	SOURCE	IDENTIFIER
Antibodies		
Rat monoclonal PE anti-mouse CD62L (clone MEL14-H2.100)	Miltenyi Biotec	Cat#130-102-543; RRID: AB_2660515
Isotype Control Antibody, rat IgG2a, PE	Miltenyi Biotec	Cat#130-123-747
Rat monoclonal FITC anti-mouse CD4 (clone H129.29)	BD Biosciences	Cat#553650; RRID: AB_394970
FITC Rat IgG2a, κ Isotype Control (clone R35-95)	BD Biosciences	Cat#555843
Rat monoclonal VioGreen anti-mouse CD45 (clone 30-F11)	Miltenyi Biotec	Cat#130-102-412; RRID: AB_2659927
Isotype Control Antibody, rat IgG2b, VioGreen™	Miltenyi Biotec	Cat#130-103-082
Hamster monoclonal APC anti-mouse CXCR3 (CD183) (clone CXCR3-173)	Miltenyi Biotec	Cat#130-102-242; RRID: AB_2655753
Armenian Hamster IgG Isotype Control (eBio299Arm), APC, eBioscience™	eBioscience	Cat#17-4888-81
Rat monoclonal PE anti-mouse T1/ST2 (IL-33R) (clone DJ8)	mdbiosciences, bioproducts division	Cat#101001PE; N/A
Rat IgG1 Isotype Control, R-PE Conjugated Antibody,	mdbiosciences, bioproducts division	Cat#1053001PE
Monoclonal PE-Vio770 anti-mouse CCR6 (CD196) (REA277)	Miltenyi Biotec	Cat#130-103-888; RRID: AB_2655947
REA Control Antibody, human IgG1, PE-Vio® 770, REAfinity™	Miltenyi Biotec	Cat#130-113-452
Rat monoclonal BV421 anti-mouse CXCR5 (CD185) (clone L138D7)	Biolegend	Cat#145511; RRID: AB_2562127
Brilliant Violet 421™ Rat IgG2b, κ Isotype Ctrl Antibody	Biolegend	Cat#400639
Rat monoclonal APC-Cy7 anti-mouse PD-1 (CD279) (clone 29F.1A12)	Biolegend	Cat#135223; RRID: AB_2563522
APC/Cyanine7 Rat IgG2a, κ Isotype Ctrl Antibody	Biolegend	Cat#400523
Rat monoclonal PerCP-Cy5.5 anti-mouse FOXP3 (clone FJK-16s)	eBioscience	Cat#45-5773-82; RRID: AB_914351
RORgamma(t) Rat-anti-Human, Mouse, Rhesus Monkey, APC, clone: AFKJS-9	eBioscience	Cat#15330820
T-bet monoclonal antibody (eBio4B10, PerCP-Cyanine5.5	eBioscience	Cat#45-5825-82
GATA3 Antibody, anti-human/mouse, FITC, REAfinity, clone: REA174	Miltenyi Biotec	Cat#130-120-061
Rat IgG2a kappa Isotype Control (eBR2a), PerCP-Cyanine5.5, eBioscience™	eBioscience	Cat#45-4321-80
Fixable Viability Stain 700	BD Biosciences	Cat#564997
Mouse monoclonal PE anti-human CD62L (clone DREG-56)	BD Biosciences	Cat#555544; RRID: AB_395928
PE Mouse IgG1, κ Isotype Control (clone X40)	BD Biosciences	Cat#340013
Monoclonal APC anti-human CD45RA (clone REA562)	Miltenyi Biotec	Cat#130-108-715; RRID: AB_2658309
REA Control Antibody, human IgG1, APC, REAfinity™	Miltenyi Biotec	Cat#130-113-446
Mouse monoclonal BV510 anti-human CD45RA (clone HI100)	Biolegend	Cat#304102; RRID: AB_314406
Brilliant Violet 510™ Mouse IgG2b, κ Isotype Ctrl Antibody	Biolegend	Cat#400345
Mouse monoclonal FITC anti-human CD4 (clone RPA-T4)	Biolegend	Cat#300502; RRID: AB_314070
FITC Mouse IgG1, κ Isotype Ctrl	Biolegend	Cat#981802
Mouse monoclonal BV421 anti-human CD4 (clone L200)	BD Biosciences	Cat#562842; N/A
BV421 Mouse IgG1, κ Isotype Control (clone X40)	BD Biosciences	Cat#562438
Mouse monoclonal APC-Cy7 anti-mouse CXCR3 (CD183) (clone G025H7)	Biolegend	Cat#353722; RRID: AB_2561423
APC/Cyanine7 Mouse IgG1, κ Isotype Ctrl Antibody	Biolegend	Cat#400128
Mouse monoclonal BV421 anti-human CD25 (clone 2A3)	BD Biosciences	Cat#564033; N/A
BV421 Mouse IgG1, κ Isotype Control (clone X40)	BD Biosciences	Cat#562438
Mouse monoclonal BV605 anti-human CCR6 (CD196) (clone G034E3)	Biolegend	Cat#353420; RRID: AB_2561449
Brilliant Violet 605™ Mouse IgG2b, κ Isotype Ctrl Antibody	Biolegend	Cat#400350
Rat monoclonal Alexa Fluor 647 anti-human CXCR5 (CD185) (clone RF8B2)	BD Biosciences	Cat#558113; N/A
Alexa Fluor® 647 Rat IgG2b, κ Isotype Control (clone A95-1)	BD Biosciences	Cat#557691

Mouse monoclonal PE anti-human PD-1 (CD279) (clone EH12.2H7)	Biolegend	Cat#329906; RRID: AB_940483
PE Mouse IgG1, κ Isotype Ctrl Antibody	Biolegend	Cat#400112
Mouse monoclonal PerCP-Cy5.5 anti-human IL7-Rα (CD127) (clone A019D5)	Biolegend	Cat#351322; RRID: AB_10897104
PerCP/Cyanine5.5 Mouse IgG1, κ Isotype Ctrl Antibody	Biolegend	Cat#400150
Mouse monoclonal PE-Cy7 anti-human CCR4 (CD194) (clone 1G1)	BD Biosciences	Cat#557864; RRID: AB_396907
PE-Cy™7 Mouse IgG1, κ Isotype Control (clone X40)	BD Biosciences	Cat#348788
Rat monoclonal PE-Cy7 anti-mouse CD45 (clone 30-F11)	BD Biosciences	Cat#552848; RRID: AB_394489
PE-Cy™7 Rat IgG2b, κ Isotype Control (clone A95-1)	BD Biosciences	Cat#552849
Mouse monoclonal BV510 anti-mouse CD45.2 (clone 104)	Biolegend	Cat#109837; RRID: AB_2561393
Brilliant Violet 510™ Mouse IgG2a, κ Isotype Ctrl Antibody	Biolegend	Cat#400268
CD11c Antibody, anti-mouse, REAfinity percp vio700	Miltenyi Biotec	Cat#130-113-811
CD11c Antibody, anti-mouse, REAfinity percp vio700	Miltenyi Biotec	Cat#130-110-706
Ly-6C monoclonal antibody (HK1,4), APC	eBioscience	Cat#17-5932-82
Rabbit monoclonal anti-human/mouse BCL6 (clone D65C10)	Cell Signaling	Cat#5650; RRID: AB_10949970
Rabbit monoclonal anti-human/mouse/rat/monkey STAT1 (clone D1K9Y)	Cell Signaling	Cat#14994; N/A
Rabbit monoclonal anti-human/mouse/rat/monkey STAT3 (clone 124H6)	Cell Signaling	Cat#9139; RRID: AB_331757
Rabbit monoclonal anti-human/mouse/rat Phospho-Stat1 (Tyr701) (clone D4A7)	Cell Signaling	Cat#7649; RRID: AB_10950970
Mouse monoclonal anti-human/mouse Phospho-Stat1 (Tyr701) (clone M135)	abcam	Cat#ab29045; RRID: AB_778096
Rabbit monoclonal anti-human/mouse/rat Phospho-Stat3 (Tyr705) XP® (clone D3A7)	Cell Signaling	Cat#9145; RRID: AB_2491009
Goat polyclonal anti-human/mouse/rat PGD synthase (clone D-17)	Santa Cruz Biotechnology	Cat#sc-14816; RRID: AB_670850
Rabbit polyclonal anti-human/mouse/rat CRTH-2/GPR44	Novus Biologicals	Cat#NBP1-76755; RRID: AB_11018469
Rabbit polyclonal anti-human/mouse DP (clone M-47)	Santa Cruz Biotechnology	Cat#sc-67278; RRID: AB_2174485
Rabbit polyclonal species indepenent anti-PGD2	Enzo Life Sciences	Cat#ADI-905-047; RRID: AB_2039492
Donkey polyclonal anti-Goat IgG (H+L) Cross-Adsorbed Secondary Antibody, AF 488	ThermoFisher Scientific	Cat#A-11055; RRID: AB_2534102
Goat polyclonal anti-Rabbit IgG (H+L) Cross-Adsorbed Secondary Antibody, AFR 568	ThermoFisher Scientific	Cat#A-11011; RRID: AB_143157
Rabbit polyclonal anti-Goat IgG Antibody, HRP conjugate	Sigma Aldrich	Cat#AP106P; RRID: AB_92411
Peroxidase AffiniPure Goat polyclonal Anti-Rabbit IgG (H+L)	Jackson ImmunoReseach	Cat#111-035-144; RRID: AB_2307391
Peroxidase AffiniPure Goat polyclonal Anti-Mouse IgG (H+L)	Jackson ImmunoReseach	Cat#115-035-146; RRID: AB_2307392
<i>In Vivo</i> Mab anti-mouse CD3ε (clone 145-2C11)	BioXCell	Cat#BE0001-1; RRID: AB_11070634
<i>In Vivo</i> Mab anti-mouse CD4 (clone GK1.5)	BioXCell	Cat#BE0003-1; RRID: AB_11070636
<i>In Vivo</i> Mab anti-mouse CD28 (clone PV-1)	BioXCell	Cat#BE0015-5; RRID: AB_11070628
<i>In Vivo</i> Mab anti-mouse IL-4 (clone 11B11)	BioXCell	Cat#BE0045; RRID: AB_1107707
<i>In Vivo</i> Mab anti-mouse IL-6 (clone MP5-20F3)	BioXCell	Cat#BE0046; RRID: AB_1107709
<i>In Vivo</i> Mab anti-mouse IFN-γ (clone XMG1.2)	BioXCell	Cat#BE0055; RRID: AB_1107694
<i>In Vivo</i> Mab anti-mouse/human/rat/hamster/canine/bovine TGF-β (clone 1D11.16.8)	BioXCell	Cat#BE0057; RRID: AB_1107757
<i>In Vivo</i> Mab anti-human CD3ε (clone OKT-3)	BioXCell	Cat#BE0001-2; RRID: AB_11070632
<i>In Vivo</i> Mab anti-human CD28 (clone CD28.2)	BioXCell	Cat#BE0291; RRID: AB_2687814
anti-asiolo-GM1	Sobioda	Cat#986-10001; RRID: AB_10949970
<i>In Vivo</i> Mab anti-mouse IL-21R Clone (4A9)	BioXcell	Cat#BE0258-5; RRID: AB_11070628
Mouse IL-21 antibody	R&D systems	Cat#AF594
Bacterial		
Bacterial Strain JM109	Promega	Cat#P9751
Stellar Competent Cells	Takara	Cat#636763

Chemicals, Peptides, and Recombinant Proteins		
Cryptotanshinone (CAS n° 35825-57-1)	Selleckchem	Cat#S2285
Epigallocatechin gallate (EGCG) (CAS n° 989-51-5)	Sigma-Aldrich	Cat#E4143
Fludarabine (CAS n° 21679-14-1)	Selleckchem	Cat#S1491
G418 (Geneticin) (CAS n°108321-42-2)	InvivoGen	Cat#ant-gn-1
Prostaglandin D2 (CAS n° 41598-07-6)	Cayman Chemical	Cat#12010
cOmplete™, Mini, EDTA-free Protease Inhibitor Cocktail	Roche Diagnostics	Cat#11836170001
TWEEN® 20	Sigma-Aldrich	Cat#P1379
Saponin (CAS n°8047-15-2)	Sigma-Aldrich	Cat#SML2160
STA-21 (CAS n° 111540-00-2)	Sigma-Aldrich	Cat#47036
TM30089 (CAS n° 844639-57-2, 627865-18-3)	ChemieTek	Cat#CT-AT002
Urethane (CAS n°51-79-6)	Sigma-Aldrich	Cat#94300
Recombinant Mouse IL-4	R&D SYSTEMS	Cat#404-ML-010
Recombinant Mouse IL-6	R&D SYSTEMS	Cat#405-ML-005
Recombinant Mouse IL-12	R&D SYSTEMS	Cat#419-ML-010
Recombinant Mouse IL-21	R&D SYSTEMS	Cat#594-ML-010
Recombinant Human TGF-β1 (Premium grade)	Miltenyi Biotec	Cat#130-095-067
RPMI 1640 with L-Glutamine - 500 ml	Dominic Dutscher	Cat#L0500-500
HEPES (1M)	gibco	Cat#15630080
Sodium pyruvate (100mM)	gibco	Cat#11360071
Penicillin-Streptomycin/Amphotericin B Mix	PAN Biotech	Cat#P06-07300
MEM Non-Essential Amino Acids Solution (100X)	gibco	Cat#11140035
Fetal Bovine Serum (South America) - 500ml	Dominic Dutscher	Cat#S1810-500
Lymphocytes Separation Medium	Eurobio Abcys	Cat#CMSMSL01-01
PowerUp™ SYBR™ Green Master Mix	Applied Biosystems	Cat#A25779
M-MLV Reverse Transcriptase (200 U/μL)	ThermoFisher Scientific	Cat#28025013
Set of dATP, dCTP, dGTP, dTTP	Promega	Cat#U1420
TransIT-TKO® Transfection Reagent	Mirus Bio	Cat#MIR 2150
eBioscience™ Flow Cytometry Staining Buffer	ThermoFisher Scientific	Cat#00-4222-26
Brilliant Stain Buffer	BD Bioscience	Cat#563794
CellTrace™ CFSE Cell Proliferation Kit, for flow cytometry	ThermoFisher Scientific	Cat#C34570
CellTrace™ Far Red Cell Proliferation Kit, for flow cytometry	ThermoFisher Scientific	Cat#C34564
eBioscience™ Intracellular Fixation & Permeabilization Buffer Set	ThermoFisher Scientific	Cat#88-8824-00
Paraformaldehyde 16% Solution (methanol-free) - 10x10ml ampoules	Agar Scientific	Cat#AGR1026
ProLong™ Gold Antifade Mountant with DAPI	ThermoFisher Scientific	Cat#P36941
Matrigel® Matrix Basement Membrane	ThermoFisher Scientific	Cat#354234
Frozen Section Media	Leica Biosystems	Cat#3801480

Critical Commercial Assays		
In-Fusion® HD Cloning Plus	Takara	Cat#638909
Mouse IL-4 ELISA Set	BD Biosciences	Cat#555232
Mouse IL-5 ELISA Set	BD Biosciences	Cat#555236
Mouse IL-10 ELISA Set	BD Biosciences	Cat#555252

Mouse IL-13 ELISA Ready-SET-Go! kit	eBioscience	Cat#15571067
Prostaglandin D2 ELISA Kit	Cayman Chemical	Cat#512031
CD4+ CD62L+ T Cell isolation Kit II, Mouse	Miltenyi Biotec	Cat#130-106-643
CD4 (L3T4) MicroBead, Mouse	Miltenyi Biotec	Cat#130-049-201
Tumor dissociation Kit, Mouse	Miltenyi Biotec	Cat#130-096-730
Tumor dissociation Kit, Human	Miltenyi Biotec	Cat#130-095-929
Lung dissociation Kit, Mouse	Miltenyi Biotec	Cat#130-095-927
LS Columns	Miltenyi Biotec	Cat#130-042-401
MS Mini MACS Separation Columns	Miltenyi Biotec	Cat#130-042-201
MACS SmartStreiners (70µm)	Miltenyi Biotec	Cat#130-098-462
Pre-Separation Filters (30µm)	Miltenyi Biotec	Cat#130-041-407
QuadroMACS Separator	Miltenyi Biotec	Cat#130-091-051
OctoMACS Separator	Miltenyi Biotec	Cat#130-042-109
Gentle Macs C tubes	Miltenyi Biotec	Cat#130-096-334
Duolink [®] flowPLA Detection Kit - Green	Sigma Aldrich	Cat#DUO94002
ChIP-IT [®] Express Enzymatic Shearing Kit	Active Motif	Cat#53035
Re-ChIP-IT [®] kit	Active Motif	Cat# 53016
Luciferase Assay System	Promega	Cat#E1500
β-Galactosidase Enzyme Assay System	Pomega	Cat#E2000
RosetteSep [™] Human CD4+ T Cell Enrichment Cocktail	STEMCELL [™] Technologies	Cat#15062

Deposited Data		
RNAseq	GEO access number GSE134875	GSE134875

Experimental Models: Cell Lines		
B16-F10	ATCC	Cat#CRL-6475; RRID: CVCL_0159
LL/2 (LLC1)	ATCC	Cat#CRL-21642; RRID: CVCL_4358
CT26.CL25	ATCC	Cat#CRL-2639; RRID: CVCL_7255
MC-38	ATCC	Cat#?; RRID: CVCL_B288
4T1	ATCC	Cat#CRL-2539; RRID:CVCL_0125
KPC	Ximbio	Cat#153474

Experimental Models: Organisms/Strains		
Mouse: C57BL/6J	The Jackson Laboratory	Cat#000664; RRID:IMSR_JAX:000664
Mouse: BALB/cByJ	The Jackson Laboratory	Cat#000651; RRID:IMSR_JAX:000651
Mouse: B6.Cg-KitW-sh/HNhrJaeBsmGllj	The Jackson Laboratory	Cat#012861; RRID:IMSR_JAX:012861
Mouse: B6.Cg-Tg(TcraTcrb)425Cbn/J	The Jackson Laboratory	Cat#004194; RRID:IMSR_JAX:004194
Mouse : B6.Cg-Rag1tm1Mom Tyrp1B-w Tg(Tcra,Tcrb)9Rest/J	The Jackson Laboratory	Cat#008684; RRID:IMSR_JAX:008684

Oligonucleotides		
Mouse <i>βactin</i> , forward	ThermoFisher Scientific	GAAGATCAAGCGAGGCTCCA

Mouse <i>βactin</i> , reverse	ThermoFisher Scientific	CCTTCCTGCATTCCATCGTA
Mouse <i>Il4</i> , forward	ThermoFisher Scientific	CGAGCTCACTCTCTGTGGTG
Mouse <i>Il4</i> , reverse	ThermoFisher Scientific	TGAACGAGGTCACAGGAGAA
Mouse <i>Il5</i> , forward	ThermoFisher Scientific	CATTTCCACAGTACCCCCAC
Mouse <i>Il5</i> , reverse	ThermoFisher Scientific	GCAATGAGAGATGAGGCTT
Mouse <i>Il10</i> , forward	ThermoFisher Scientific	TGTCAAATTCATTCATGGCCT
Mouse <i>Il10</i> , reverse	ThermoFisher Scientific	ATCGATTTCTCCCTGTGAA
Mouse <i>Il13</i> , forward	ThermoFisher Scientific	ATGTTGGTCAGGGAATCCAG
Mouse <i>Il13</i> , reverse	ThermoFisher Scientific	TGTGTCTCTCCCTCTCGACCC
Mouse <i>Hpgds</i> , forward	ThermoFisher Scientific	AGGTGCTTGATGTGTGAGCA
Mouse <i>Hpgds</i> , reverse	ThermoFisher Scientific	ATGTCAAGCTGATGCAGTGG
ChIP Mouse pan-STATs <i>pHpgds</i> , forward	ThermoFisher Scientific	GCTAGTCAATGATTATTCTGGTCT
ChIP Mouse pan-STATs <i>pHpgds</i> , reverse	ThermoFisher Scientific	GATCAGGCAACTGACAGATATTTT
ChIP Mouse STAT3 <i>pHpgds</i> , forward	ThermoFisher Scientific	CAGTCCTCTCTCCTCACCTT
ChIP Mouse STAT3 <i>pHpgds</i> , reverse	ThermoFisher Scientific	GGAGGACTTCAAGCTTAGCG
Human <i>βactin</i> , forward	ThermoFisher Scientific	GTTGTCGACGACGAGCG
Human <i>βactin</i> , reverse	ThermoFisher Scientific	GCACAGAGCCTCGCCTT
Human <i>Hpgds</i> , forward	ThermoFisher Scientific	CACAGAATTGCACCATGCCA
Human <i>Hpgds</i> , reverse	ThermoFisher Scientific	TTGCTAGGCTCTGGTGAAGA
Ptgsd Mouse siRNA Oligo Duplex	Origen/Life Technologies	Cat#SR402083
Trilencer-27 Universal scrambled negative control siRNA duplex - 2 nmol	Origen/Life Technologies	Cat#SR30004

Recombinant DNA		
pSV-β-Galactosidase Control Vector	Promega	Cat#E1081
pGL3 Luciferase Reporter Vectors	Promega	Cat#E1751
Duolink [®] In Situ PLA [®] Probe Anti-Rabbit PLUS	Sigma Aldrich	Cat#DUO92002
Duolink [®] In Situ PLA [®] Probe Anti-Mouse MINUS	Sigma Aldrich	Cat#DUO92004

Software and Algorithms		
7500 Fast System SDS Software (v1.4.0.25)	ThermoFisher Scientific	N/A
Image Lab [™] Software (v5.0)	Bio-Rad	N/A
FlowJo v10	FlowJo	N/A
ImageJ Software	ImageJ	N/A
ZEN system	Carl Zeiss Microscopy	N/A
GraphPad Prism Software (v6.00)	GraphPad Prism	N/A
DigiRead, ScanPlus Software (v1.8.0.2)	Biochrom	Cat#G01906590

Other : Devices and Cell culture system		
iCycler iQ [™] Real-Time PCR Detection System	Bio-Rad	Cat#170-8740
7500 Fast Real-Time PCR System	ThermoFisher Scientific	Cat#4351107

ViiA™ 7 Dx Instrument, 96 well	Applied Biosystems	Cat#4453539
LSRII™ Cell Analyser	BD Biosciences	N/A
FACSCanto™ 10-Color Cell Analyser	BD Biosciences	Cat#657338
LSRFortessa™ Cell Analyzer	BD Biosciences	Cat#649225
FACSAria™III Cell Sorter	BD Biosciences	N/A
gentleMACS™ Octo Dissociator with Heaters	Miltenyi Biotec	Cat#130-096-427
Asys UVM 340 Microplate Reader	Biochrom	Cat#G01906590
EnVision 2105 Multimode Plate Reader	PerkinElmer	Cat#2105-0010
ZEISS Apotome.2	Carl Zeiss Microscopy	N/A
Mantra 2™ Quantitative Pathology Workstation	Akoya Biosciences	N/A
Transwell insert ThinCert™, 24 wells, 8 µm	greiner bio-one	Cat#662638

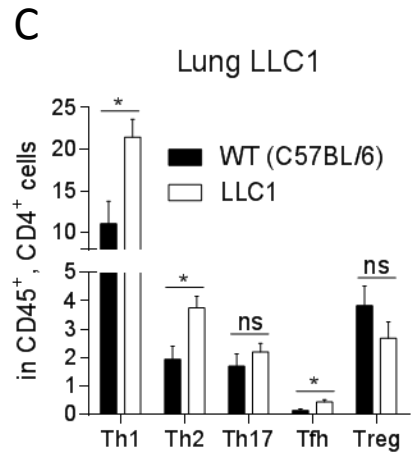
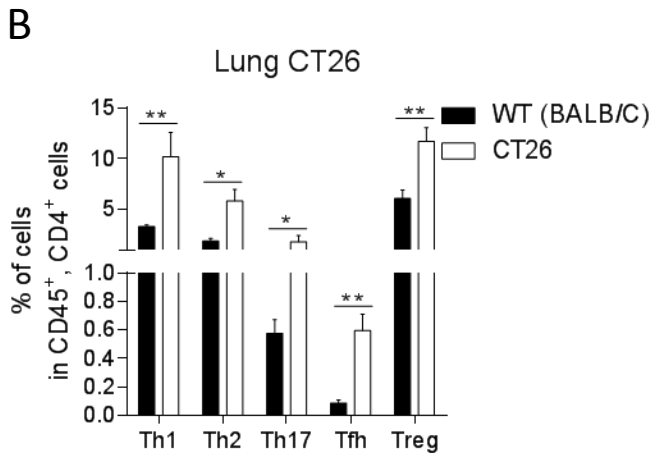
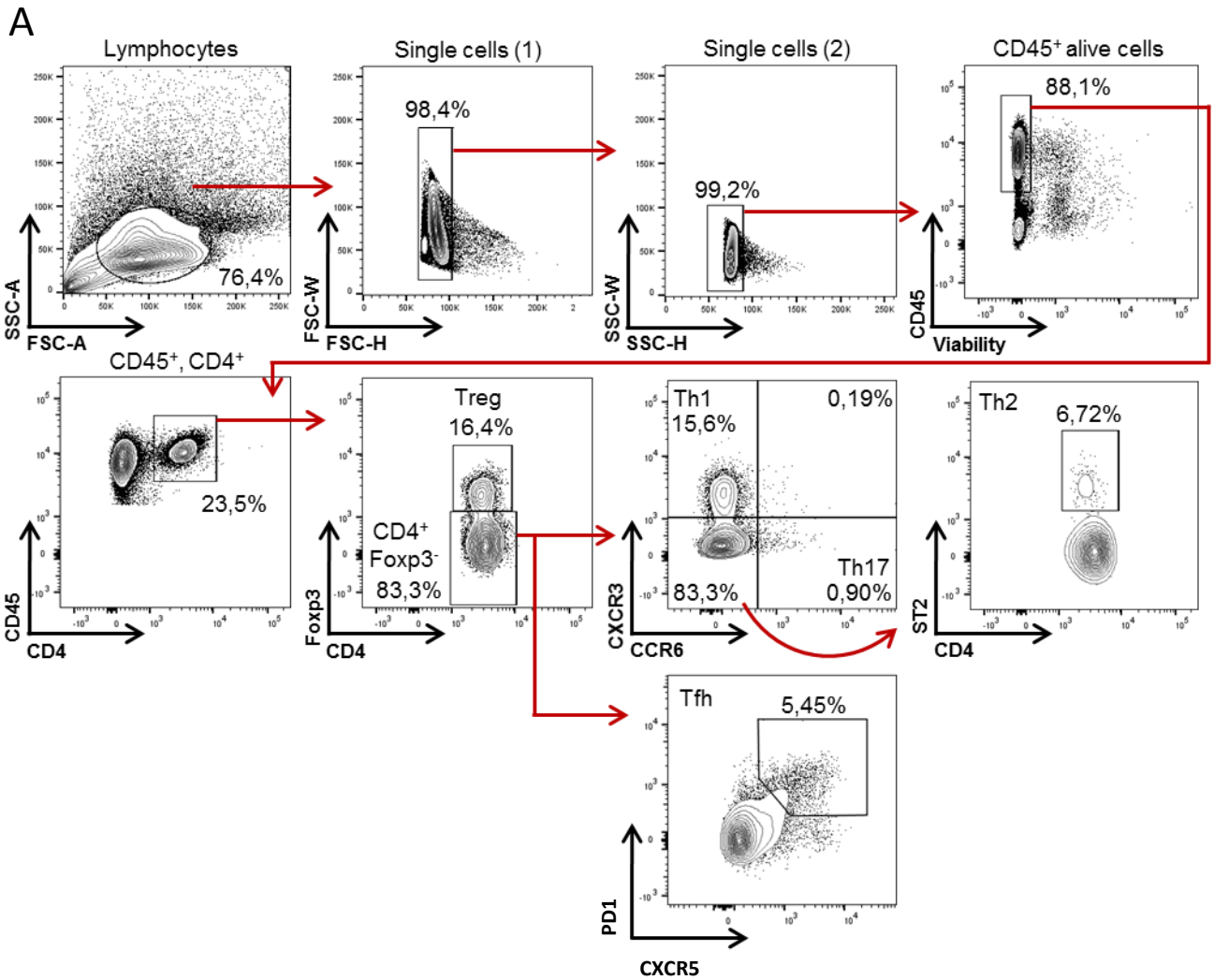
Supplementary table 2: cutoffs used in the gene expression profiles of human cancers

Cancer_Type	Nb_sample	Cutpoint_Th2	Cutpoint_TFH
STAD	415	922.128528	280.19299
COAD	283	469.132232	125.56664
COADREAD	377	473.919908	124.72572
BLCA	408	1052.412152	290.76579
KIRC	533	1078.106252	440.09094
KIRP	290	756.456732	286.89752
PAAD	178	931.947472	312.67518
KIPAN	889	758.25378	376.06994
LUAD	515	862.273784	303.02321
READ	94	696.30006	105.9325
THCA	501	1378.02682	370.36449
KICH	66	756.372808	159.92657

Supplementary Table 3. Correlation analysis table between Th1, Th2, Th17 and Tfh cells from lung of B16-F10 and urethane-treated bearing mice.

		Th1	Th2	Th17	Treg	Tfh
Th1	r ²		0,0603	0,01531	0,02986	0,2416
			0,2180	0,2000	0,2315	0,3679
	p value		0,2266	0,5738	0,4538	0,0531
			0,1737	0,1950	0,1592	0,0630
Th2	r ²	0,0603		0,01942	0,03446	0,6987
		0,2180		0,0662	0,3143	0,6706
	p value	0,2266		0,4971	0,4204	<0,0001
		0,1737		0,4730	0,0918	0,0011
Th17	r ²	0,01531	0,01942		0,004357	0,000939
		0,2000	0,0662		0,08754	0,06836
	p value	0,5738	0,4971		0,7762	0,9758
		0,1950	0,4730		0,3770	0,5870
Treg	r ²	0,02986	0,03446	0,004357		0,06034
		0,2315	0,3143	0,08754		0,2661
	p value	0,4538	0,4204	0,7762		0,2831
		0,1592	0,0918	0,3770		0,1043
Tfh	r ²	0,2416	0,6987	0,000939	0,06034	
		0,3679	0,6706	0,06836	0,2661	
	p value	0,0531	<0,0001	0,9758	0,2831	
		0,0630	0,0011	0,5870	0,1043	

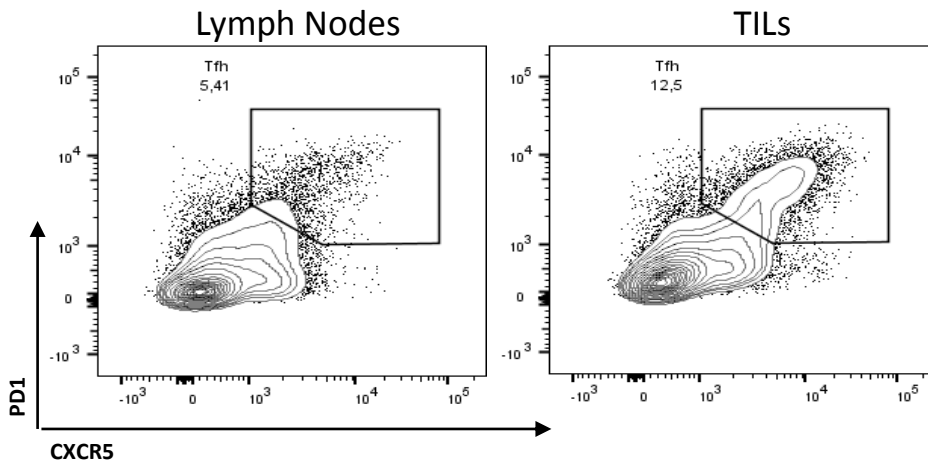
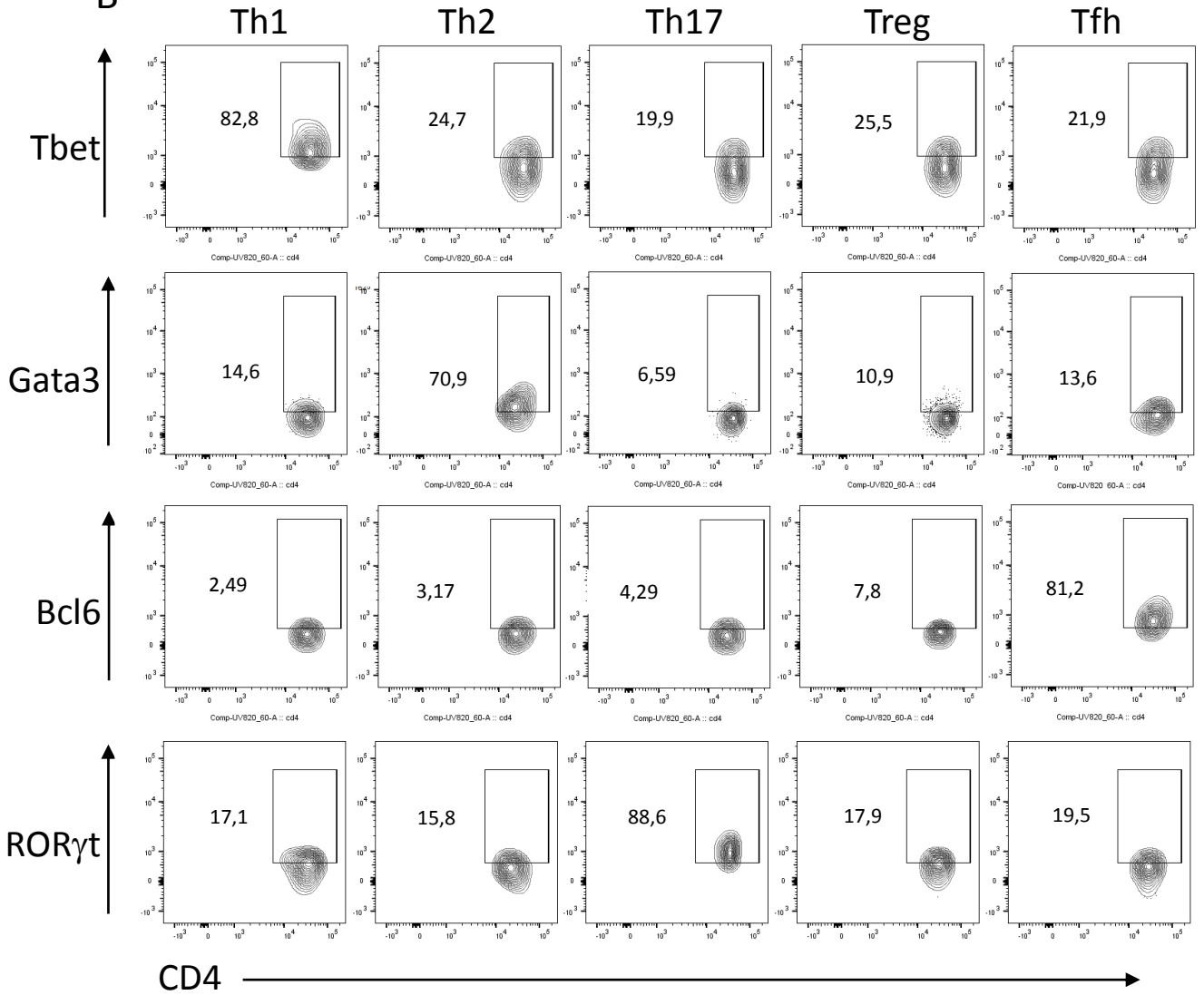
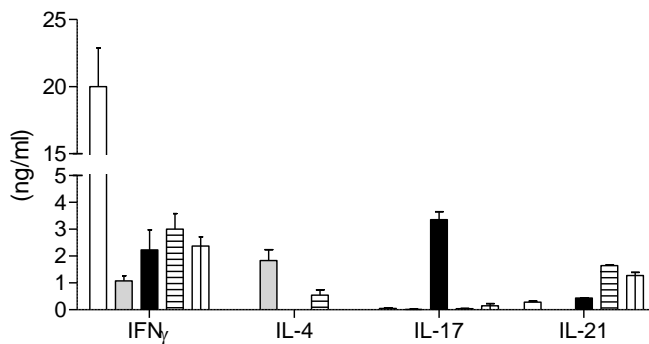
B16-F10 tumor bearing (white) and urethane treated (grey) mice. r² and p value related to linear regression analysis of each couple comparison are reported in the table.



Supplementary Fig1: Th1, Th2, Th17, Tfh and Treg cell subpopulations in lungs of WT and CT26 or LLC1 bearing mice.

A. Flow cytometry gating strategy to identify mouse Th1, Th2, Th17, Treg and Tfh subpopulations through chemokine receptors and Foxp3 transcription factor. **B and C.** Proportion of Th1, Th2, Th17, Tfh and Treg cell subpopulations in lungs of syngeneic WT and CT26 (**B**) or LLC1 (**C**) injected mice, evaluated by cytometry.

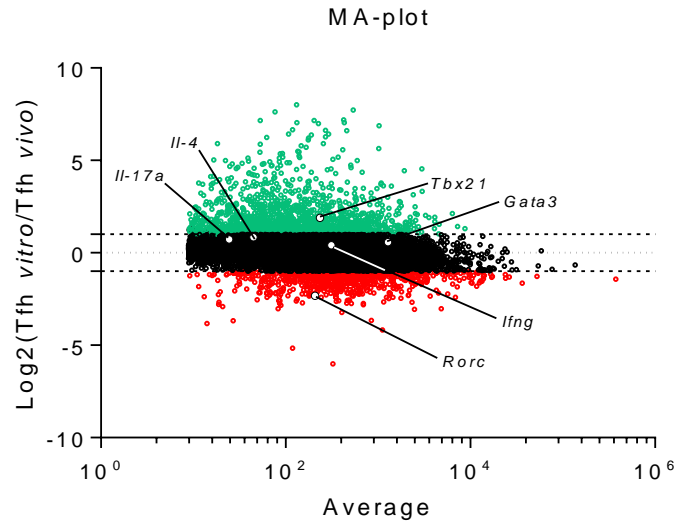
Indicated values deal with the mean \pm SEM and are representative of three independent experiments at least; * $p < 0,05$; ** $p < 0,01$.

A**B****C**

Supplementary Fig 2: *In vivo* CD4 T cell profiles

A. Identification of Tfh in lymph nodes and B16F10 tumors according to CXCR5 and PD1 staining,
B. Expression of Tbet, Gata3, ROR γ t, and Bcl6 in sorted Th1, Th2, Th17, Tregs and Tfh cells from B16F10 tumor bearing mice according to the gating strategy presented in Supplementary Figure 1,
C. IFN γ , IL-4, IL-17 and IL-21 quantification by ELISA in Th1 (white), Th2 (gray), Th17 (black), Tfh from lymph nodes (horizontal lines) and Tfh from B16F10 tumors (vertical lines) according to the gating strategies presented before and restimulated 24h with anti-CD3 and anti-CD28. Indicated values deal with the mean \pm SEM and are representative of three independent experiments; * $p < 0,05$; ** $p < 0,01$; *** $p < 0,001$.

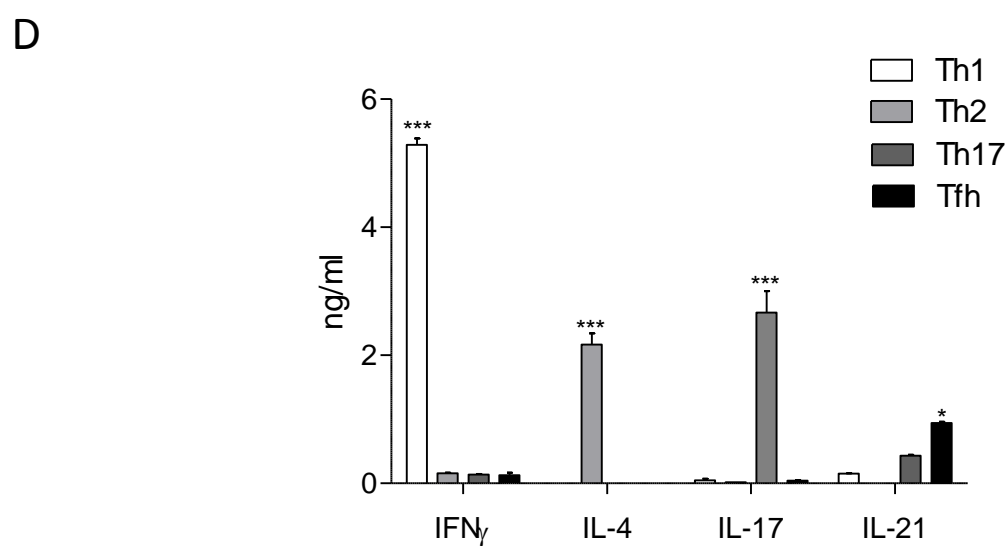
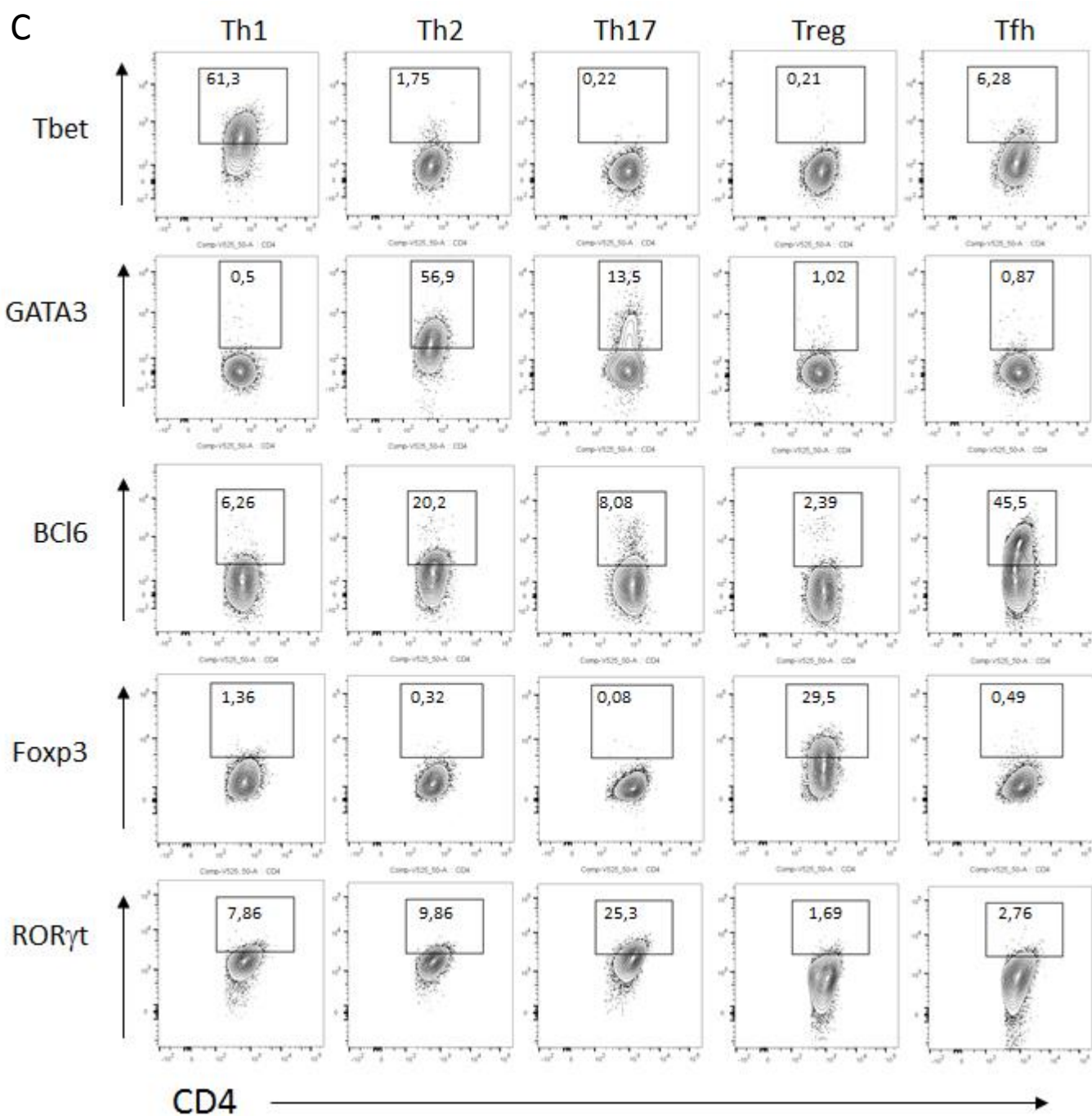
A



B

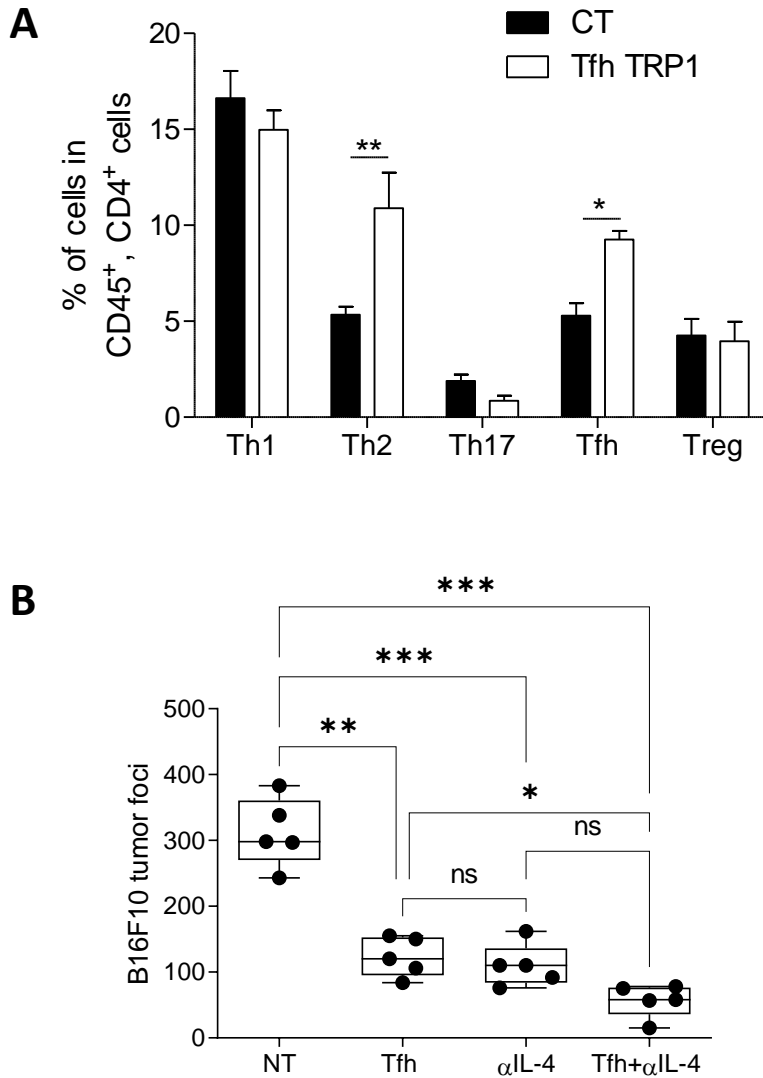
	Term	Overlap	P-value	Adjusted P-value	Genes
*	negative regulation of T-helper cell differentiation (GO:0045623)	3/9	0,000718	0,010090	ANXA1;TBX21;FOXP3
	positive regulation of T-helper 1 type immune response (GO:0002827)	3/13	0,002294	0,023000	ANXA1;SLC11A1;CCR2
	regulation of T-helper 2 cell cytokine production (GO:2000551)	2/9	0,014560	0,081400	RSAD2;TBX21
	regulation of T-helper 1 type immune response (GO:0002825)	2/10	0,017950	0,093930	SLC11A1;CCR2
	regulation of T-helper 2 cell differentiation (GO:0045628)	2/9	0,014560	0,081400	CD86;ANXA1
	positive regulation of T-helper cell differentiation (GO:0045624)	2/12	0,025600	0,118800	CD86;ANXA1
	regulation of T-helper 17 cell lineage commitment (GO:2000328)	1/7	0,139000	0,357500	TBX21
	positive regulation of T-helper 2 cell differentiation (GO:0045630)	1/7	0,139000	0,357500	CD86
ns	regulation of T-helper 1 cell differentiation (GO:0045625)	1/8	0,157217	0,366200	ANXA1
	T-helper 17 cell differentiation (GO:0072539)	1/9	0,175049	0,374200	RORA
	T-helper 1 type immune response (GO:0042088)	1/8	0,157217	0,366200	EBI3
	T-helper cell differentiation (GO:0042093)	1/12	0,226318	0,393400	RORA
	positive regulation of regulatory T cell differentiation (GO:0045591)	1/9	0,01456	0,08140	BCL6;FOXP3
	regulation of regulatory T cell differentiation (GO:0045589)	2/21	0,07196	0,24217	BCL6;FOXP3
	regulation of transcription regulatory region DNA binding (GO:2000677)	1/27	0,43873	0,55272	FAM129B
	positive regulation of transcription regulatory region DNA binding (GO:2000679)	1/20	0,34802	0,48555	FAM129B

	Term	Overlap	P-value	Adjusted P-value	Genes
	positive regulation of T-helper 2 cell differentiation (GO:0045630)	1/7	0,08754	0,34061	TNFSF4
	regulation of T-helper 1 cell differentiation (GO:0045625)	1/8	0,09941	0,34061	TNFSF4
	negative regulation of T-helper cell differentiation (GO:0045623)	1/9	0,11112	0,34306	TNFSF4
ns	T-helper 17 cell differentiation (GO:0072539)	1/9	0,11112	0,34306	RORC
	regulation of T-helper 2 cell differentiation (GO:0045628)	1/9	0,11112	0,34306	TNFSF4
	T-helper cell differentiation (GO:0042093)	1/12	0,14535	0,36843	RORC
	positive regulation of T-helper cell differentiation (GO:0045624)	1/12	0,14535	0,36843	TNFSF4
	regulation of regulatory T cell differentiation (GO:0045589)	1/21	0,24037	0,42910	TNFSF4

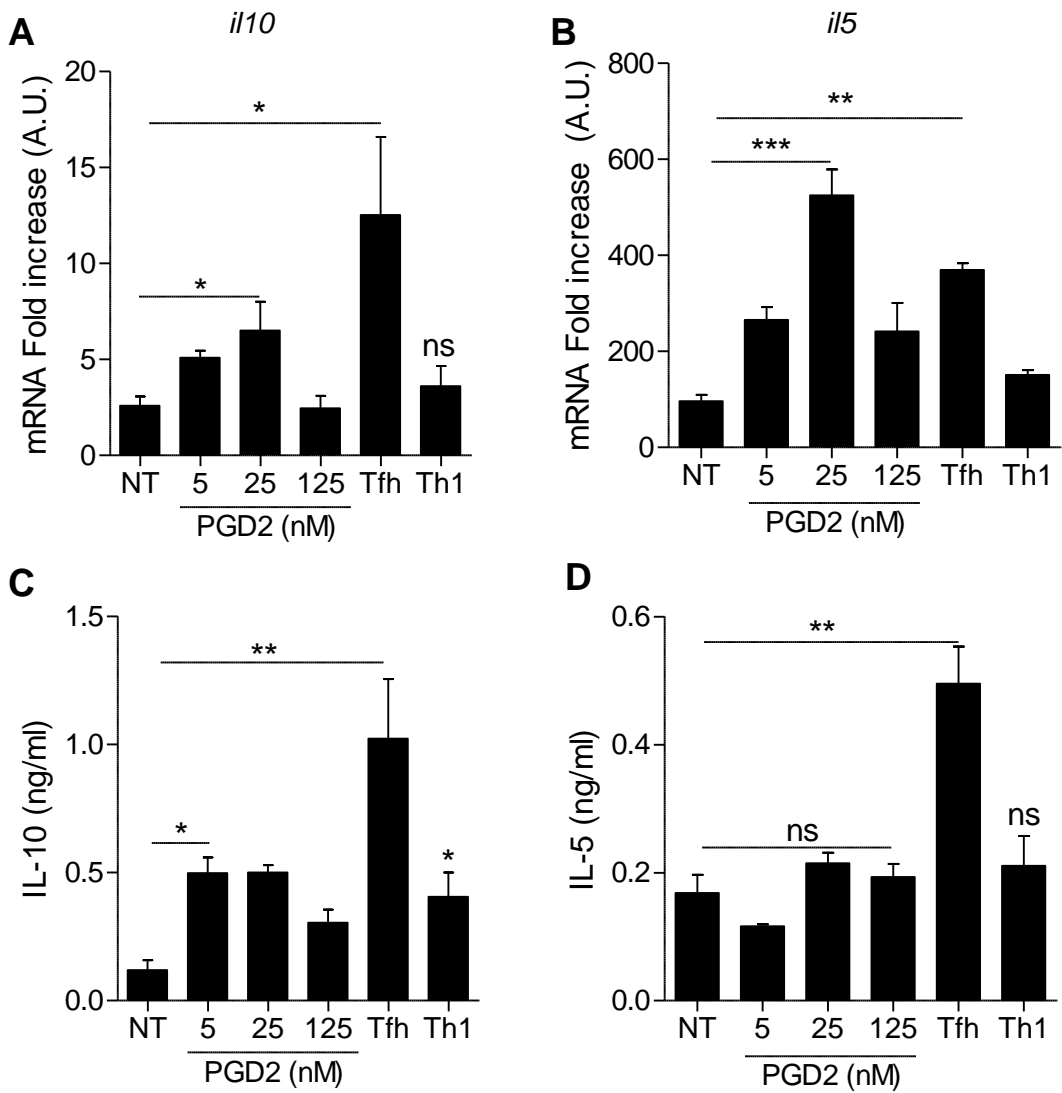


Supplementary Fig 3: In vitro differentiated CD4 T cell profiles

A. MA-plot isplain RNA sequencing data of in vitro and in vivo (TILs) Tfh cells, Green: upregulated, red: downregulated genes of at least 2 folds in *in vitro* Tfh compare to *in vivo* Tfh cells. n=3. **B.** T helper cells biological process related to up (upper part) and down regulated (lower part) genes respectively. **C.** Expression of transcription factors in *in vitro* differentiated cells. **D.** Detection of cytokine production by ELISA in the same cells.

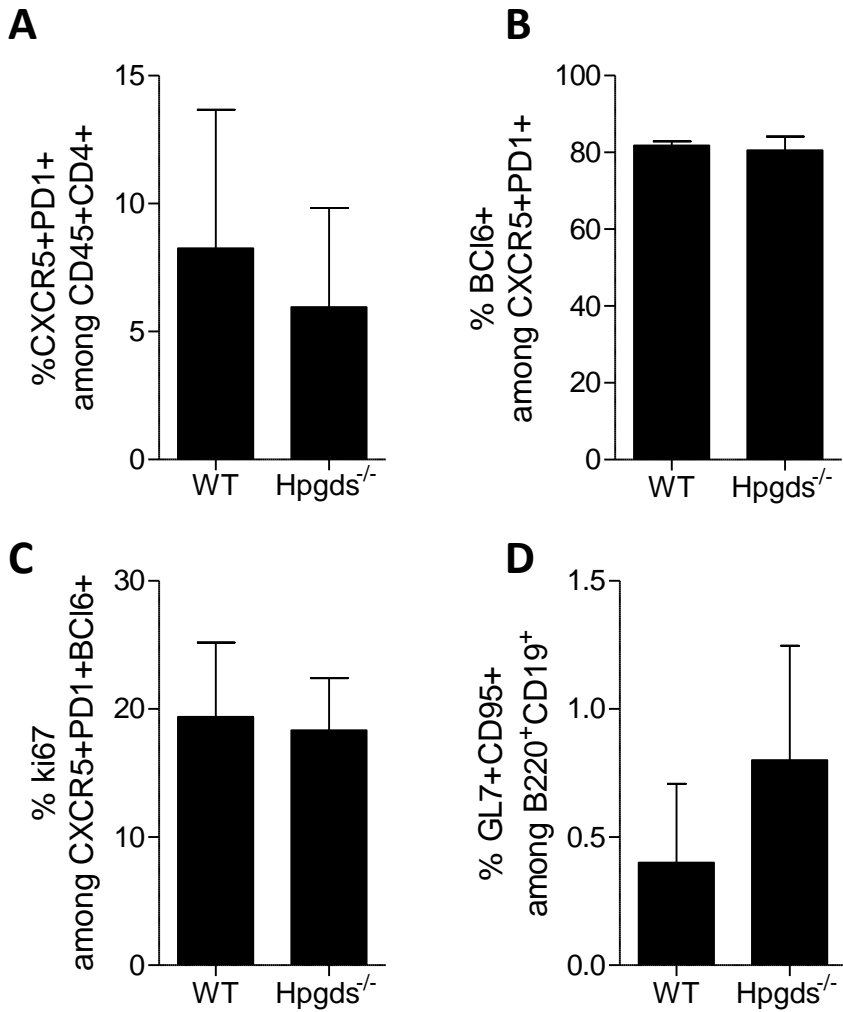


Supplementary Fig 4: A, Proportion of CD4⁺ T cell subsets in lungs of Ctrl and TRP1 Tfh-like injected mice bearing B16-F10 lung tumor foci. **B**, B16-F10 lung tumor foci 13 days after intravenous injection of *in vivo* induced Tfh from TRP-1 mice or IL-4 blocking antibody (α IL-4), or both Tfh+ α IL-4.



Supplementary Fig5: PGD2 produced by Tfh cells activates Th2 cells

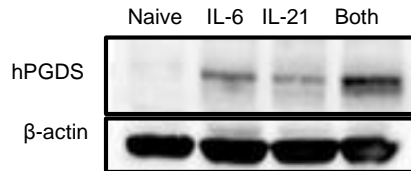
A-B. *il10* and *il5* expression in in vitro Th2 cells in addition, or not (NT), of recombinant PGD2 (5, 25 and 125 nM) or in vitro Tfh or Th1 supernatant –Tfh or Th1). **C-D,** ELISA quantification of IL-10 and IL-5 in the same experiment,



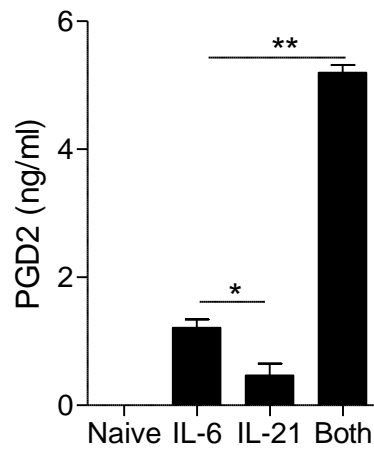
Supplementary Fig6: Hpgds deficient mice show no differences in healthy conditions

In healthy WT and Hpgds^{-/-} mice, Tfh frequency (A), differentiation determined by Bcl6 staining (B), proliferation determined by Ki67 staining (C), and function determined by B cell phenotype (D), of Tfh cells evaluated by cytometry,

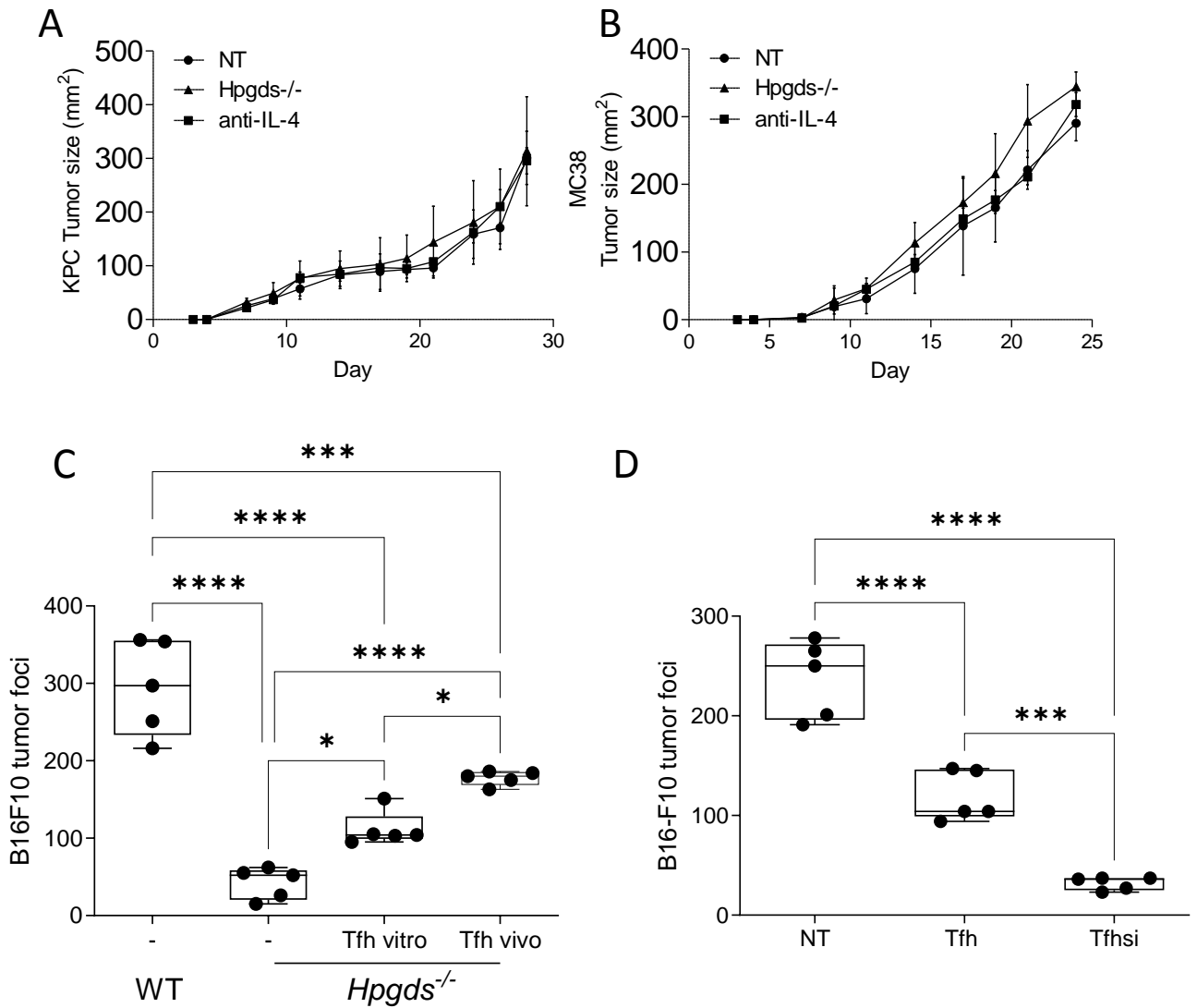
A



B

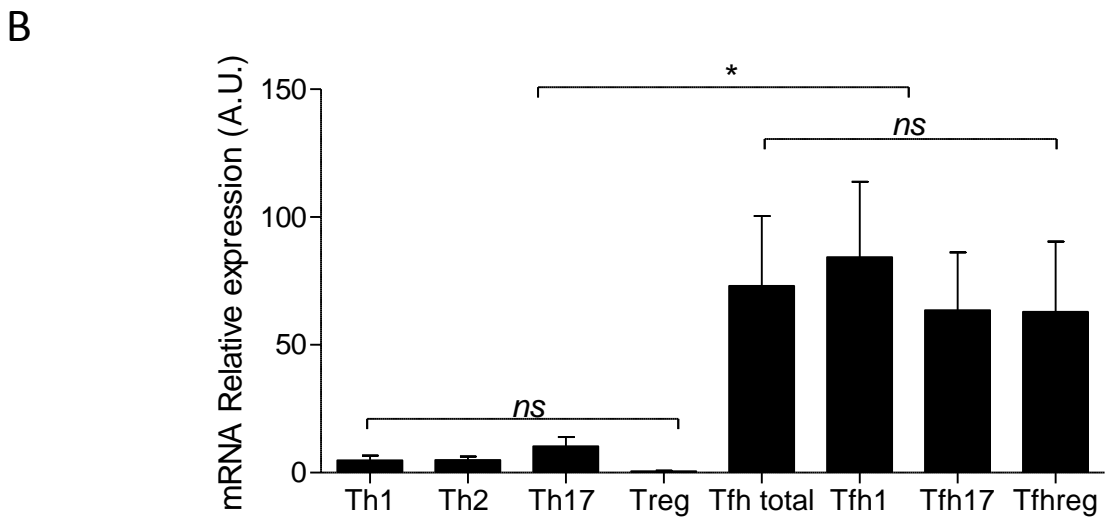
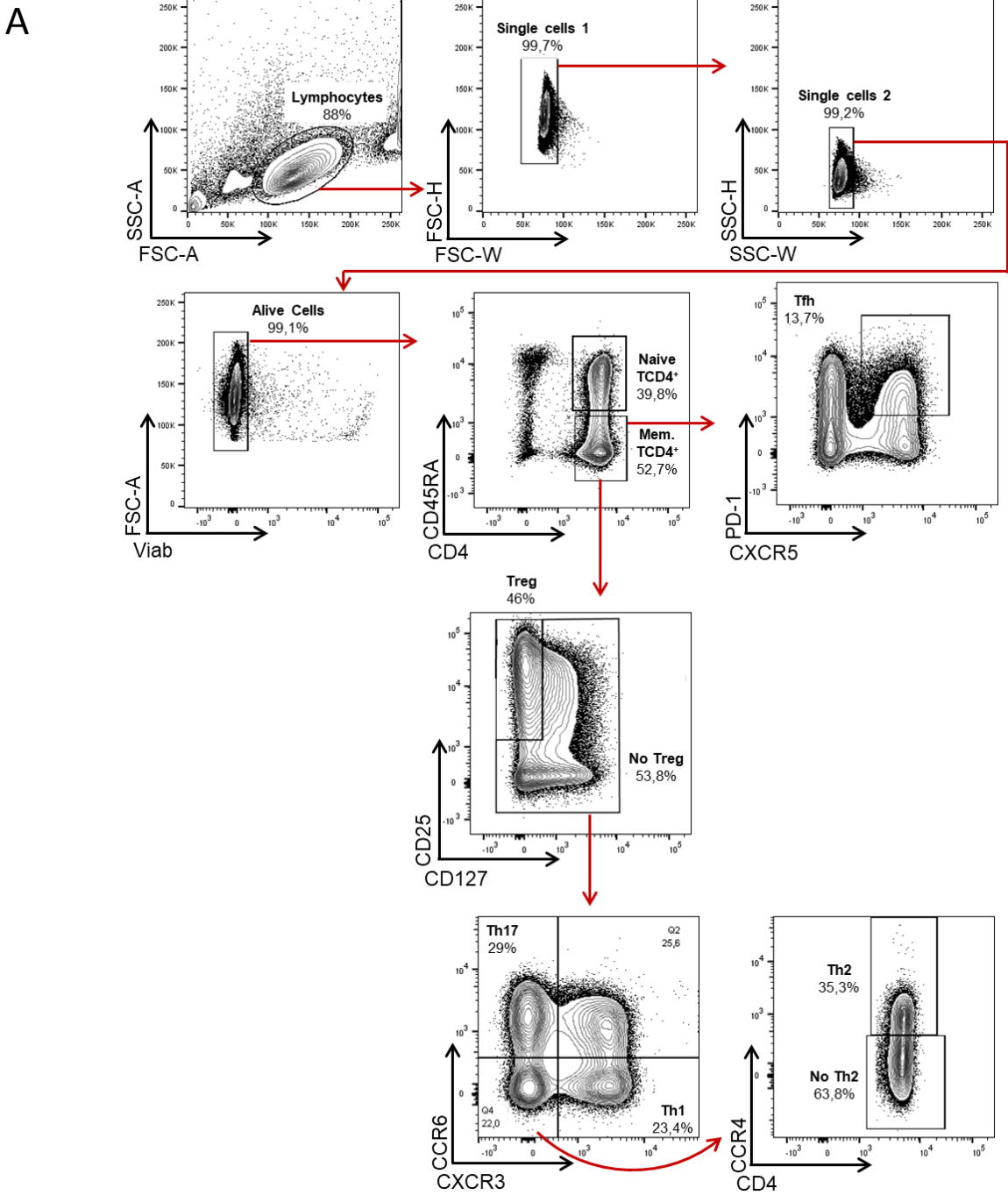


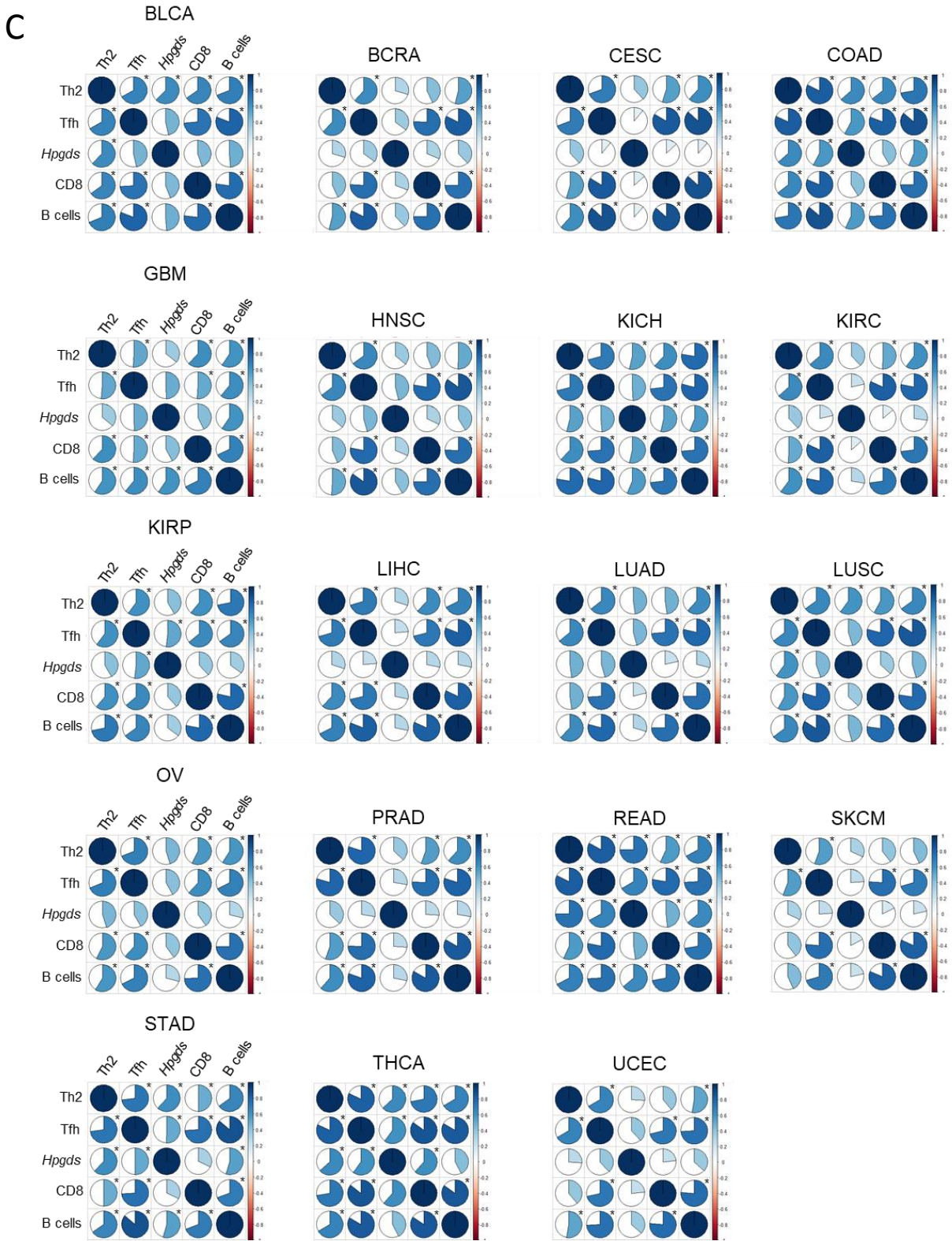
Supplementary figure 7: A. HPGDS protein expression in naive CD4⁺ T cells, activated for 24h by anti-CD3/CD28 stimulation and treated with recombinant IL-6, IL-21 or both (50 ng/ml each) compared to untreated naive CD4⁺ T cells. **B.** PGD2 production quantification by EIA in the same conditions.



Supplementary Fig 8:

Tumor growth of **(A)** KPC pancreatic cancer or **(B)** MC38 colorectal cancer in WT C57Bl6 mice treated or not with anti-IL-4 or in *Hpgds*^{-/-} mice. **C.** Lung tumor foci in WT mice, or in *Hpgds*^{-/-} mice transferred or not (-) with TRP-1 Tfh cells differentiated either *in vitro* or *in vivo*. **D.** Lung tumor foci in WT mice not treated (NT) or transferred with *in vitro* differentiated TRP-1 Tfh cells (Tfh) or *in vitro* differentiated TRP-1 Tfh cells transfected with si*Hpgds* (Tfh_{si}).





Supplementary Fig 9:

A. Flow cytometry gating strategy to identify mouse Th1, Th2, Th17, Treg and Tfh subpopulations through chemokine receptors and Foxp3 transcription factor. **B.** *Hpgds* relative expression in Th1, Th2, Th17, Treg, total TFh, TFh1 (sorted according to CXCR3 staining), TFh17 (CCR6+) and TFh reg (CD25+ and Foxp3+) cells sorted from PBMCs of healthy donors and *in vitro* reactivated overnight with anti-CD3 and anti-CD28 antibodies. **C.** Correlation matrix between Tfh, Th2, CD8, B cells metagenes and *Hpgds* gene in TCGA cohorts