

Supplementary Table 1-1 Immunological properties of primary antibodies and their respective IHC staining conditions

		Primary antibody														Dilution	Incubation time	Temperature	Supplementary information	Positive control	Reactivity
Antibody				Species reactivity																	
Antigen	Clone	Supplier	Catalog No.	Clonality	Host animal	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other								
ACTH	SPM333	Santa Cruz Biotechnology, Inc.	sc-52980	MoAb	Mo	○	○	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Pituitary	○		
	02A3	Agilent Technology	M350101-2	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/500	~60m	RT	-	Pituitary	○		
Actin, β	AC-74	Sigma-Aldrich	A2228	MoAb	Mo	○	○	○	-	○	-	-	-	~×1/500	O/N	4°C	-	Testis	○		
Actin, muscle	HHF35	Agilent Technology	M063501-2	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/100	~30m	RT	-	Muscle	○		
Actin, sarcomeric	Alpha-Sr-1	Agilent Technology	M087401-2	MoAb	Mo	○	-	-	-	-	-	-	-	×1/10	~120m or O/N	RT or 4°C	-	Muscle	○		
				MoAb	Mo	○	-	-	-	-	-	-	-	-	~×1/100	~60m	RT	-	Muscle	○	
Actin, α-smooth muscle	IA4	Agilent Technology	M085129-2	MoAb	Mo	○	-	-	-	-	○	-	-	~×1/50	~30m	4°C	-	Other	○		
				MoAb	Mo	○	○	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Vessel	○	
				MoAb	Mo	○	○	-	-	-	-	-	-	-	-	~×1/50	O/N	4°C	-	Mammary	○
				MoAb	Mo	-	-	-	-	-	○	○	-	-	-	~×1/200	O/N	4°C	-	Vessel	○
				MoAb	Mo	○	-	-	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Eye	○
				MoAb	Mo	○	-	-	-	-	-	-	-	Marmoset	~×1/100	~60m	RT	Diluted with IMMUNOSHOT immunostaining Fine	Intestine	○	
				MoAb	Mo	-	○	-	-	-	-	-	-	-	-	~×1/100	~60m	RT	-	Intestine	○
				MoAb	Mo	○	-	-	-	-	-	-	-	-	-	~×1/500	~120m or O/N	RT or 4°C	-	Muscle	○
				MoAb	Mo	○	-	-	-	-	-	○	-	-	-	~×1/1000	~60m	RT	-	Vessel	○
				MoAb	Mo	○	-	-	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Mammary	○
	MoAb	Mo	-	-	-	-	-	-	○	-	Cow	~×1/1000	~30m	RT	-	Intestine	○				
	MoAb	Mo	-	-	-	-	-	-	○	-	-	-	-	O/N	4°C	-	Lung	○			
	MoAb	Mo	Nichirei Biosciences	412021	MoAb	Mo	○	○	-	-	-	-	-	-	Prediluted	~60m	RT	-	Kidney (Mouse) Large intestine (Rat)	○	
	MoAb	Mo	Abcam plc	ab32575	MoAb	Rb	○	-	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Muscle	○	
MoAb	Mo	Abcam plc	ab32575	MoAb	Rb	○	○	-	-	-	-	-	-	~×1/500	~60m	RT	-	Uterus	○		
MoAb	Mo	Abcam plc	ab124964	MoAb	Rb	-	○	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Muscle	○		
Adipophilin	-	-	GP40	PoAb	GP	○	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Liver	△		
						○	○	-	-	-	-	-	-	~×1/100	~60m	RT	-	Adrenal	○		
						○	○	-	-	-	-	-	-	~×1/1000	~60m	37°C	-	Liver	○		
						-	○	-	-	-	-	-	○	~×1/100	~60m	RT	Diluted with IMMUNOSHOT immunostaining Fine	Other	○		
	AP125	Progen	-	651102	MoAb	Mo	○	-	-	-	-	○	-	-	Prediluted	~60m	RT	-	Liver	○	
					MoAb	Mo	○	-	-	-	-	○	-	-	-	Prediluted	~60m	RT	-	Adrenal	○
					MoAb	Mo	○	-	-	-	-	-	-	Marmoset	~×1/200	~30m	RT	Diluted with IMMUNOSHOT immunostaining Fine	Adrenal	○	
					MoAb	Mo	○	-	-	-	-	-	-	-	-	Prediluted	~60m	RT	-	Liver	○
MoAb	Mo	○	-	-	-	-	-	-	-	-	-	Prediluted	~60m	RT	-	Liver	○				
MoAb	Mo	Acris Antibodies GmbH	BM5051	MoAb	Mo	○	-	-	-	-	-	-	~×1/50	O/N	4°C	-	Mammary	○			
MoAb	Mo	Novus Biologicals	NB110-40877	PoAb	Rb	-	○	-	-	-	-	-	~×1/20000	O/N	4°C	-	Adrenal	○			
Albumin	-	Agilent Technology	A000102-2	PoAb	Rb	○	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Eye	○			
Amylase 2A	-	Proteintech	15845-1-AP	PoAb	Rb	○	-	-	-	-	-	-	~×1/200	~60m	RT	-	Pancreas	○			
β-Amyloid	6E10	Covance	SIG-39300-99	MoAb	Mo	-	○	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Brain	○		
	82E1	Immuno-Biological Laboratories Co., Ltd.	10326	MoAb	Mo	-	○	-	-	-	-	-	-	~×1/200	~60m	RT	-	Brain	○		
Androgen receptor	G122-25	BD Pharmingen Inc.	554224	MoAb	Mo	-	-	○	-	-	-	-	~×1/100	O/N	4°C	-	Gonad	○			
Anti-Human Macrophage Scavenger Receptor A (MSR-A:CD204)	SRA-E5	Trans Genic	KT022	MoAb	Mo	-	-	-	-	○	-	-	-	~×1/500	~60m	RT	-	Spleen	○		
Aquaporin 1	I/22	Abcam plc	ab9566	MoAb	Mo	○	○	-	-	○	-	-	-	~×1/200	O/N	4°C	-	Kidney	○		
	I/ASF6	GeneTen	GTX11023	MoAb	Mo	○	○	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Kidney	○		
	-	Merck	AB2219	PoAb	Rb	○	-	-	-	-	-	-	-	×1/1000	O/N	4°C	-	Kidney	○		

Supplementary Table 1-2 Immunological properties of primary antibodies and their respective IHC staining conditions

Antibody	Primary antibody									
	Fixing solution	Fixing time	Embedding	Antigen retrieval method	Solution	Concentration/pH/reagent	Incubation temperature	Incubation time	Blocking	
				Method					Blocking solution	Blocking time
ACTH	10% For	Unknown	P	Not complied	-	-	-	-	-	-
	10% For	~1w	P	Not complied	-	-	-	-	Block Ace	~1hr
Actin, $\beta$	10% For	Unknown	P	Not complied	-	-	-	-	-	-
Actin, muscle	10% For	~1m	P	Not complied	-	-	-	-	-	-
Actin, sarcomeric	10% For	~1m	P	Not complied	-	-	-	-	-	-
	10% For	~1w	P	MW	Citric acid BF	0.01M	70-100°C	~30m	-	-
	10% For	~1w	P	PC	Citric acid BF	10mM	100°C<	~10m	Block Ace	~1hr
Actin, $\alpha$ -smooth muscle	10% For	Unknown	P	Not complied	-	-	-	-	-	-
	10% For	1y~	P	AU	Citric acid BF	-	100°C<	~5m	4% Block Ace	~1hr
	10% For	~1w	P	PC	Citric acid BF	0.01M	100°C<	~5m	3% H <sub>2</sub> O <sub>2</sub>	~1hr
	10% For	~1m	P	Not complied	-	-	-	-	BSA	~1hr
	10% For	~1w	P	Not complied	-	-	-	-	2% BSA/PBS	~1hr
	10% For	~1w	P	PC	Citric acid BF	10mM	100°C<	~10m	Block Ace	~1hr
	10% For	~1w	P	PC	Citric acid BF	10mM	100°C<	~10m	Reagent in kit	~1hr
	10% For	~1m	P	Not complied	-	-	-	-	-	-
	10% For	~1d	P	Not complied	-	-	-	-	5% Skim milk in PBS	~1hr
	10% For	~1m	P	MW	Citric acid BF	-	100°C<	~30m	-	-
	10% For	~1w	P	MW	Citric acid BF	0.1M	100°C<	~30m	No information	-
	10% For	~1w	P	AU	Tris BF	-	100°C<	~10m	Blocking One	~1hr
	10% For	~1y	P	Not complied	-	-	-	-	0.5% Casein/PBS	~1hr
	10% For	Unknown	P	MW or not complied	Citric acid BF	-	Unknown	~10m	Block Ace	~1hr
10% For	~1w	P	Boil	Distilled water	-	70-100°C	~30m	-	-	
10% For	~1w	P	MW	EDTA	1mM	100°C<	~30m	2.5% Normal serum	~1hr	
Adipophilin	10% For	1y~	P	AU	Citric acid BF	-	100°C<	~5m	4% Block Ace	~1hr
	10% For	~1w	P	MW	Citric acid BF	-	100°C<	~30m	2.5% Normal serum	~1hr
	10% For	~O/N	P	PC	Citric acid BF	-	70-100°C	~10m	Goat Serum	30min
	10% For	~1w	P	PC	Citric acid BF	10mM	100°C<	~10m	Block Ace	~1hr
	10% For	~1d	F	Not complied	-	-	-	-	5% Skim milk in PBS	~1hr
	10% For	~1m	P	Not complied	-	-	-	-	Goat Serum	~1hr
	10% For	~1w	P	PC	-	-	100°C<	~10m	Block Ace	~1hr
	10% For	~1y	P	MW	-	-	100°C<	~5m	10% Goat Serum	~1hr
	10% For	~1y	P	MW	-	-	100°C<	~5m	10% Goat Serum	~1hr
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	No information	-
10% For	~1m	P	AU	Citric acid BF	pH6.0	100°C<	~10m	Goat Serum	~1hr	
Albumin	10% For	~1d	P	Proteinase	Dako RTU	-	RT	~10m	2% BSA/PBS	~1hr
Amylase 2A	10% For	~1d	P	PC	Citric acid BF	-	70-100°C	~10m	Normal serum	30min
$\beta$ -Amyloid	10% For	Unknown	P	Insuccation	Formic acid	70%	RT	~30m	Block Ace	~1hr
	PFA	~1w	P	Insuccation	Formic acid	90%	RT	~5m	-	-
Androgen receptor	10% For	Unknown	P	MW	Citric acid BF	-	70-100°C	~30m	Block Ace	~1hr
Anti-Human Macrophage Scavenger Receptor A (MSR-A:CD204)	10% For	~2d	P	MW	Citric acid BF	pH9.0	-	~30m	-	-
Aquaporin 1	10% For	~O/N	P	Boil	Citric acid BF	10mM pH6.0	70-100°C	~60m	Skim milk	~1hr
	10% For	~1m	P	AU	Citric acid BF	pH6.0	100°C<	~10m	Goat Serum	~1hr
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	Protein block serum	30min

Supplementary Table 1-3 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody	Secondary antibody							Supplementary information	Figure No.	
Antibody	Secondary antibody information		Supplier	Catalog No.	Incubation time	Temperature	Reagent			Incubation time
	Product									
ACTH	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	No information	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	-10m	-	
Actin, $\beta$	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	-	-	-	No information	-	
Actin, muscle	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	~5m	-	
Actin, sarcomeric	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	~5m	-	
	-		Agilent Technology	E0413	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~20m	-	
Actin, $\alpha$ -smooth muscle	-		Nichirei	-	~30m	RT	DAB	No information	-	
	EnVision+/HRP, Mouse		Agilent Technology	-	~30m	37°C	DAB	~3m	-	
	EnVision+ Dual Link, Single Reagents, HRP		Agilent Technology	K4063	~30m	RT	DAB	~1m	1	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	~1m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI) (Histo Stainer)		Nichirei	714191	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~10m	-	
	Histofine mouse Stain Kit		Nichirei	414321	~10m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~60m	RT	DAB	~10m	-	
	EnVision+ Dual Link, Single Reagents, HRP		Agilent Technology	K4063	~30m	RT	DAB	~3m	-	
	Histofine Simple Stain MAX-PO(M)		Nichirei	424131	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m	-	
	Histofine mouse Stain Kit		Nichirei	414321	~10m	RT	DAB	~10m	2	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~3m	-	
Adipophilin	Envision+ / HRP, RUO Rabbit		Agilent Technology	K4003	~30m	RT	DAB	~5m	-	
	VECTOR ImmPRESS HRP REAGENT Anti-Rabbit IgG		Vector Laboratories	MP-7451	~30m	RT	ImmPACT NovaRED	~3m	-	
	Goat Anti-Guinea Pig IgG Antibody (H+L), Biotinylated		Vector Laboratories	BA-7000	~30m	37°C	DAB	~1m	-	
	VECTASTAIN ABC-HRP Kit, Peroxidase (Guinea pig IgG)		Vector Laboratories	PK-4007	~30m	RT	DAB	~3m	-	
	VECTASTAIN ABC-HRP Kit, Peroxidase (Guinea pig IgG)		Vector Laboratories	PK-4007	~30m	RT	DAB	~1m	-	
	Histofine Simple Stain Mouse MAX-PO(R)		Nichirei	414341	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~60m	RT	DAB	~10m	3	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191F	~30m	RT	DAB	~1m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~10m	-	
	Histofine Histofine Simple Stain AP(M)		Nichirei	414241	~30m	RT	NF(New Fuchsin Substrate System)	~5m	-	
	EnVision+/HRP, Mouse		Agilent Technology	-	~30m	RT	DAB	~20s	-	
	VECTASTAIN Elite ABC Kit(mouse)		Vector Laboratories	PK-6102	~30m	RT	DAB	~5m	4	
	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	414131F	~30m	RT	DAB	~1m	-	
Albumin	Histofine Simple Stain Rat MAX-PO(MULTI) (Histo Stainer)		Nichirei	714191	~30m	RT	DAB	~10m	-	
Amylase 2A	VECTASTAIN Elite ABC Kit(rabbit IgG)		Vector Laboratories	PK-6101	~30m	RT	DAB	~30s	-	
$\beta$ -Amyloid	Histofine mouse Stain Kit		Nichirei	414321	~10m	RT	DAB	~10m	-	
	Peroxidase-labeled streptavidin		Nichirei	426062	~5m	RT	DAB	~30s	-	
Androgen receptor	VECTASTAIN Elite ABC Kit(mouse IgG)		Vector Laboratories	PK-6102	~30m	RT	DAB	~10m	-	
Anti-Human Macrophage Scavenger Receptor A (MSR-A:CD204)	EnVision+ Dual Link, Single Reagents, HRP		Agilent Technology	K4063	~60m	RT	DAB	~3m	5	
Aquaporin 1	EnVision+/HRP, Mouse		Agilent Technology	-	~60m	RT	DAB	~5m	6	
	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	414131F	~30m	RT	DAB	~1m	7	
	Envision+ / HRP, RUO Rabbit		Agilent Technology	K4002	~30m	RT	DAB	~5m	8	

Supplementary Table 2-1 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody																				
Antibody						Species reactivity								Dilution	Incubation time	Temperature	Supplementary information	Positive control	Reactivity	
Antigen	Clone	Supplier	Catalog No.	Clonality	Host animal	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other							
Aquaporin 2	-	Prosci	50-225	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Kidney	○	
ATG5	-	Novus Biologicals	NB110-53818	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/500	~60m	RT	-	Kidney	○	
ATP synthase C	SCMAS	Abcam plc	ab181243	MoAb	Rb	-	○	-	-	-	-	-	-	~×1/200	~60m	RT	Diluted with IMMUNOSHOT immunostaining Fine	Brain	○	
Bcl-2	I24	Agilent Technology	M088701-2	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Spleen	○	
BCRP	BXP-53	Enzo Life Sciences	ALX-801-036-C050	MoAb	Rt	○	○	-	-	-	○	-	-	~×1/1000	~60m	4°C	-	Liver	○	
	BXP-21	Cell Science	MON9041	MoAb	Mo	-	-	-	-	-	-	-	Xenograft (Human)	~×1/1000	~60m	RT	-	Other	○	
BrdU	Bu20a	Agilent Technology	M074401-8	MoAb	Mo	○	○	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Thymus	○	
				MoAb	Mo	○	-	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Testis	○
				MoAb	Mo	○	-	-	-	-	-	-	-	-	~×1/100	~60m	RT	-	Liver	○
	IIB5	Abcam plc	ab8955	MoAb	Mo	○	○	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Intestine	○	
N-cadherin	3B9	Thermo Fisher Scientific	33-3900	MoAb	Mo	○	-	-	-	-	○	-	-	~×1/1000	~60m	RT	-	Kidney	○	
				MoAb	Mo	-	○	-	-	-	-	-	-	-	~×1/100	~60m	RT	-	Kidney	○
Calbindin D28K	CB-955	Sigma-Aldrich	C9848	MoAb	Mo	-	○	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Brain	○	
		Abcam plc	ab82812	MoAb	Mo	-	-	○	-	-	-	-	-	~×1/1000	~60m	RT	-	Eye	○	
	D114Q	Cell Signaling Technology	#13176	MoAb	Rb	○	-	-	-	○	-	-	-	~×1/1000	O/N	4°C	-	Kidney	○	
Calponin	CALP	Thermo Scientific	MA5-11620	MoAb	Mo	○	-	-	-	-	○	-	-	~×1/1000	~60m	RT	-	Mammary	○	
	hCP	Sigma-Aldrich	C2687	MoAb	Mo	-	-	-	-	-	○	-	-	~×1/1000	O/N	4°C	-	Mammary	○	
Calretinin	DAK-Calret1	Agilent Technology	M724501-2	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/50	~30m	RT	-	Lung	○	
	6B8.2	Merck	MAB1568	MoAb	Mo	-	-	○	-	-	-	-	-	~×1/500	~60m	RT	-	Eye	○	
Carcinoembryonic Antigen	II -7	Agilent Technology	M707201-2	MoAb	Mo	-	-	-	-	-	○	-	-	~×1/25	O/N	4°C	-	Intestine	○	
Caspase-3	-	Promega	G748	PoAb	Rb	○	○	-	-	-	-	-	-	~×1/200	~60m	RT	-	Spleen	○	
	-	Cell Signaling Technology	9662	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/200	O/N	4°C	-	Other	○	
Cleaved Caspase-3	-	Cell Signaling Technology	9661(S)	PoAb	Rb	○	○	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Intestine	○	
				PoAb	Rb	○	○	-	-	-	○	-	-	-	~×1/200	~60m	RT	-	Thymus	○
				PoAb	Rb	○	-	-	-	-	-	-	-	-	~×1/500	~30m	RT	Diluted with IMMUNOSHOT immunostaining Fine	Thymus	○
				PoAb	Rb	-	○	-	-	-	-	-	-	-	~×1/500	~30m	RT	Diluted with IMMUNOSHOT immunostaining Fine	Thymus	○
Catalase	-	Abcam plc	ab16731	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/200	~60m	RT	-	Liver	○	
	-			PoAb	Rb	-	○	-	-	-	-	-	-	-	~×1/200	~60m	RT	-	Liver	○
β catenin	E247	Abcam plc	ab32572	MoAb	Rb	-	○	-	-	-	-	-	-	~×1/500	~60m	RT	Diluted with IMMUNOSHOT immunostaining Fine	Lung	○	
				MoAb	Rb	-	-	-	-	-	-	-	Marmoset	~×1/500	~60m	RT	Diluted with IMMUNOSHOT immunostaining Fine	Lung	○	
	14	BD Transduction Laboratories	610153	MoAb	Mo	-	○	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Intestine	○	
				MoAb	Mo	-	○	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Intestine	○	
Cathepsin K	-	Abcam plc	ab19027	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Intestine	○	
				PoAb	Rb	-	○	-	-	-	-	-	-	-	~×1/200	~60m	RT	-	Bone	○

Supplementary Table 2-2 Immunological properties of primary antibodies and their respective IHC staining conditions

Antibody	Primary antibody									
	Fixing solution	Fixing time	Embedding	Antigen retrieval method	Solution	Concentration/pH/reagent	Incubation temperature	Incubation time	Blocking	
				Method					Blocking solution	Blocking time
Aquaporin 2	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	Protein block serum	30min
ATG5	PFA	~2d	P	AU	Citric acid BF	-	100°C<	~30m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
ATP synthase C	10% For	~1w	P	Not complied	-	-	-	-	Block Ace	~1hr
Bcl-2	10% For	Unknown	P	MW	Citric acid BF	-	-	~30m	-	-
BCRP	10% For	~1w	P	AU	Distilled water	-	100°C<	~10m	Rabbit serum	~1hr
	10% For	~1w	P	AU	Citric acid BF	0.01M	100°C<	~30m	Rabbit serum	~1hr
BrdU	10% For	~O/N	P	Proteinase	-	0.4mg/mL	RT	~30m	4% Block Ace	~1hr
	10% For	~1m	P	Proteinase	-	0.05mol/L	RT	~10m	-	-
	10% For	~1y	P	PC	Citric acid BF	-	100°C<	~5m	Skim milk	~1hr
	10% For	~O/N	P	PC	Citric acid BF	-	70-100°C	~10m	Normal serum	30min
	10% For	~1d	P	MW	Citric acid BF	-	70-100°C	~30m	Block Ace	~1hr
	10% For	~1w	P	MW	Citric acid BF	0.01M	70-100°C	~30m	-	-
N-cadherin	10% For	~1m	P	AU	Citric acid BF	pH6.0	100°C<	~10m	Goat Serum	~1hr
	10% For	~1m	P	AU	Citric acid BF	pH6.0	100°C<	~10m	Goat Serum	~1hr
Calbindin D28K	4% Zinc For	~2d	P	MW	Citric acid BF	-	100°C<	~30m	-	-
	DA	~1d	P	MW	Citric acid BF	-	100°C<	~30m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
	10% For	~1w	P	Boil	Citric acid BF	-	70-100°C	~30m	No information	-
	10% For	~O/N	P	Boil	Citric acid BF	10mM pH6.0	70-100°C	~60m	Skim milk	~1hr
Calponin	10% For	~1d	P	MW	Citric acid BF	0.01M	70-100°C	~30m	5% Skim milk in PBS	~1hr
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	10% Goat Serum	~1hr
Calretinin	10% For	~1m	P	Boil	Citric acid BF	-	70-100°C	~30m	-	-
	DA	~1d	P	MW	Citric acid BF	-	100°C<	~30m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
Carcinoembryonic Antigen	10% For	~1w	P	AU	Tris BF	-	100°C<	~10m	Blocking One	~1hr
Caspase-3	DA	~O/N	P	MW	Immunosaver	-	100°C<	~5m	2% BSA/PBS	~1hr
	10% For	Unknown	P	MW	Citric acid BF	-	-	-	-	-
Cleaved Caspase-3	10% For	~1w	P	AU	EDTA	1mM	100°C<	~30m	-	-
	10% For	~1w	P	MW	EDTA	1mM	100°C<	~30m	2.5% Normal serum	~1hr
	10% For	~1w	P	PC	-	-	100°C<	~10m	Block Ace	~1hr
	10% For	~1w	P	PC	-	-	100°C<	~5m	Block Ace	~1hr
	10% For	Unknown	P	MW	Citric acid BF	-	-	~30m	-	-
Catalase	10% For	~1w	P	PC	Target Retrieval Solution, pH 9	-	100°C<	~10m	Block Ace	~1hr
	10% For	~1w	P	PC	Citric acid BF	10mM	100°C<	~10m	Block Ace	~1hr
β catenin	10% For	~1w	P	PC	Target Retrieval Solution, pH 9	-	100°C<	~10m	Block Ace	~1hr
	10% For	~10d	P	PC	-	-	100°C<	~10m	Block Ace	~1hr
	10% For	~1w	P	PC	Citric acid BF	0.01M	100°C<	~5m	3% H <sub>2</sub> O <sub>2</sub>	~1hr
	10% For	~1d	P	AU	-	-	100°C<	~30m	-	-
	10% For	~O/N	P	PC	Citric acid BF	-	70-100°C	~10m	Normal serum	30min
Cathepsin K	10% For	~1w	P	Boil	EDTA	1mM	70-100°C	O/N	-	-

Supplementary Table 2-3 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody	Secondary antibody							Supplementary information	Figure No.
Antibody	Secondary antibody information	Supplier	Catalog No.	Incubation time	Temperature	Reagent	Incubation time		
	Product								
Aquaporin 2	Envision+ / HRP, RUO Rabbit	Agilent Technology	K4002	~30m	RT	DAB	~5m	-	9
ATG5	Histofine Simple Stain Rat MAX-PO(R)	Nichirei	414181	~60m	RT	DAB	~30s	-	
ATP synthase C	Histofine Simple Stain Mouse MAX-PO(R)	Nichirei	414341	~30m	RT	DAB	~10m	-	
Bcl-2	-	-	-	-	-	-	No information	-	
BCRP	Unknown	-	-	-	-	DAB	~5m	-	
	Rabbit Anti-Mouse Immunoglobulins/Biotine - Rabbit F(ab)2 (affinity isolated)	Agilent Technology	E0413	~30m	RT	DAB	~5m	-	
BrdU	EnVision+/HRP, Mouse	Agilent Technology	-	~30m	37°C	DAB	~3m	-	10
	Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	~30m	RT	DAB	~5m	-	
	Histofine SAB- PO(M)	Nichirei	424022	~10m	RT	DAB	~20m	-	
	VECTASTAIN Elite ABC Kit(mouse IgG)	Vector Laboratories	PK-6102	~30m	RT	DAB	~1m	-	
	Anti-Mouse IgG F(ab)2-Biotin antibody produced in rabbit	Sigma Aldrich	SAB3701007-2MG	~30m	RT	DAB	~5m	-	
	Rabbit Anti-Mouse Immunoglobulins/Biotine - Rabbit F(ab)2 (affinity isolated)	Agilent Technology	E0413	~30m	RT	DAB	~5m	-	
N-cadherin	Histofine Simple Stain MAX-PO(MULTI)	Nichirei	414131F	~30m	RT	DAB	~1m	-	11
	Histofine mouse Stain Kit	Nichirei	414321F	~30m	RT	DAB	~1m	-	
Calbindin D28K	EnVision+ Dual Link, Single Reagents, HRP	Agilent Technology	K4063	~30m	RT	DAB	~3m	-	
	Envision+ / HRP, RUO Mouse	Agilent Technology	K4001	~30m	RT	DAB	~5m	-	12
	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	37°C	DAB	~10m	-	
	EnVision+/HRP, Mouse	Agilent Technology	-	~60m	RT	DAB	~5m	-	13
Calponin	Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	~60m	RT	DAB	~10m	-	14
	EnVision+/HRP, Mouse	Agilent Technology	-	~30m	RT	DAB	~3m	-	15
Calretinin	Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	~30m	RT	DAB	~5m	-	
	Envision+ / HRP, RUO Mouse	Agilent Technology	K4001	~30m	RT	DAB	~1m	-	16
Carcinoembryonic Antigen	Histofine Simple Stain MAX-PO(MULTI)	Nichirei	424154	~30m	37°C	DAB	~3m	-	
Caspase-3	Histofine Simple Stain Rat MAX-PO(MULTI) (Histo Stainer)	Nichirei	714191	~30m	RT	DAB	~10m	-	
	-	-	-	-	-	-	No information	-	
Cleaved Caspase-3	Histofine Simple Stain Rat MAX-PO(MULTI) (Histo Stainer)	Nichirei	714191	~30m	RT	DAB	~10m	-	
	VECTOR ImmPRESS HRP REAGENT Anti-Rabbit IgG	Vector Laboratories	MP-7451	~30m	RT	DAB	~3m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Mouse MAX-PO(R)	Nichirei	414341	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(R)	Nichirei	414181	-	-	-	No information	-	
Catalase	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Mouse MAX-PO(R)	Nichirei	414341	~30m	RT	DAB	~5m	-	
β catenin	Histofine Simple Stain Mouse MAX-PO(R)	Nichirei	414341	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain MAX-PO(R)	Nichirei	424141	~30m	RT	DAB	~10m	-	
	Envision+ / HRP, RUO Mouse	Agilent Technology	K4000	~30m	RT	DAB	~3m	-	
	EnVision+ Dual Link, Single Reagents, HRP	Agilent Technology	K4063	~30m	RT	DAB	~3m	-	17
	VECTASTAIN Elite ABC Kit(mouse IgG)	Vector Laboratories	PK-6102	~30m	RT	DAB	~3m	-	
Cathepsin K	Histofine Simple Stain Mouse MAX-PO(R)	Nichirei	414341	~30m	RT	DAB	~5m	-	

Supplementary Table 3-1 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody																						
Antibody						Species reactivity								Dilution	Incubation time	Temperature	Supplementary information	Positive control	Reactivity			
Antigen	Clone	Supplier	Catalog No.	Clonality	Host animal	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other									
CD3	F7.2.38	Agilent Technology	M725401-2	MoAb	Mo	-	-	-	-	-	○	-	Cow	~×1/100	~30m	RT	-	Lymph node	○			
				MoAb	Mo	○	-	-	-	-	-	-	-	-	-	~×1/50	~60m	RT	-	Spleen	○	
				MoAb	Mo	○	-	-	-	-	-	-	-	-	-	-	~×1/100	~30m	RT	-	Spleen	○
				MoAb	Mo	○	-	-	-	-	○	-	-	-	-	-	~×1/1000	~60m	RT	-	Lymph node	○
	SP-7	Abcam plc	ab16669	MoAb	Rb	○	-	-	-	-	-	-	-	-	~×1/200	~60m	RT	-	Spleen	○		
				MoAb	Rb	○	○	-	-	-	-	-	-	-	Cat	~×1/100	~60m	RT	-	Lymph node	○	
	-	Abcam plc	ab5690	PoAb	Rb	-	○	-	-	-	-	-	-	-	~×1/100	~30m	RT	-	Lymph node	○		
				PoAb	Rb	-	-	-	-	-	-	○	-	-	-	Prediluted	~60m	37°C	-	Spleen	○	
	-	Agilent Technology	IS50330-2J	PoAb	Rb	-	-	-	-	-	○	-	-	-	Prediluted	~60m	RT	-	Spleen	○		
				PoAb	Rb	○	-	-	-	-	-	-	-	-	-	Prediluted	~30m	RT	-	Lymph node	○	
	-	Sigma-Aldrich	C7930	PoAb	Rb	-	-	-	-	-	○	○	-	-	~×1/1000	O/N	4°C	-	Lymph node	○		
				PoAb	Sh	○	○	-	-	-	-	-	-	-	-	~×1/100	~30m	RT	-	Spleen	○	
	-	Santa Cruz Biotechnology, Inc.	sc-1127	PoAb	Sh	○	○	-	-	-	-	-	-	-	~×1/100	~30m	RT	-	Spleen	○		
				MoAb	Rt	-	○	-	-	-	-	-	-	-	-	~×1/100	~30m	RT	-	Lymph node	○	
-	Agilent Technology	M725429-2	MoAb	Mo	-	-	-	-	-	-	○	-	Cow, Cat	~×1/50	O/N	4°C	-	Lymph node	○			
			MoAb	Rb	○	○	-	-	-	-	-	-	-	-	Prediluted	O/N	4°C	-	Spleen	○		
CD3e	-	Nichirei Biosciences	413591	MoAb	Rb	○	○	-	-	-	-	-	-	Prediluted	O/N	4°C	-	Spleen	○			
CD4	-	Biorbyt	orb4830	PoAb	Rb	○	○	○	-	-	×	-	-	~×1/100	O/N	4°C	-	Lymph node	○			
				PoAb	Mo	○	-	-	-	-	-	-	-	-	~×1/50	O/N	4°C	-	Lymph node	○		
	OT110B5	OriGene	TA500477	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/50	O/N	4°C	-	Lymph node	○			
	1F6	Nichirei Biosciences	413181	MoAb	Mo	-	-	-	-	○	-	-	-	Prediluted	O/N	4°C	-	Lymph node	○			
-	-	Santa Cruz Biotechnology, Inc.	sc-13573	MoAb	Rt	-	○	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Lymph node	○			
CD10	56C6	Thermo Fisher Scientific	MA5-14050	MoAb	Mo	-	-	-	-	-	○	-	-	~×1/500	O/N	4°C	-	Spleen	○			
CD11b	OX42	Bio-Rad Laboratories, Inc.	MCA74G	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/500	~60m	RT	-	Liver	○			
CD20	-	Lab Vision(Thermo Fisher Scientific)	RB-9013	PoAb	Rb	-	-	-	-	-	○	-	Cow	~×1/500	~30m	RT	-	Lymph node	○			
				PoAb	Rb	-	-	-	-	-	○	-	-	-	Cat	~×1/200	~60m	RT	-	Spleen	○	
	-	BIOCARE Medical LLC	ACR 3004 A	PoAb	Rb	-	-	-	-	-	○	-	-	~×1/100	~60m	RT	-	Lymph node	○			
				PoAb	Rb	-	○	-	-	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Lymph node	○	
CD20cy	L26	Agilent Technology	IS60430-2J	MoAb	Mo	-	-	-	-	○	-	-	-	Prediluted	~60m	RT	-	Spleen	○			
CD31	-	Abcam plc	ab28364	PoAb	Rb	-	○	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Heart	○			
				MEC13.3	BD Pharmingen Inc.	550274	MoAb	Rt	-	○	-	-	-	-	-	~×1/200	O/N	4°C	-	Skin	○	
CD34	-	Boster Immunoleader	PA1334	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/200	O/N	4°C	-	Liver	○			
				PoAb	Rb	○	○	-	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Intestine	○	
CD36	-	Novus Biologicals	NB400-144	PoAb	Rb	○	○	-	-	-	-	-	-	~×1/1000-5000	~30m	RT	-	Lung	○			
CD45R	RA3-6B2	BD Pharmingen Inc.	550286	MoAb	Rt	-	○	-	-	-	-	-	-	~×1/50	O/N	4°C	-	Lymph node	○			
				MoAb	Rt	-	○	-	-	-	-	-	-	-	~×1/100	~60m	RT	-	Lymph node	○		
		R&D Systems	MAB1217	MoAb	Rt	-	○	-	-	-	-	-	-	-	~×1/100	~60m	RT	-	Spleen	○		
				MoAb	Rt	-	○	-	-	-	-	-	-	-	~×1/500	~60m	RT	-	Lymph node	○		
CD61	Y2/51	Agilent Technology	M075301-2	MoAb	Mo	-	-	-	-	-	○	-	~×1/50	O/N	4°C	-	Bone marrow	○				

Supplementary Table 3-2 Immunological properties of primary antibodies and their respective IHC staining conditions

Antibody	Primary antibody									
	Fixing solution	Fixing time	Embedding	Antigen retrieval method	Solution	Concentration/pH/reagent	Incubation temperature	Incubation time	Blocking	
				Method					Blocking solution	Blocking time
CD3	10% For	~1w	P	MW	Citric acid BF	0.1M	100°C<	~30m	No information	-
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	-	-
	10% For	~1d	P	MW	Tris-EDTA (10 mM Tris/1 mM EDTA, pH 9.0)	1mM	70-100°C	~30m	5% Skim milk in PBS	~1hr
	10% For	~1w	P	AU	Citric acid BF	0.01M or Agilent S1699	100°C<	~30m	-	-
	10% For	~1w	P	MW	Tris BF	pH6.0	100°C<	~5m	2% BSA/PBS	~1hr
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	Goat Serum	~1hr
	10% For	1y~	P	AU	Citric acid BF	-	100°C<	~5m	4% Block Ace	~1hr
	10% For	~1w	P	MW	Citric acid BF	-	100°C<	~30m	Blocking One	~1hr
	10% For	~6m	P	AU	EDTA	-	100°C<	~5m	0.5% Casein/PBS	~1hr
	10% For	~1w	P	Proteinase	-	-	RT	~5m	Block Ace	~1hr
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	10% Goat Serum	~1hr
	10% For	~6m	P	AU	Tris BF	-	100°C<	~30m	Dako X0909	~1hr
10% For	~1w	P	PC	Citric acid BF	10mM	100°C<	-	Block Ace	~1hr	
10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	-	-	
CD3e	10% For	Unknown	P	MW	Immunosaver	-	Unknown	~30m	Block Ace	~1hr
CD4	10% For	Unknown	P	MW	Dako Target Retrieval Solution, pH 9	-	-	~30m	-	-
	10% For	Unknown	P	MW	HistoVT One	-	-	~30m	-	-
	10% For	~1m	P	Not complied	-	-	-	-	Goat Serum	~1hr
	-	~1d	F	Not complied	-	-	-	-	2% BSA/PBS	~1hr
CD10	10% For	~1w	P	AU	EDTA	-	100°C<	~10m	Blocking One	~1hr
CD11b	10% For	~1d	F	Not complied	-	-	-	5% Skim milk in PBS	~1hr	
CD20	10% For	~1w	P	MW	Citric acid BF	0.1M	100°C<	~30m	No information	-
	10% For	~1w	P	Not complied	-	-	-	-	Goat Serum	~1hr
	10% For	Unknown	P	MW	Citric acid BF	0.01M	70-100°C	~30m	5% Skim milk in PBS	~1hr
	10% For	Unknown	P	Not complied	-	-	-	-	-	-
CD20cy	10% For	~6m	P	AU	EDTA	-	100°C<	~5m	0.5% Casein/PBS	~1hr
CD31	10% For	Unknown	P	MW	Citric acid BF	-	Unknown	~30m	Block Ace	~1hr
	F, Sli, 10% For	~1hr	F	Not complied	-	-	-	-	Swine serum(x500)	~1hr
CD34	10% For	~1m	P	PC	Citric acid BF	-	100°C<	~30m	Casein	O/N
	10% For	~1w	P	AU	Agilent S1699	-	100°C<	~30m	-	-
CD36	10% For	~1m	P	Boil	Citric acid BF	-	70-100°C	~30m	-	-
CD45R	10% For	1y~	P	AU	Citric acid BF	-	100°C<	~5m	4% Block Ace	~1hr
	10% For	~1m	P	Not complied	-	-	-	-	Goat Serum	~1hr
	10% For	~1w	P	MW	Distilled water	-	100°C<	~30m	Rabbit serum	~1hr
	10% For	~1w	P	MW	Citric acid BF	pH6.0	100°C<	~10m	2% BSA/PBS	~1hr
	10% For	Unknown	P	MW	EDTA	-	Unknown	~30m	Block Ace	~1hr
CD61	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~10m	Blocking One	~1hr



Supplementary Table 3-3 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody		Secondary antibody						Supplementary information	Figure No.
Antibody	Secondary antibody information	Supplier	Catalog No.	Incubation time	Temperature	Reagent	Incubation time		
	Product								
CD3	Histofine Simple Stain MAX-PO(M)	Nichirei	424131	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	~30m	RT	DAB	~20s	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	~30s	18	
	Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	~60m	RT	DAB	~10m	-	
	Rabbit Immunoglobulins	Agilent Technology	E0431	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI) (Histo Stainer)	Nichirei	714191	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191F	~30m	RT	DAB	~1m	-	
	EnVision+HRP, Rabbit	Agilent Technology	-	~30m	37°C	DAB	~5m	19	
	Histofine Simple Stain MAX-PO(MULTI)	Nichirei	424154	~30m	37°C	DAB	~3m	20	
	Histofine Simple Stain MAX-PO(R)	Nichirei	424141	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	~10m	-	
	EnVision+HRP, Rabbit	Agilent Technology	-	~30m	RT	DAB	~3m	21	
	Histofine Simple Stain Mouse MAX-PO(G)	Nichirei	414351	~10m	RT	DAB	~5m	22	
Histofine Simple Stain Mouse MAX-PO(Rat)	Nichirei	414311	~30m	RT	DAB	~10m	-		
LSAB Kits, Universal, HRP, Rabbit/Mouse	Agilent Technology	K0675	~10m	RT	DAB	~10s	-		
CD3e	Histofine Simple Stain Rat MAX-PO(R)	Nichirei	414181	~60m	RT	DAB	No information	-	
CD4	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	No information	-	
	Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	-	-	-	No information	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191F	~30m	RT	DAB	~1m	-	
	Histofine Simple Stain Mouse MAX-PO(Rat)	Nichirei	414311	~30m	RT	DAB	~10m	-	
CD10	Histofine Simple Stain MAX-PO(MULTI)	Nichirei	424154	~30m	37°C	DAB	~3m	-	
CD11b	Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	~60m	RT	DAB	~10m	23	
CD20	Histofine Simple Stain MAX-PO(R)	Nichirei	424141	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain MAX-PO(R)	Nichirei	424141	~30m	RT	DAB	~5m	24	
	Histofine Simple Stain Rat MAX-PO(R)	Nichirei	414181	~60m	RT	DAB	~10m	25	
	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	~3m	-	
CD20cy	Histofine Simple Stain MAX-PO(M)	Nichirei	424131	~30m	RT	DAB	~10m	26	
CD31	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	~3m	-	
	Chicken anti-Rat IgG (H+L) Cross-Adsorbed Secondary Antibody, Alexa Fluor 594	Thermo Fisher Scientific	A21471	~30m	37°C	-	No information	27	
CD34	EnVision+ Dual Link, Single Reagents, HRP	Agilent Technology	K4063	~30m	RT	DAB	~3m	28	
	Rabbit Immunoglobulins	Agilent Technology	E0431	~30m	RT	DAB	~5m	-	
CD36	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	~5m	-	
CD45R	Biotinylated Anti-Rat IgG (H+L)	Vector Laboratories	-	~30m	37°C	DAB	~3m	29	
	Histofine Simple Stain MAX-PO(M)	Nichirei	414131F	~30m	RT	DAB	~1m	-	
	Unknown	-	-	-	-	DAB	~5m	-	
	Histofine Simple Stain Mouse MAX-PO(Rat)	Nichirei	414311	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain Mouse MAX-PO(Rat)	Nichirei	414311	~30m	RT	DAB	~10m	-	
CD61	Histofine Simple Stain MAX-PO(MULTI)	Nichirei	424154	~30m	37°C	DAB	~3m	-	

Supplementary Table 4-1 Immunological properties of primary antibodies and their respective IHC staining conditions

		Primary antibody																		
		Antibody			Species reactivity									Dilution	Incubation time	Temperature	Supplementary information	Positive control	Reactivity	
Antigen	Clone	Supplier	Catalog No.	Clonality	Host animal	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other							
CD68	ED1	Bio-Rad Laboratories, Inc.	MCA341R	MoAb	Mo	○	-	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Spleen	○
			MCA341GA	MoAb	Mo	○	-	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Spleen	○
			MCA341R	MoAb	Mo	○	-	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Spleen	○
			MCA341GA	MoAb	Mo	○	-	-	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Nerve	-
		BMA Biomedicals	T-3003	MoAb	Mo	○	-	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Lymph node	○
				MoAb	Mo	○	○	-	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Other	○
				MoAb	Mo	○	-	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Spleen	○
		Merck	MAB1435	MoAb	Mo	○	-	-	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Joint (osteoclast)	○
				MoAb	Mo	○	-	-	-	-	-	-	-	-	~×1/200	~60m	RT	-	Eye	○
		Bio-Rad Laboratories, Inc.	MCA341R	MoAb	Mo	○	-	-	-	-	-	-	-	-	~×1/100	~60m	RT	-	Liver	○
	MCA341GA			MoAb	Mo	○	-	-	-	-	-	-	-	~×1/200	~60m	RT	-	Liver	○	
	Abcam plc	ab31630	MoAb	Mo	○	-	-	-	-	-	-	-	-	~×1/500	~30m	RT	-	Lung	○	
KP1	Agilent Technology	M081401-2	MoAb	Mo	-	-	-	-	○	-	-	-	-	~×1/50	O/N	4°C	-	Lung	○	
		IS61330-2	MoAb	Mo	-	-	-	-	○	-	-	-	-	Prediluted	~60m	RT	-	Spleen	○	
CD79α	HM57	Abcam plc	ab62650	MoAb	Mo	○	-	-	-	-	○	-	-	~×1/4000	O/N	4°C	-	Lymph node	○	
CD117/c-kit	-	Agilent Technology	A450229-2	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/100	~30m	RT	-	Other	○	
				PoAb	Rb	-	-	-	-	-	○	-	-	-	~×1/200	O/N	4°C	-	Intestine	○
				PoAb	Rb	-	-	-	-	-	○	-	-	Cat	~×1/500	O/N	4°C	-	Skin	○
				PoAb	Rb	-	-	-	-	-	○	-	-	-	~×1/500	O/N	4°C	-	Skin	○
				PoAb	Rb	-	-	-	-	-	○	-	-	-	~×1/500	~60m	RT	-	Stomach	○
CD138	281-2	BD Pharmingen Inc.	553712	MoAb	Rt	-	○	-	-	-	-	-	~×1/1000	O/N	4°C	-	Lymph node	○		
CD163	ED2	Bio-Rad Laboratories, Inc.	MCA342R	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/200	~60m	RT	-	Liver	○	
				MoAb	Mo	○	-	-	-	-	-	-	-	~×1/100	~30m	RT	-	Other	○	
				MoAb	Mo	○	-	-	-	-	-	-	-	~×1/50	O/N	4°C	-	Spleen	△	
		BMA Biomedicals	T-3011	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/200	~60m	RT	-	Eye	○	
Cdc2	-	Santa Cruz Biotechnology, Inc.	sc-54	PoAb	Mo	○	○	-	-	-	-	-	~×1/1000	O/N	4°C	-	Other	○		
e-erb-2	-	Agilent Technology	A048529-2	PoAb	Rb	-	-	-	-	○	-	-	~×1/500	O/N	4°C	-	Skin	○		
				PoAb	Rb	-	-	-	-	○	-	-	-	~×1/200	~60m	RT	-	Lung	○	
Chitinase 3-like 1 (CHI3L1)	-	Abcam plc	ab77528	PoAb	Rb	-	○	-	-	-	-	-	~×1/500	~60m	RT	-	Liver	○		
				PoAb	Rb	-	-	-	-	○	-	-	-	~×1/200	~60m	RT	-	Adrenal	○	
Chromogranin A	-	Nichirei Biosciences	412751	PoAb	Rb	-	-	-	-	○	-	-	~×1/100	O/N	4°C	-	Pancreas	○		
				PoAb	Rb	○	-	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Intestine	○	
Chx10	-	Exalpa biologicals	X1180P	PoAb	Sh	○	-	-	-	-	-	-	~×1/50	~60m	37°C	-	Eye	○		
Claudin 11	-	Novus Biologicals	NBP1-82470	PoAb	Rb	○	○	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Testis	○	
				PoAb	Rb	○	○	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Testis	○
Clusterin	-	R&D Systems	AF2937	PoAb	Gt	○	-	-	-	-	-	-	-	~×1/50	~60m	RT	-	Kidney	○	
				PoAb	Gt	○	-	-	-	-	-	-	-	-	~×1/50	O/N	4°C	-	Kidney	○
Collagen type I	-	Abcam plc	ab34710	PoAb	Rb	○	-	-	-	-	-	-	~×1/200	~60m	RT	-	Skin	○		
				PoAb	Rb	-	-	-	-	-	-	-	○	~×1/500	O/N	4°C	-	Skin	○	
Collagen type II	II-4C11	KYOWA PHARMA CHEMICAL	F-57	MoAb	Mo	○	-	-	-	-	-	-	~×1/100	~60m	RT	-	Joint	○		
				MoAb	Mo	-	-	-	-	-	-	○	~×1/100	~60m	RT	-	Joint	○		
Collagen type III	FH-7A	Abcam plc	ab6310	MoAb	Mo	○	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Skin	○		
Collagen type IV	-	Bio-Rad Laboratories, Inc.	2150-1470	PoAb	Rb	○	○	-	-	-	-	-	~×1/500	O/N	4°C	-	Liver (Fibrosis)	○		

Supplementary Table 4-2 Immunological properties of primary antibodies and their respective IHC staining conditions

Antibody	Primary antibody									
	Fixing solution	Fixing time	Embedding	Antigen retrieval method	Solution	Concentration/pH/reagent	Incubation temperature	Incubation time	Blocking	
				Method					Blocking solution	Blocking time
CD68	10% For	~1w	P	AU	Citric acid BF	0.01M	100°C<	~30m	-	-
	10% For	~4hr	P	Proteinase	-	20µg/ml	-	-	Swine serum(x500)	~1hr
	10% For	Unknown	P	MW	Citric acid BF	-	Unknown	~30m	Block Ace	~1hr
	10% For	~O/N	P	Trypsin	-	-	37°C	~10m	Normal serum	30min
	10% For	Unknown	P	MW	Citric acid BF	-	-	~10m	-	-
	10% For	Unknown	P	MW	Citric acid BF	-	Unknown	~30m	Block Ace	~1hr
	10% For	~1m	P	Not complied	-	-	-	-	BSA	~1hr
	10% For	~O/N	P	Trypsin	-	-	37°C	~10m	Normal serum	30min
	10% For	~1w	P	MW	Citric acid BF	pH6.0	100°C<	~10m	2% BSA/PBS	~1hr
	10% For	~1m	P	Proteinase	-	-	RT	~10m	Goat Serum	~1hr
	PLP	~O/N	P	Proteinase	-	100µg/ml	RT	~10m	5% Skim milk in PBS	~1hr
10% For	~1m	P	Boil	Citric acid BF	-	70-100°C	~30m	-	-	
10% For	~O/N	P	Boil	Citric acid BF	10mM pH6.0	70-100°C	~60m	Skim milk	~1hr	
10% For	~6m	P	AU	EDTA	-	100°C<	~5m	0.5% Casein/PBS	~1hr	
CD79α	10% For	~1m	P	AU	Citric acid BF	pH6.0	100°C<	~30m	Goat Serum	~1hr
CD117/c-kit	10% For	~O/N	P	PC	Citric acid BF	-	70-100°C	~10m	Normal serum	30min
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	10% Goat Serum	~1hr
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	-	-
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~10m	Blocking One	~1hr
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
CD138	10% For	1y~	P	AU	Citric acid BF	-	100°C<	~5m	4% Block Ace	~1hr
CD163	PLP	~O/N	P	Proteinase	-	100µg/ml	RT	~10m	5% Skim milk in PBS	~1hr
	Zamboni	~1w	P	Proteinase	-	-	RT	~10m	Goat Serum	~1hr
	10% For	~4hr	P	Proteinase	-	20µg/ml	-	-	Swine serum(x500)	~1hr
	10% For	~1w	P	Proteinase	-	Ready to use	RT	~10m	2% BSA/PBS	~1hr
Cdc2	10% For	Unknown	P	MW	Citric acid BF	-	-	~30m	-	-
e-erb-2	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~10m	Blocking One	~1hr
	10% For	~1w	P	AU	EDTA	-	100°C<	~10m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
Chitinase 3-like 1 (CHI3L1)	10% For	~1w	P	PC	EDTA	-	100°C<	~10m	Goat Serum	~1hr
Chromogranin A	10% For	~1d	P	MW	Citric acid BF	0.01M	70-100°C	~30m	5% Skim milk in PBS	~1hr
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~10m	Blocking One	~1hr
	10% For	~1m	P	AU	Citric acid BF	pH6.0	100°C<	~30m	Goat Serum	~1hr
Chx10	PFA	~1d	P	AU	Citric acid BF	-	100°C<	~30m	3% H <sub>2</sub> O <sub>2</sub> /Goat serum/Protein Block	~1hr
Claudin 11	10% For	Unknown	P	MW	Citric acid BF	-	-	~30m	-	-
	10% For	Unknown	P	MW	Citric acid BF	-	-	~30m	-	-
Clusterin	PFA	~2d	P	AU	Citric acid BF	-	100°C<	~10m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
	10% For	Unknown	P	Not complied	-	-	-	-	Block Ace	~1hr
Collagen type I	10% For	~1w	P	MW	Immunosaver	-	70-100°C	~30m	-	-
	10% For	~1m	P	Not complied	-	-	-	-	BSA	~1hr
Collagen type II	PFA	~1m	P	Hyaluronidase	-	2%	RT	~30m	-	-
	PFA	~1m	P	Hyaluronidase	-	2%	RT	~30m	Goat Serum	~1hr
Collagen type III	10% For	~1w	P	MW	Distilled water	-	70-100°C	~30m	-	-
Collagen type IV	10% For	~1w	P	AU	Citric acid BF	0.01M	100°C<	~30m	-	-

Supplementary Table 4-3 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody	Secondary antibody							Supplementary information	Figure No.	
Antibody	Secondary antibody information		Supplier	Catalog No.	Incubation time	Temperature	Reagent			Incubation time
	Product									
CD68	Rabbit Anti-Mouse Immunoglobulins/Biotine - Rabbit F(ab)2 (affinity isolated)		Agilent Technology	E0413	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	37°C	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	~10m	-	
	VECTASTAIN Elite ABC Kit(mouse IgG)		Vector Laboratories	PK-6102	~30m	RT	DAB	~3m	-	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	~3m	-	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	~30s	AC: 4min (mouse)	
	Polyclonal Rabbit Anti-Mouse Immunoglobulins and Streptavidin/HRP		Agilent Technology	E0464/P0397	~30m	RT	DAB	~1m	-	
	VECTASTAIN Elite ABC Kit(mouse IgG)		Vector Laboratories	PK-6102	~30m	RT	DAB	~3m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI) (Histo Stainer)		Nichirei	714191	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	414131F	~30m	RT	DAB	~1m	-	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~60m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	~5m	-	
	EnVision+/HRP, Mouse		Agilent Technology	-	~60m	RT	DAB	~5m	-	
Histofine Simple Stain MAX-PO(M)		Nichirei	424131	~30m	RT	DAB	~10m	-		
CD79α	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191F	~30m	RT	DAB	~1m	-	
CD117/c-kit	VECTASTAIN Elite ABC Kit(rabbit IgG)		Vector Laboratories	PK-6101	~30m	RT	DAB	~3m	-	
	EnVision+/HRP, Rabbit		Agilent Technology	-	~30m	RT	DAB	~3m	-	
	LSAB Kits, Universal, HRP, Rabbit/Mouse		Agilent Technology	K0675	~10m	RT	DAB	~10s	-	
	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m	-	
	Envision+ / HRP, RUO Rabbit		Agilent Technology	K4003	~30m	RT	DAB	~1m	-	
CD138	Biotinylated Anti-Rat IgG (H+L)		Vector Laboratories	-	~30m	37°C	DAB	~3m	-	
CD163	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~60m	RT	DAB	~10m	-	
	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	414131F	~30m	RT	DAB	~1m	-	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	37°C	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI) (Histo Stainer)		Nichirei	714191	~30m	RT	DAB	~10m	-	
Cdc2	-		-	-	-	-	No information	-		
e-erb-2	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m	-	
	Envision+ / HRP, RUO Rabbit		Agilent Technology	K4003	~30m	RT	DAB	~5m	-	
Chitinase 3-like 1 (CHI3L1)	Histofine Simple Stain Mouse MAX-PO(R)		Nichirei	414341	~30m	RT	DAB	~5m	-	
Chromogranin A	Histofine Simple Stain Rat MAX-PO(R)		Nichirei	414181	~60m	RT	DAB	~10m	-	
	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191F	~30m	RT	DAB	~1m	-	
Chx10	Anti sheep IgG Rabbit/HRP		Agilent Technology	P0163	~30m	RT	DAB	~20s	-	
Claudin 11	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	No information	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	No information	-	
Clusterin	Histofine Simple Stain Rat MAX-PO(G)		Nichirei	414331	~60m	RT	DAB	~30s	-	
	Histofine Simple Stain Rat MAX-PO(G)		Nichirei	414331	~30m	RT	DAB	~3m	-	
Collagen type I	Envision+ / HRP, RUO Rabbit		Agilent Technology	K4003	~30m	RT	DAB	~5m	-	
	Polyclonal Goat Anti-Rabbit Immunoglobulins and Streptavidin/HRP		Agilent Technology	E0432/P0397	~30m	RT	DAB	~5m	-	
Collagen type II	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~30s	Decalcified with 10% EDTA2Na	
	EnVision+System / HRP, Mouse(DAB+), RUO		Agilent Technology	K4006	~30m	RT	DAB	~1m	Decalcified with K-CX	
Collagen type III	Rabbit Anti-Mouse Immunoglobulins/Biotine - Rabbit F(ab)2 (affinity isolated)		Agilent Technology	E0413	~30m	RT	DAB	~5m	-	
Collagen type IV	Rabbit Immunoglobulins		Agilent Technology	E0431	~30m	RT	DAB	~5m	-	

Supplementary Table 5-1 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody																					
Antibody				Species reactivity										Dilution	Incubation time	Temperature	Supplementary information	Positive control	Reactivity		
Antigen	Clone	Supplier	Catalog No.	Clonality	Host animal	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other								
Cox-2	33	BD Transduction Laboratories	610203	MoAb	Mo	-	○	-	-	-	-	-	-	~×1/50	O/N	4°C	-	Kidney	○		
	-	Immuno-Biological Laboratories Co., Ltd.	18955	MoAb	Mo	-	○	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Kidney	○		
	-	Immuno-Biological Laboratories Co., Ltd.	18955	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/50	O/N	4°C	-	Kidney	○		
	33	BD Transduction Laboratories	610204	MoAb	Mo	○	-	○	-	-	○	-	-	~×1/200	~30m	RT	-	Kidney	○		
-	Cayman Chemical	160106	PoAb	Mo	○	-	-	-	-	-	-	-	~×1/1000	~30m	RT	-	Kidney	○			
CXCR3	-	Bioss Inc	bs-2209R	PoAb	Rb	○	○	-	○	-	-	-	-	~×1/100	O/N	4°C	-	Lymph node	×		
Cyclin D1	DCS6	Cell Signaling Technology	2926	MoAb	Mo	○	○	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Intestine	○		
Cystatin C	-	Abcam plc	ab109508	MoAb	Rb	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Kidney	○		
Cytokeratin or Keratin/cytokeratin	AE1/AE3	Agilent Technology	IR05361-2J	MoAb	Mo	○	○	-	-	-	-	-	-	Prediluted	O/N	4°C	-	Skin	○		
				MoAb	Mo	○	-	○	-	-	○	-	-	-	Prediluted	~60m	RT	~×1/5	Skin	○	
				MoAb	Mo	○	-	-	-	-	-	-	-	Marmoset	-	Prediluted	~30m	RT	-	Skin	○
				MoAb	Mo	-	-	-	-	-	-	○	-	-	-	Prediluted	O/N	4°C	-	Skin	○
				MoAb	Mo	○	-	-	-	-	-	-	-	-	-	Prediluted	~30m	RT	-	Kidney	○
		Nichirei Biosciences	412811	MoAb	Mo	-	-	-	-	-	○	-	-	-	-	Prediluted	~60m	RT	-	Lung	○
				MoAb	Mo	-	-	-	-	-	-	○	○	-	-	Prediluted	~60m	37°C	-	Lung	○
				MoAb	Mo	○	-	-	-	-	-	○	-	Zebrafish	-	Prediluted	O/N	4°C	-	Skin	○
				MoAb	Mo	-	○	-	-	-	-	-	-	-	-	Prediluted	O/N	4°C	-	Skin	○
				MoAb	Rb	○	○	-	-	-	-	○	-	-	-	Prediluted	~60m	RT	-	Skin	○
MoAb	Mo	○	-	-	-	-	-	-	-	-	-	Prediluted	O/N	4°C	-	Uterus	○				
Cytokeratin	-	Nichirei Biosciences	422061	PoAb	Rb	○	-	-	-	-	-	-	-	Prediluted	O/N	4°C	-	Skin	○		
Cytokeratin 6	-	Abcam plc	ab 24646	PoAb	Rb	-	○	-	-	-	-	-	-	~×1/500	~60m	RT	-	Skin	○		
Cytokeratin 7	OV-TL 12/30	Agilent Technology	M701801-2	MoAb	Mo	-	○	-	-	-	○	-	Cat	~×1/25	~60m	RT	-	Intestine	○		
				MoAb	Mo	○	-	-	-	-	○	-	-	Cat	~×1/25	~60m	RT	-	Intestine	○	
Cytokeratin 8	Ks8.7	Progen	61038	MoAb	Mo	-	○	-	-	-	-	-	-	~×1/20	~60m	RT	-	Liver	○		
Cytokeratin 8/18	-	Progen	GP11	PoAb	GP	-	○	-	-	-	-	-	-	~×1/100	~30m	RT	-	Other	○		
				PoAb	GP	○	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Other	○	
Cytokeratin 10	DE-K10	Abcam plc	ab 9026	MoAb	Mo	○	○	-	-	-	-	-	-	~×1/500	~60m	RT	-	Skin	○		
Cytokeratin 14	-	GeneTex	GTX104124	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Skin	○		
Cytokeratin 18	Ks18.04	Progen	61028	MoAb	Mo	-	○	-	-	-	-	-	-	~×1/100	~60m	RT	-	Other	○		
	C-04	Abcam plc	ab 668	MoAb	Mo	○	-	-	-	-	-	-	Cat	~×1/100	~60m	RT	-	Eye	○		
		Santa Cruz Biotechnology, Inc.	SC-51582	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/100	~120m	RT	-	Mammary	○		
Cytokeratin 19	b170	Leica Biosystems	NCL-CK19	MoAb	Mo	○	-	-	-	○	-	○	~×1/200	~60m	RT	-	Brain	○			
				MoAb	Mo	-	○	-	-	-	-	-	-	-	~×1/150	~60m	RT	-	-	○	
	-	Agilent Technology	M088801-2	MoAb	Mo	-	-	-	-	-	○	-	-	~×1/50	O/N	4°C	-	Skin	○		
	-	Abcam plc	ab15463	PoAb	Rb	○	○	-	-	-	○	-	Cat	~×1/100	~60m	RT	-	Liver	○		
				PoAb	Rb	○	-	-	-	-	-	-	-	-	~×1/50	O/N	RT	-	Forestomach stain	○	
BA17	R&D Systems	MAB3506	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/500	~60m	RT	-	Liver	○			
Desmin	D33	Agilent Technology	IR60661-2J	MoAb	Mo	○	-	-	-	○	-	-	-	Prediluted	~60m	RT	~×1/3	Muscle	○		
				MoAb	Mo	○	-	-	-	-	-	-	-	-	Prediluted	~60m	RT	-	Kidney	○	
				MoAb	Mo	-	-	-	-	-	○	-	○	-	-	Prediluted	O/N	4°C	-	Muscle	○
				MoAb	Mo	○	-	-	-	-	-	-	-	-	-	Prediluted	~60m	RT	-	Kidney	○
				MoAb	Mo	○	-	-	-	-	-	-	-	Marmoset	-	Prediluted	~60m	RT	-	Muscle	○
		Nichirei Biosciences	413651	MoAb	Mo	○	-	-	-	-	-	○	-	-	Prediluted	~60m	37°C	-	Muscle	○	
Dityrosine (DT)	1C3	Japan Institute for the Control of Aging, NIKKEN SEIL Co. Ltd	MDT-020P	MoAb	Mo	○	○	-	-	-	○	-	-	~×1/200	O/N	4°C	-	Other	○		
Dog IgG	-	Bethyl Laboratories, Inc.	A40-123P	PoAb	Gt	-	-	-	-	-	○	-	-	~×1/200	O/N	4°C	-	Lymph node	○		

Supplementary Table 5-2 Immunological properties of primary antibodies and their respective IHC staining conditions

Antibody	Primary antibody									
	Fixing solution	Fixing time	Embedding	Antigen retrieval method	Solution	Concentration/pH/reagent	Incubation temperature	Incubation time	Blocking	
				Method					Blocking solution	Blocking time
Cox-2	10% For	~1w	P	PC	Citric acid BF	0.01M	100°C<	~5m	3% H <sub>2</sub> O <sub>2</sub>	~1hr
	10% For	~1w	P	PC	Citric acid BF	0.01M	100°C<	~5m	3% H <sub>2</sub> O <sub>2</sub>	~1hr
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~10m	-	-
	10% For	Unknown	P	Not complied	-	-	-	-	-	-
CXCR3	10% For	Unknown	P	MW	Dako Target Retrieval Solution, pH 9	-	-	~30m	-	-
Cyclin D1	10% For	1y~	P	AU	Citric acid BF	-	100°C<	~5m	4% Block Ace	~1hr
Cystatin C	10% For	Unknown	P	MW	Citric acid BF	-	Unknown	~10m	Block Ace	~1hr
Cytokeratin or Keratin/cytokeratin	10% For	1y~	P	AU	Citric acid BF	-	100°C<	~5m	4% Block Ace	~1hr
	10% For	~1d	P	MW	Citric acid BF	0.01M	70-100°C	~30m	5% Skim milk in PBS	~1hr
	10% For	~1w	P	PC	-	-	100°C<	~10m	Block Ace	~1hr
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	10% Goat Serum	~1hr
	10% For	~O/N	P	PC	Citric acid BF	-	70-100°C	~10m	Normal serum	30min
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~10m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
	10% For	~1w	P	MW	Citric acid BF	-	100°C<	~30m	Blocking One	~1hr
	10% For	~1m	P	AU	Citric acid BF	pH6.0	100°C<	~30m	Goat Serum	~1hr
	10% For	Unknown	P	AU	Citric acid BF	pH6.0	100°C<	~30m	Goat Serum	~1hr
	10% For	Unknown	P	MW	Citric acid BF	-	-	~30m	-	-
Cytokeratin	10% For	~1w	P	Trypsin	-	0.10%	37°C	~10m	10% Goat Serum	~1hr
Cytokeratin 6	10% For	~1w	P	MW	Immunosaver	-	100°C<	~5m	2% BSA/PBS	~1hr
Cytokeratin 7	10% For	~1w	P	Proteinase	-	0.04	RT	~10m	Goat Serum	~1hr
	10% For	~1w	P	Proteinase	-	0.04	RT	~10m	Goat Serum	~1hr
Cytokeratin 8	10% For	~1m	P	AU	Citric acid BF	pH6.0	100°C<	~10m	Goat Serum	~1hr
Cytokeratin 8/18	10% For	~1m	P	AU	Citric acid BF	pH6.0	100°C<	~10m	Block Ace	~1hr
	10% For	Unknown	P	MW	Citric acid BF	-	-	~30m	-	-
Cytokeratin 10	10% For	~1w	P	MW	Immunosaver	-	100°C<	~5m	2% BSA/PBS	~1hr
Cytokeratin 14	10% For	~1w	P	Trypsin	-	0.10%	37°C	~10m	10% Goat Serum	~1hr
Cytokeratin 18	10% For	~1m	P	AU	Citric acid BF	pH6.0	100°C<	~10m	Goat Serum	~1hr
	10% For	~1w	P	MW	Citric acid BF	pH6.0	100°C<	~10m	2% BSA/PBS	~1hr
	10% For	~6m	P	AU	Tris BF	-	100°C<	~30m	Dako X0909	~1hr
Cytokeratin 19	10% For	~1d	P	Trypsin	-	0.10%	37°C	~30m	5% Skim milk in PBS	~1hr
	10% For	~1m	P	Trypsin	-	-	37°C	~30m	Goat Serum	~1hr
	10% For	~1w	P	AU	Tris BF	-	100°C<	~10m	Blocking One	~1hr
	10% For	~1w	P	PC	Citric acid BF	-	100°C<	~10m	Goat Serum	~1hr
	10% For	~1d	P	Boil	Citric acid BF	-	70-100°C	~30m	No information	-
Desmin	10% For	~1w	P	Boil	Citric acid BF	-	70-100°C	~30m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
	10% For	~1d	P	Not complied	-	-	-	-	5% Skim milk in PBS	~1hr
	PFA	~1d	P	AU	Citric acid BF	-	100°C<	~30m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	10% Goat Serum	~1hr
	10% For	~1d	P	AU	Citric acid BF	-	100°C<	~30m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
	10% For	~1w	P	PC	Citric acid BF	10mM	100°C<	~10m	Block Ace	~1hr
Dityrosine (DT)	10% For	~1y	P	MW	Citric acid BF	0.01mol/L	70-100°C	~10m	0.5% Casein/PBS	~1hr
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~10m	Blocking One	~1hr
Dog IgG	10% For	~1w	P	AU	Tris BF	-	100°C<	~10m	Blocking One	~1hr

Supplementary Table 5-3 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody	Secondary antibody							Supplementary information	Figure No.	
Antibody	Secondary antibody information		Supplier	Catalog No.	Incubation time	Temperature	Reagent			Incubation time
	Product									
Cox-2	EnVision+ Dual Link, Single Reagents, HRP		Agilent Technology	K4063	~30m	RT	DAB	~5m	-	
	LSAB Kits, Universal, HRP, Rabbit/Mouse		Agilent Technology	K0675	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~1m	38	
	-		-	-	-	-	-	No information	-	
CXCR3	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~5m	-	
Cyclin D1	EnVision+/HRP, Mouse		Agilent Technology	-	~30m	37°C	DAB	~3m	-	
Cystatin C	Histofine Simple Stain Rat MAX-PO(R)		Nichirei	414181	~30m	RT	DAB	~30s	-	
Cytokeratin or Keratin/cytokeratin	EnVision+/HRP, Mouse		Agilent Technology	-	~30m	37°C	DAB	~3m	-	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~60m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~10m	-	
	EnVision+/HRP, Mouse		Agilent Technology	-	~30m	RT	DAB	~3m	39	
	VECTASTAIN Elite ABC Kit(mouse IgG)		Vector Laboratories	PK-6102	~30m	RT	DAB	~1m	-	
	Envision+ / HRP, RUO Mouse		Agilent Technology	K4001	~30m	RT	DAB	~3m	-	
	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191F	~30m	RT	DAB	~1m	40	
	Histofine mouse Stain Kit		Nichirei	414321F	~30m	RT	DAB	No information	-	
	Histofine Simple Stain Rat MAX-PO(R)		Nichirei	414181	~30m	RT	DAB	~5m	-	
Cytokeratin	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~10m	-	
Cytokeratin	Histofine SAB- PO(R)		Nichirei	424031	~10m	RT	DAB	~1m	41	
Cytokeratin 6	Histofine Simple Stain Mouse MAX-PO(G) (Histo Stainer)		Nichirei	714341	~30m	RT	DAB	~10m	-	
Cytokeratin 7	Histofine Simple Stain MAX-PO(M)		Nichirei	424131	~30m	RT	DAB	~5m	42	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	~5m	-	
Cytokeratin 8	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191F	~30m	RT	DAB	~1m	-	
Cytokeratin 8/18	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191F	~30m	RT	DAB	~1m	-	
	-		Agilent Technology	-	~30m	RT	DAB	~5m	-	
Cytokeratin 10	Histofine mouse Stain Kit (Histo Stainer)		Nichirei	714321	~30m	RT	DAB	~10m	-	
Cytokeratin 14	Histofine SAB- PO(R)		Nichirei	424031	~10m	RT	DAB	~1m	43	
Cytokeratin 18	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	414131F	~30m	RT	DAB	~1m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI) (Histo Stainer)		Nichirei	714191	~30m	RT	DAB	~10m	-	
	EnVision+ Dual Link, Single Reagents, HRP		Agilent Technology	K4063	~10m	RT	DAB	~3m	44	
Cytokeratin 19	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~60m	RT	DAB	~10m	45	
	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	414131F	~30m	RT	DAB	~1m	-	
	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m	46	
	Histofine Simple Stain Rat MAX-PO(R)		Nichirei	414181	~30m	RT	DAB	~5m	47	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~10m	-	
Desmin	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	~1m	-	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~60m	RT	DAB	~10m	-	
	EnVision+/HRP, Mouse		Agilent Technology	-	~30m	RT	DAB	~3m	48	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~20m	-	
Dityrosine (DT)	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	-	-	-	No information	-	
Dog IgG	Histofine Simple Stain MAX-PO(G)		Nichirei	414162	~30m	37°C	DAB	~3m	-	

Supplementary Table 6-1 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody																				
Antibody						Species reactivity								Dilution	Incubation time	Temperature	Supplementary information	Positive control	Reactivity	
Antigen	Clone	Supplier	Catalog No.	Clonality	Host animal	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other							
Dog IgM	-	Bethyl Laboratories, Inc.	A40116A	PoAb	Gt	-	-	-	-	-	○	-	-	~×1/200	O/N	4°C	-	Lymph node	○	
E.coli	-	USBiological	314192	PoAb	Rb	-	○	-	-	-	-	-	-	~×1/500	~60m	RT	-	Other	○	
E-cadherin	36/E-Cadherin	BD Transduction Laboratories	610181	MoAb	Mo	○	-	-	-	-	○	-	-	~×1/500	~60m	RT	-	Skin	○	
	-	Santa Cruz Biotechnology, Inc.	sc-7870	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/50	~60m	37°C	-	Eye	○	
Estrogen receptor α (ERα)	-	Santa Cruz Biotechnology, Inc.	SC-543	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/200	~30m	RT	-	Mammary	○	
	6F11	Thermo Fisher	MA5-13304	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Pituitary	○	
Endothelin-1 (ET-1)	-	Immuno-Biological Laboratories Co., Ltd.	18201	PoAb	Rb	-	-	-	-	-	○	-	-	~×1/25	O/N	4°C	-	Vessel	○	
Endothelin-A (ET-A)	A-405	Immuno-Biological Laboratories Co., Ltd.	16201	PoAb	Rb	-	-	-	-	-	○	-	-	~×1/25	O/N	4°C	-	Vessel	○	
Endothelin-B (ET-B)	8Z11	Immuno-Biological Laboratories Co., Ltd.	10253	MoAb	Mo	-	-	-	-	-	○	-	-	~×1/50	O/N	4°C	-	Vessel	○	
F4/80	Cl:A3-1	Abcam plc	ab6640	MoAb	Rt	-	○	-	-	-	-	-	-	~×1/500	~60m	RT	-	Spleen	○	
	BM8	eBioscience(Thermo Fisher Scientific)	14-4801-82	MoAb	Rt	○	○	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Spleen	○	
Fas	-	Abnova	PAB8028	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Testis	○	
Fascin	EP5902	Abcam plc	ab126772	MoAb	Rb	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Spleen	○	
Fibrinogen	-	Agilent Technology	A008002-2	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/200	O/N	4°C	-	Other	○	
FosB	-	Santa Cruz Biotechnology, Inc.	sc-7203	PoAb	Rb	-	-	-	-	○	-	-	-	~×1/100	O/N	4°C	-	Brain	○	
Foxp3	FJK-16s	eBioscience(Thermo Fisher Scientific)	14-5773	MoAb	Rt	○	○	-	-	-	○	-	-	~×1/100	O/N	4°C	-	Lymph node	○	
FSH	-	Bio-Rad Laboratories, Inc.	4561-6959	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Pituitary	○	
Galectin-1	-	R&D Systems	AF1245	PoAb	Gt	-	○	-	-	-	-	-	-	~×1/50	O/N	4°C	-	Spinal cord	○	
Glial Fibrillary Acidic Protein (GFAP)	-	Agilent Technology	IR52461-2J	PoAb	Rb	○	-	-	-	-	○	-	-	Prediluted	~60m	RT	~×1/5	Brain	○	
	-		IS52430-2J	PoAb	Rb	-	-	-	-	-	○	-	-	-	Prediluted	O/N	4°C	-	Brain	○
	-		IR52461-2J/IS52430-2J	PoAb	Rb	○	-	-	-	-	-	-	-	Marmoset	Prediluted	~30m	RT	-	Brain	○
	-		IS52430-2J	PoAb	Rb	-	○	-	-	-	-	-	-	-	Prediluted	~30m	RT	-	Brain	○
	6F2	Nichirei Biosciences	M076101-2	MoAb	Mo	○	-	-	-	○	-	-	-	~×1/100	~60m	RT	-	Eye	○	
	GA5		422261	MoAb	Mo	○	-	-	-	-	-	-	-	-	Prediluted	O/N	4°C	-	Spinal cord	○
	GA5		Cell Signaling Technology	3670	MoAb	Mo	○	-	-	-	-	○	-	-	~×1/1000	~60m	RT	-	Brain	○
Growth Hormone	222540	R&D Systems	MAB1566	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Pituitary	○	
	-			PoAb	Gt	○	-	-	-	-	-	-	-	-	~×1/100	~60m	RT	-	Kidney	○
α2u-globulin	-	R&D Systems	AF 586	PoAb	Gt	○	-	-	-	-	-	-	-	~×1/500	~60m	37°C	-	Kidney	○	
	-			PoAb	Gt	○	-	-	-	-	-	-	-	-	~×1/200-300	~120m or O/N	RT or 4°C	-	Kidney	○
	-			PoAb	Gt	○	-	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Other	○
	-			PoAb	Gt	○	-	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Kidney	○
	-			MoAb	Mo	○	-	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Kidney	○
α2u-globulin (Biotinylated)	129736	R&D Systems	BAM586	MoAb	Mo	○	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Kidney	○		
Glucagon	K79bB10	Abcam plc	ab10988	MoAb	Mo	○	-	-	-	-	-	-	~×1/4000	O/N	4°C	-	Pancreas	○		
Glucose transporter 1 (GLUT1)	-	Abcam plc	ab14683	PoAb	Rb	○	-	-	-	-	-	-	~×1/200	O/N	4°C	-	Placenta	○		
Glutamine Synthetase	GS-6	Merck	MAB302	MoAb	Mo	○	-	-	-	-	-	-	~×1/200	O/N	4°C	-	Eye	○		
Glutathione S-transferase Placental type	-	MBL International	311	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Liver	○	
	-			PoAb	Rb	○	-	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Liver	○
	-			PoAb	Rb	○	-	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Liver	○
	-			PoAb	Rb	-	○	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Liver	○
	-			PoAb	Rb	○	-	-	-	-	-	-	-	-	~×1/200	~30m	RT	-	Liver	○
	-			PoAb	Rb	○	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Liver	○
	-			PoAb	Rb	○	-	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Liver	○
	-			PoAb	Rb	○	-	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Liver	○
	-			PoAb	Rb	○	-	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Other	○
Hemoglobin	-	MP Biomedicals	55447	PoAb	Rb	-	○	-	-	-	-	-	~×1/1000	O/N	4°C	-	Other	○		



Supplementary Table 6-2 Immunological properties of primary antibodies and their respective IHC staining conditions

Antibody	Primary antibody										
	Fixing solution	Fixing time	Embedding	Antigen retrieval method		Solution	Concentration/pH/reagent	Incubation temperature	Incubation time	Blocking	
				Method						Blocking solution	Blocking time
Dog IgM	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~10m	Blocking One	~1hr
E.coli	10% For	~1w	P	MW		Citric acid BF	-	100°C<	~30m	2.5% Normal serum	~1hr
E-cadherin	10% For	~1d	P	MW		EDTA	1mM	70-100°C	~30m	5% Skim milk in PBS	~1hr
	PFA	~1d	P	AU		Citric acid BF	-	100°C<	~30m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
Estrogen receptor α (ERα)	10% For	~6m	P	AU		Tris BF	-	100°C<	~30m	Dako X0909	~1hr
	10% For	Unknown	P	MW		Citric acid BF	-	-	~30m	-	-
Endothelin-1 (ET-1)	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~10m	Blocking One	~1hr
Endothelin-A (ET-A)	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~10m	Blocking One	~1hr
Endothelin-B (ET-B)	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~10m	Blocking One	~1hr
F4/80	10% For	~1w	P	Boil		Agilent S1699	-	70-100°C	~30m	-	-
	10% For	Unknown	P	Proteinase		-	-	RT	~10m	Block Ace	~1hr
Fas	DA	Unknown	P	Not complied		-	-	-	-	-	-
Fascin	10% For	~1w	P	PC		Citric acid BF	-	100°C<	~10m	Goat Serum	~1hr
Fibrinogen	10% For	Unknown	P	Proteinase		-	-	RT	~5m	Block Ace	~1hr
FosB	PFA	~2d	F	Not complied		-	-	-	-	Block Ace	~1hr
Foxp3	10% For	Unknown	P	MW		HistoVT One	-	-	~30m	-	-
FSH	10% For	~1w	P	Trypsin		Not complied	-	37°C	~30m	No information	-
Galactin-1	PFA	~O/N	F	Not complied		-	-	-	-	No information	-
Glial Fibrillary Acidic Protein (GFAP)	10% For	~1d	P	Proteinase		-	100µg/ml	RT	~10m	5% Skim milk in PBS	~1hr
	10% For	~1w	P	AU		Tris BF	-	100°C<	~10m	Blocking One	~1hr
	10% For	~1w	P	Not complied		-	-	-	-	Block Ace	~1hr
	10% For	~1w	P	Not complied		-	-	-	-	Block Ace	~1hr
	10% For	~1w	P	MW		Citric acid BF	pH6.0	100°C<	~10m	2% BSA/PBS	~1hr
	10% For	~4hr	P	Not complied		-	-	-	-	Swine serum(x500)	~1hr
	10% For	~1d	P	MW		Citric acid BF	0.01M	70-100°C	~30m	5% Skim milk in PBS	~1hr
Growth Hormone	10% For	~1w	P	Trypsin		Not complied	-	37°C	~30m	No information	-
	10% For	~1w	P	Not complied		-	-	-	-	2% BSA/PBS	~1hr
α2u-globulin	10% For	~1w	P	Proteinase / Boil		- / Citric acid BF	-	37°C / 70-100°C	~30m / ~30m	No information	-
	10% For	~1m	P	MW		Citric acid BF	-	70-100°C	~30m	-	-
	10% For	~1m	P	AU		-	-	100°C<	~10m	Block Ace	~1hr
	10% For	1y~	P	MW		Citric acid BF	-	70-100°C	~10m	4% Block Ace	~1hr
α2u-globulin (Biotinylated)	10% For	~1w	P	Trypsin		Not complied	-	37°C	~30m	Protein block serum	~1hr
Glucagon	10% For	~1m	P	AU		Citric acid BF	pH6.0	100°C<	~30m	Goat Serum	~1hr
Glucose transporter 1 (GLUT1)	10% For	~O/N	P	PC		Citric acid BF	-	70-100°C	~10m	VECTASTAIN Elite ABC Kit(rabbit)	30min
Glutamine Synthetase	DA	Unknown	P	Proteinase		-	-	RT	~10m	Block Ace	~1hr
Glutathione S-transferase Placental type	10% For	~1w	P	Not complied		-	-	-	-	Dako X0909	~1hr
	10% For	~1w	P	Not complied		-	-	-	-	Dako X0909	~1hr
	10% For	1y~	P	AU		Citric acid BF	-	100°C<	~5m	4% Block Ace	~1hr
	10% For	~1w	P	Not complied		-	-	-	-	Swine serum(x500)	~1hr
	10% For	~1y	P	Not complied		-	-	-	-	-	-
	10% For	Unknown	P	Not complied		-	-	-	-	-	-
	10% For	~1d	P	Not complied		-	-	-	-	No information	-
10% For	Unknown	P	Not complied		-	-	-	-	Block Ace	~1hr	
Hemoglobin	10% For	~1m	P	AU		Citric acid BF	pH6.0	100°C<	~30m	Goat Serum	~1hr

Supplementary Table 6-3 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody	Secondary antibody							Supplementary information	Figure No.	
Antibody	Secondary antibody information		Supplier	Catalog No.	Incubation time	Temperature	Reagent			Incubation time
	Product									
Dog IgM	Histofine Simple Stain MAX-PO(G)		Nichirei	414162	~30m	37°C	DAB	~3m	-	
E.coli	Universal elite ABC kit, Positive tissue: E.coli infected tissue		Vector Laboratories	PK-7200	~30m	RT	DAB	~3m	-	
E-cadherin	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~60m	RT	DAB	~10m	49	
	Envision+ / HRP, RUO Mouse		Agilent Technology	K4001	~30m	RT	DAB	~20m	-	
Estrogen receptor $\alpha$ (ER $\alpha$ )	Histofine Simple Stain Rat MAX-PO(R)		Nichirei	414181	~10m	RT	DAB	~1m	50	
	-		-	-	-	-	-	No information	-	
Endothelin-1 (ET-1)	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m	51	
Endothelin-A (ET-A)	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m	52	
Endothelin-B (ET-B)	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m	53	
F4/80	Histofine Simple Stain MAX-PO(Rat) (Histo Stainer)		Nichirei	714311	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain Mouse MAX-PO(Rat)		Nichirei	414311	~30m	RT	DAB	~10m	-	
Fas	Histofine Simple Stain Rat MAX-PO(R)		Nichirei	414181	-	-	-	No information	-	
Fascin	Histofine Simple Stain Rat MAX-PO(R)		Nichirei	414181	~30m	RT	DAB	~5m	54	
Fibrinogen	Histofine Simple Stain Rat MAX-PO(R)		Nichirei	414181	~30m	RT	DAB	No information	-	
FosB	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424152	~30m	RT	DAB	~20m	55	
Foxp3	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	-	-	-	No information	-	
FSH	Envision+ / HRP, RUO Rabbit		Agilent Technology	K4002	~30m	RT	DAB	~5m	56	
Galectin-1	Alexa Fluor 488		Thermo Fisher Scientific	A-11055	~30m	RT	FITC	No information	-	
Glial Fibrillary Acidic Protein (GFAP)	Histofine Simple Stain Rat MAX-PO(R)		Nichirei	414181	~60m	RT	DAB	~10m	57	
	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Mouse MAX-PO(R)		Nichirei	414341	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI) (Histo Stainer)		Nichirei	714191	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	37°C	DAB	~10m	58	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~60m	RT	DAB	~10m	59	
	Fluorophore labeled immunoglobulin		Thermo Fisher Scientific	A-11017	~30m	RT	DAPI (H-1200, VECTOR) (VECTASHIELD Mounting Medium)	Unknown	-	
Growth Hormone	Envision+ / HRP, RUO Mouse		Agilent Technology	K4001	~30m	RT	DAB	~5m	60	
$\alpha$ 2u-globulin	Histofine Simple Stain Rat MAX-PO(G)		Nichirei	414331	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(G)		Nichirei	414331	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(G) (Histo Stainer)		Nichirei	714331	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(G)		Nichirei	414331F	~30m	RT	DAB	~1m	-	
	Biotinylated Anti-Goat Immunoglobulins		-	-	~30m	37°C	DAB	~3m	61	
$\alpha$ 2u-globulin (Biotinylated)	Envision+ / HRP, RUO Mouse		Agilent Technology	K4001	~30m	RT	DAB	~3m	62	
Glucagon	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191F	~30m	RT	DAB	~1m	63	
Glucose transporter 1 (GLUT1)	VECTASTAIN Elite ABC Kit(rabbit IgG)		Vector Laboratories	PK-6101	~30m	RT	DAB	~1m	-	
Glutamine Synthetase	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~3m	-	
Glutathione S-transferase Placental type	EnVision+ Dual Link, Single Reagents, HRP		Agilent Technology	K4063	~10m	RT	DAB	~3m	-	
	LSAB2 Kits, Universal, HRP, Rabbit/Mouse. For use on rat tissue		Agilent Technology	K0609	~10m	RT	NF(New Fuchsin Substrate System)	~10m	-	
	EnVision+/HRP, Rabbit		Agilent Technology	-	~30m	37°C	DAB	~3m	-	
	Rabbit Immunoglobulins		Agilent Technology	E0431	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~5m	64	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~3m	-	
	LSAB2 Kits, Universal, HRP, Rabbit/Mouse. For use on rat tissue		Agilent Technology	K0609	~30m	RT	DAB	~1m	65	
Hemoglobin	Histofine Simple Stain Rat MAX-PO(R)		Nichirei	414181	~30m	RT	DAB	No information	-	
	Histofine Simple Stain MAX-PO(R)		Nichirei	414141F	~30m	RT	DAB	~1m	-	

Supplementary Table 7-1 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody																						
Antibody					Species reactivity									Dilution	Incubation time	Temperature	Supplementary information	Positive control	Reactivity			
Antigen	Clone	Supplier	Catalog No.	Clonality	Host animal	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other									
Hepatocyte	OCH1E5	Agilent Technology	M715801-2	MoAb	Mo	-	-	-	-	-	○	-	-	~×1/25	O/N	4°C	-	Liver	○			
					MoAb	Mo	-	-	-	-	-	-	○	-	-	-	Prediluted	O/N	4°C	-	Liver	○
Hexanoyl lysine (HEL)	5F12	Japan Institute for the Control of Aging, NIKKEN SEIL Co, Ltd	MHL-021P	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Other	○			
HLA-DR(MHC class II)/TAL.1B5	TAL.1B5	Agilent Technology	M074601-2	MoAb	Mo	-	-	-	-	-	○	-	-	~×1/500	O/N	4°C	-	Lymph node	○			
Heat Shock Protein 60 (HSP60)	D6F1	Cell Signaling Technology	12165	MoAb	Rb	○	○	-	-	-	○	-	-	~×1/500	O/N	4°C	-	Other	○			
Heat Shock Protein 70 (HSP70)	-	Santa Cruz Biotechnology, Inc.	sc-1060	PoAb	Gt	-	○	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Brain	○			
T-bet/TBX21	-	LifeSpan BioSciences	LS-C29739	PoAb	Rb	-	-	-	-	-	○	-	-	~×1/100	O/N	4°C	-	Lymph node	○			
4-Hydroxy-2-nonenal	HNEJ-2	Japan Institute for the Control of Aging, NIKKEN SEIL Co, Ltd	MHN-100P	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	-	○			
Iba1	-	FUJIFILM Wako Pure Chemical Corporation	019-19741	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/1000	~60m	37°C	-	Brain	○			
				PoAb	Rb	-	-	-	-	-	-	○	-	-	Cow	~×1/200	~30m	RT	-	Lung	○	
				PoAb	Rb	○	○	-	-	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Brain	○	
				PoAb	Rb	○	-	-	-	-	-	-	○	-	-	~×1/2000	O/N	4°C	-	Brain	○	
				PoAb	Rb	-	-	-	-	-	-	-	○	-	-	Cow, Cat	~×1/50	O/N	4°C	-	Lymph node	○
				PoAb	Rb	-	○	-	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Kidney	○	
				PoAb	Rb	○	-	-	-	-	-	-	-	-	○	~×1/500	~30m	RT	-	Brain	○	
				PoAb	Rb	-	○	-	-	-	-	-	-	-	-	~×1/500	~30m	RT	-	Brain	○	
				PoAb	Rb	○	-	-	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Other	○	
				PoAb	Rb	-	○	-	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Other	○	
				PoAb	Rb	○	-	-	-	-	-	-	○	-	-	~×1/1000	~60m	RT	-	Brain	○	
				PoAb	Rb	-	-	-	-	-	-	-	○	-	-	~×1/500	~60m	37°C	-	Lung	○	
				PoAb	Rb	-	○	-	-	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Spinal cord	○	
				PoAb	Rb	○	-	-	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Eye	○	
PoAb	Rb	-	-	-	-	-	-	-	○	-	-	~×1/1000	~60m	RT	-	Spleen	○					
-	-	Bioss Inc	bs-1363R	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Spleen	○			
IgG	-	Agilent Technology	IR51261-2J	PoAb	Rb	-	-	-	-	○	-	-	-	Prediluted	~60m	RT	-	Spleen	○			
IL-17	-	Abcam plc	ab79056	PoAb	Rb	○	○	-	-	-	○	-	-	~×1/200	O/N	4°C	-	Pancreas	○			
Influenza A Virus	-	Merck	AB1074	PoAb	Gt	-	-	-	-	-	○	-	-	~×1/100	~240m	4°C	-	Influenza A virus	○			
iNOS	-	Abcam plc	AB3523	PoAb	Rb	-	-	-	-	-	○	-	-	~×1/200	O/N	4°C	-	LPS-induced macrophages	○			
Insulin	-	Agilent Technology	IR00261-2J	PoAb	GP	-	-	-	-	○	-	-	-	Prediluted	~30m	RT	-	Pancreas	○			
	K36aC10	Abcam plc	ab6995	MoAb	Mo	○	-	-	-	-	○	-	-	~×1/1000	~60m	RT	-	Pancreas	○			
Intrinsic factor	-	Fitzgerald Industries International	20-IR51	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Stomach	○			
Kappa Light Chains	-	Agilent Technology	IR50661-2J	PoAb	Rb	-	-	-	-	-	○	-	-	Prediluted	~60m	RT	-	Lymph node	○			
	-	Agilent Technology	IR62661-2	MoAb	Mo	-	-	-	-	-	○	-	-	Prediluted	O/N	4°C	-	Tumor tissue	○			
Ki-67	-	Leica Biosystems	NCL-Ki67-MM1	MoAb	Mo	○	○	-	-	-	○	-	-	~×1/100	~30m	4°C	-	Other	○			
				MoAb	Rb	○	○	-	-	-	○	-	-	-	Prediluted	O/N	4°C	-	Other	○		
	SP6	Nichirei Biosciences	418071	MoAb	Rb	○	-	-	-	-	-	-	-	-	Prediluted	~30m	RT	-	Liver	○		
				MoAb	Rb	○	-	-	-	-	-	-	-	-	Prediluted	~60m	RT	-	Intestine	○		
				PoAb	Rb	-	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Esophagus	○		
				PoAb	Rb	-	○	-	-	-	-	-	-	-	~×1/200	O/N	4°C	-	Intestine	○		
	MK167	Novus Biologicals	NB600-1252	MoAb	Rb	○	-	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Liver	○			
				PoAb	Rb	-	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Intestine	○		
	MIB-1	Agilent Technology	M724001-2	MoAb	Mo	-	-	-	-	-	-	○	-	-	~×1/100	O/N	4°C	-	Lymph node	○		
				MoAb	Mo	-	-	-	-	-	-	-	○	-	~×1/500	O/N	4°C	-	Intestine	○		
MoAb				Mo	-	-	-	-	-	-	-	○	-	~×1/200	~60m	RT	-	Intestinal tract	○			
MoAb				Mo	-	-	-	-	-	-	-	○	-	~×1/500	O/N	4°C	-	Intestine	○			

Supplementary Table 7-2 Immunological properties of primary antibodies and their respective IHC staining conditions

Antibody	Primary antibody										
	Fixing solution	Fixing time	Embedding	Antigen retrieval method		Solution	Concentration/pH/reagent	Incubation temperature	Incubation time	Blocking	
				Method						Blocking solution	Blocking time
Hepatocyte	10% For	~1w	P	AU		Tris BF	-	100°C<	~10m	Blocking One	~1hr
	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~30m	10% Goat Serum	~1hr
Hexanoyl lysine (HEL)	10% For	Unknown	P	Not complied		-	-	-	-	-	-
HLA-DR(MHC class II)/TAL.1B5	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~30m	10% Goat Serum	~1hr
Heat Shock Protein 60 (HSP60)	10% For	Unknown	P	MW		HistoVT One	-	-	~30m	-	-
Heat Shock Protein 70 (HSP70)	PFA	~10d	P	Trypsin		-	0.13%	37°C	~10m	0.5% Casein/PBS	~1hr
T-bet/TBX21	10% For	Unknown	P	MW		Dako Target Retrieval Solution, pH 9	-	-	~30m	-	-
4-Hydroxy-2-nonenal	10% For	Unknown	P	MW		HistoVT One	-	-	~30m	-	-
Iba1	PFA	~1d	P	Boil		Citric acid BF	-	70~100°C	~30m	No information	-
	10% For	~1w	P	MW		Citric acid BF	0.1M	100°C<	~30m	No information	-
	10% For	1y~	P	AU		Citric acid BF	-	100°C<	~5m	4% Block Ace	~1hr
	10% For	~1m	P	AU		Citric acid BF	pH6.0	100°C<	~30m	Goat Serum	~1hr
	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~30m	-	-
	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~30m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
	10% For	~1w	P	PC		Citric acid BF	10mM	100°C<	~10m	Block Ace	~1hr
	10% For	~1w	P	PC		Citric acid BF	10mM	100°C<	~10m	Block Ace	~1hr
	10% For	Unknown	P	PC		Citric acid BF	-	Unknown	~30m	Block Ace	~1hr
	10% For	Unknown	P	PC		Citric acid BF	-	Unknown	~30m	Block Ace	~1hr
	10% For	~1d	P	MW		Citric acid BF	0.01M	70~100°C	~30m	5% Skim milk in PBS	~1hr
	10% For	~1w	P	MW		Citric acid BF	-	100°C<	~30m	Blocking One	~1hr
	10% For	~O/N	P	Not complied		-	-	-	-	No information	-
	10% For	~1w	P	MW		Citric acid BF	pH6.0	100°C<	~10m	2% BSA/PBS	~1hr
10% For	~2d	P	MW		-	-	-	~5m	-	-	
10% For	~1m	P	Not complied		-	-	-	-	-	-	
IgG	10% For	~1w	P	Proteinase		-	-	RT	~5m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
IL-17	10% For	Unknown	P	MW		HistoVT One	-	-	~30m	-	-
Influenza A Virus	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~10m	Blocking One	~1hr
iNOS	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~10m	Blocking One	~1hr
Insulin	10% For	~1y	P	Not complied		-	-	-	-	Normal serum	~1hr
	10% For	~1m	P	Not complied		-	-	-	-	Goat Serum	~1hr
Intrinsic factor	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~30m	No information	-
Kappa Light Chains	10% For	~1d	P	Proteinase		-	100µg/ml	-	-	5% Skim milk in PBS	~1hr
Ki-67	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~10m	Blocking One	~1hr
	10% For	Unknown	P	MW		Citric acid BF	-	-	~30m	-	-
	10% For	~O/N	P	Boil		Citric acid BF	10mM pH6.0	70~100°C	~60m	Skim milk	~1hr
	10% For	~10d	P	PC		Citric acid BF	-	70~100°C	~5m	-	-
	10% For	~1d	P	MW		Citric acid BF	0.01M	70~100°C	~30m	5% Skim milk in PBS	~1hr
	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~30m	No information	-
	10% For	~1d	P	PC		Citric acid BF	-	100°C<	~5m	Block Ace	~1hr
	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~30m	10% Goat Serum	~1hr
	10% For	1y~	P	AU		Citric acid BF	-	100°C<	~5m	4% Block Ace	~1hr
	10% For	~1w	P	PC		Immunosaver	-	100°C<	~10m	No information	-
	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~30m	-	-
	10% For	~1w	P	AU		Citric acid BF	pH6.0	100°C<	~10m	BSA	~1hr
	10% For	~1d	P	MW		Citric acid BF	0.01 M	70~100°C	~30m	5% Skim milk in PBS	~1hr

Supplementary Table 7-3 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody	Secondary antibody							Supplementary information	Figure No.
Antibody	Secondary antibody information	Supplier	Catalog No.	Incubation time	Temperature	Reagent	Incubation time		
	Product								
Hepatocyte	Histofine Simple Stain MAX-PO(MULTI)	Nichirei	424154	~30m	37°C	DAB	~3m	-	
	EnVision+/HRP, Mouse	Agilent Technology	-	~30m	RT	DAB	~3m	-	66
Hexanoyl lysine (HEL)	-	Nichirei	-	-	-	-	No information	-	
HLA-DR(MHC class II)/TAL.1B5	EnVision+/HRP, Mouse	Agilent Technology	-	~30m	RT	DAB	~3m	-	67
Heat Shock Protein 60 (HSP60)	-	Nichirei	-	~30m	RT	DAB	~3m	-	
Heat Shock Protein 70 (HSP70)	Histofine Simple Stain Mouse MAX-PO(G)	Nichirei	414351	~30m	RT	DAB	~10m	-	
T-bet/TBX21	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	~1m	-	
4-Hydroxy-2-nonenal	Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	~30m	RT	DAB	~5m	-	
Iba1	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	37°C	DAB	~10m	-	
	Histofine Simple Stain MAX-PO(R)	Nichirei	424141	~30m	RT	DAB	~10m	-	
	EnVision+/HRP, Rabbit	Agilent Technology	-	~30m	37°C	DAB	~3m	-	68
	Histofine Simple Stain MAX-PO(R)	Nichirei	414141F	~30m	RT	DAB	~1m	-	
	LSAB Kits, Universal, HRP, Rabbit/Mouse	Agilent Technology	K0675	~10m	RT	DAB	~10s	-	
	Envision+ / HRP, RUO Rabbit	Agilent Technology	K4003	~60m	RT	DAB	~1m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Mouse MAX-PO(R)	Nichirei	414341	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(R)	Nichirei	414181	~30m	RT	DAB	~10m	-	
	Histofine mouse Stain Kit	Nichirei	414321	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(R)	Nichirei	414181	~60m	RT	DAB	~10m	-	
	Histofine Simple Stain MAX-PO(MULTI)	Nichirei	424154	~30m	37°C	DAB	~3m	-	69
	Alexa Fluor 555	Thermo Fisher Scientific	A-31572	~30m	RT	Cy3	No information	-	
Histofine Simple Stain Rat MAX-PO(MULTI) (Histo Stainer)	Nichirei	714191	~30m	RT	DAB	~10m	-		
Envision+ / HRP, RUO Rabbit	Agilent Technology	K4003	~30m	RT	DAB	~20s	-		
EnVision+ Dual Link, Single Reagents, HRP	Agilent Technology	K4063	~30m	RT	DAB	~3m	-		
IgG	Envision+ / HRP, RUO Rabbit	Agilent Technology	K4003	~30m	RT	DAB	~1m	-	
IL-17	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	~3m	-	
Influenza A Virus	Histofine Simple Stain MAX-PO(G)	Nichirei	414162	~30m	37°C	DAB	~3m	-	
iNOS	Histofine Simple Stain MAX-PO(MULTI)	Nichirei	424154	~30m	37°C	DAB	~3m	-	70
Insulin	VECTASTAIN ABC-HRP Kit, Peroxidase (Guinea pig IgG)	Vector Laboratories	PK-4007	~30m	RT	DAB	~10m	-	71
	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191F	~30m	RT	DAB	~1m	-	72
Intrinsic factor	VECTASTAIN Elite ABC Kit(rabbit IgG)	Vector Laboratories	PK-6101	~30m	RT	DAB	~5m	-	73
Kappa Light Chains	Histofine Simple Stain Rat MAX-PO(R)	Nichirei	414181	~60m	RT	DAB	~10m	-	74
Ki-67	Histofine Simple Stain MAX-PO(MULTI)	Nichirei	424154	~30m	37°C	DAB	~3m	-	75
	-	-	-	-	-	-	No information	-	
	EnVision+/HRP, Rabbit	Agilent Technology	-	~60m	RT	DAB	~5m	-	76
	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(R)	Nichirei	414181	~60m	RT	DAB	~10m	-	
	Envision+ / HRP, RUO Rabbit	Agilent Technology	K4002	~30m	RT	DAB	~5m	-	77
	Histofine Simple Stain Mouse MAX-PO(R)	Nichirei	414341	~30m	RT	DAB	~3m	-	
	Histofine SAB- PO(R)	Nichirei	424031	~10m	RT	DAB	~20s	-	78
	EnVision+/HRP, Rabbit	Agilent Technology	-	~30m	37°C	DAB	~3m	-	
	Histofine Simple Stain Mouse MAX-PO(R)	Nichirei	414341	~30m	RT	DAB	~1m	-	
LSAB Kits, Universal, HRP, Rabbit/Mouse	Agilent Technology	K0675	~10m	RT	DAB	~10s	-		
Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	~30m	RT	DAB	~5m	-		
Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	~60m	RT	DAB	~10m	-		

Supplementary Table 8-1 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody																					
Antibody						Species reactivity								Dilution	Incubation time	Temperature	Supplementary information	Positive control	Reactivity		
Antigen	Clone	Supplier	Catalog No.	Clonality	Host animal	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other								
KIM-1/ Tim-1	-	R&D Systems	AF3689	PoAb	Gt	○	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Kidney	○		
	-			PoAb	Gt	○	-	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Kidney	○	
	-			PoAb	Gt	○	-	-	-	-	-	-	-	-	~×1/200	O/N	4°C	-	Kidney	○	
	-			PoAb	Gt	○	-	-	-	-	-	-	-	-	~×1/200	O/N	4°C	-	Kidney	○	
Laminin	-	Sigma-Aldrich	L9393	PoAb	Rb	○	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Skin	○			
LAMP-1	-	Sigma-Aldrich	L1418	PoAb	Rb	○	○	-	-	-	-	-	-	~×1/100	O/N	4°C	-	-	○		
	-	Abcam plc	ab24170	PoAb	Rb	○	○	-	-	-	○	-	-	~×1/200	O/N	4°C	-	-	○		
LAMP-2	AMC2	Thermo Fisher Scientific	51-2200	PoAb	Rb	○	○	-	-	-	-	-	-	~×1/200	~60m	RT	-	Liver(Phospholipidosis)	○		
				PoAb	Rb	○	-	-	-	-	-	-	-	-	~×1/500	~60m	RT	-	Liver	○	
				PoAb	Rb	○	○	-	-	-	-	-	-	-	-	~×1/500	~60m	RT	-	Stomach	○
				PoAb	Rb	○	-	-	-	-	-	-	-	-	-	~×1/500	~60m	RT	-	Kidney	○
				PoAb	Rb	○	○	-	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Other	○
				PoAb	Rb	○	○	-	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	-	○
	-	LifeSpan Biosciences (LSBio)	LS-B3144-50	MoAb	Mo	○	○	-	-	-	-	-	-	~×1/500	O/N	4°C	-	-	○		
	-			MoAb	Mo	-	-	-	-	-	○	-	-	-	~×1/1000	O/N	4°C	-	Other	○	
LC3	-	MBL International	PM036	PoAb	Rb	○	○	-	-	-	○	-	-	~×1/1000	O/N	4°C	-	Other	○		
	-			PoAb	Rb	-	○	-	-	-	○	-	-	-	~×1/500	O/N	4°C	-	Kidney	○	
	5F10	NanoTools	0231-100/LC3-5F10	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/200	~60m	RT	-	Kidney	○		
LDH	-	Santa Cruz Biotechnology, Inc.	SC-33781	PoAb	Rb	○	-	-	-	-	-	-	~×1/200	~60m	RT	-	Liver	○			
<i>Dolichos biflorus</i> Lectin (DBA)	Labeled antigen	EY Laboratories	H-1201-1	-	-	○	-	-	-	-	-	-	~×1/25	O/N	4°C	-	Kidney	○			
LH	-	Thermo Scientific	PA1-23783	PoAb	Rb	○	○	-	-	-	-	-	~×1/100	O/N	4°C	-	Pituitary	○			
Lipocalin-2 /NGAL	-	R&D Systems	AF1757	PoAb	Gt	○	-	-	-	-	-	-	~×1/200	O/N	4°C	-	Kidney	○			
MAC-2	M3/38	Cedarlane Laboratories	CL8942AP	MoAb	Rt	-	○	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Lung	○		
				MoAb	Rt	-	○	-	-	-	-	-	-	-	~×1/50	O/N	4°C	-	Skin	○	
MAC-3	M3/84	BD Pharmingen Inc.	550292	MoAb	Rt	-	○	-	-	-	-	-	~×1/50	O/N	4°C	-	Lymph node	○			
Macrophage	RM0029-11H3	Abcam plc	ab56297	MoAb	Rt	-	○	-	-	-	-	-	~×1/100	~60m	RT	-	Eye	○			
Myelin Basic Protein	26	Merck	MAB384	MoAb	Mo	○	-	-	-	-	○	-	~×1/1000	~60m	RT	-	Brain	○			
	-	Abcam plc	ab40390	PoAb	Rb	○	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Nerve	○			
	-	Sigma-Aldrich	M3821	PoAb	Rb	○	○	-	-	-	-	-	~×1/100	O/N	4°C	-	Nerve	○			
MCM7	EP1974Y	Abcam plc	ab52489	MoAb	Rb	○	○	-	-	-	-	-	~×1/1000	~60m	RT	-	Intestine	○			
MDA	1F83	Japan Institute for the Control of Aging	MMD-030n	MoAb	Mo	○	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Other	△			
Melan A	A103	Agilent Technology	M719601-2	MoAb	Mo	-	-	-	-	○	-	-	-	~×1/50	~60m	RT	-	Skin	○		
				MoAb	Mo	-	-	-	-	-	○	-	-	-	~×1/200	~30m	RT	-	Skin	○	
				MoAb	Mo	○	-	-	-	-	-	○	-	-	~×1/200	~60m	RT	-	Skin	○	
				MoAb	Mo	-	-	-	-	-	-	○	-	-	~×1/50	O/N	4°C	-	Melanoma	○	
Melanoma	PNL2	Nichirei	413381	MoAb	Mo	-	-	-	-	-	○	-	Prediluted	O/N	4°C	-	Skin	○			
				MoAb	Mo	○	-	-	-	-	○	-	-	~×1/100	~60m	RT	-	Skin	○		
Mesothelin	-	Immuno-Biological Laboratories Co., Ltd.	28001	PoAb	Rb	○	-	-	-	-	-	-	~×1/200	O/N	4°C	-	Heart	○			
				PoAb	Rb	○	-	-	-	-	-	-	-	~×1/200	~30m	RT	Diluted with IMMUNOSHOT immunostaining Fine	Other	○		
				PoAb	Rb	-	○	-	-	-	-	-	-	~×1/200	~30m	RT	Diluted with IMMUNOSHOT immunostaining Fine	Lung	○		
MHC Class II (RT1B)	OX-6	Bio-Rad Laboratories, Inc.	MCA46R	MoAb	Mo	○	○	-	-	-	-	-	~×1/100	~60m	RT	-	Spleen	○			
				MoAb	Mo	○	-	-	-	-	-	-	-	~×1/500	~60m	RT	-	Liver	○		

Supplementary Table 8-2 Immunological properties of primary antibodies and their respective IHC staining conditions

Antibody	Primary antibody										
	Fixing solution	Fixing time	Embedding	Antigen retrieval method		Solution	Concentration/pH/reagent	Incubation temperature	Incubation time	Blocking	
				Method						Blocking solution	Blocking time
KIM-1/ Tim-1	10% For	1y~	P	AU		Citric acid BF	-	100°C<	~5m	4% Block Ace	~1hr
	10% For	~2d	P	Not complied		-	-	-	-	No information	-
	10% For	Unknown	P	MW		Citric acid BF	-	Unknown	~30m	Block Ace	~1hr
	PFA	Unknown	P	MW		Citric acid BF	-	-	~30m	-	-
Laminin	10% For	1y~	P	Proteinase		-	0.4mg/mL	RT	~30m	4% Block Ace	~1hr
LAMP-1	10% For	Unknown	P	MW		HistoVT One	-	-	~30m	-	-
	10% For	Unknown	P	MW		HistoVT One	-	-	~30m	-	-
LAMP-2	10% For	~1w	P	MW		Citric acid BF	-	100°C<	~30m	-	-
	10% For	~1y	P	MW		-	-	100°C<	~5m	Skim milk	~1hr
	10% For	~O/N	P	Not complied		-	-	-	-	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
	PFA	~2d	P	Not complied		-	-	-	-	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
	10% For	~1m	P	AU		Citric acid BF	pH6.0	100°C<	~10m	Goat Serum	~1hr
	10% For	Unknown	P	Not complied		-	-	-	-	-	-
	10% For	Unknown	P	MW		HistoVT One	-	-	~30m	-	-
	10% For	Unknown	P	MW		Immunosaver	-	100°C<	~60m	No information	-
LC3	10% For	~1m	P	AU		Citric acid BF	pH6.0	100°C<	~10m	Goat Serum	~1hr
	10% For	~O/N	P	MW		HistoVT One	-	-	~30m	-	-
	PFA	~2d	P	Boil		Citric acid BF	10mM pH6.0	70~100°C	~60m	Skim milk	~1hr
LDH	10% For	~2d	P	AU		EDTA	-	100°C<	~10m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
LDH	10% For	~1w	P	Not complied		-	-	-	-	Block Ace	~1hr
<i>Dolichos biflorus</i> Lectin (DBA)	10% For	~1m	P	Not complied		-	-	-	-	Not complied	-
LH	10% For	Unknown	P	MW		HistoVT One	-	-	~30m	-	-
Lipocalin-2 /NGAL	10% For	Unknown	P	Trypsin / AU		- / Citric acid BF	0.1% / -	37°C / 100°C<	~5m / ~5m	Block Ace	~1hr
MAC-2	10% For	~1w	P	Not complied		-	-	-	-	No information	-
	10% For	~1w	P	PC		Citric acid BF	0.01M	100°C<	~5m	3% H <sub>2</sub> O <sub>2</sub>	~1hr
MAC-3	10% For	~2d	P	MW		Citric acid BF	-	70~100°C	~30m	Swine serum(x500)	~1hr
Macrophage	10% For	~1d	P	Proteinase		-	Ready to use	RT	~10m	2% BSA/PBS	~1hr
Myelin Basic Protein	10% For	~1d	P	MW		Citric acid BF	0.01 M	70~100°C	~30m	5% Skim milk in PBS	~1hr
	DA	Unknown	P	MW		Citric acid BF	-	Unknown	~10m	Block Ace	~1hr
	10% For	1y~	P	AU		Citric acid BF	-	100°C<	~5m	4% Block Ace	~1hr
MCM7	10% For	~1w	P	MW		Citric acid BF	0.01M	70~100°C	~30m	No information	-
MDA	Bo	~O/N	P	Not complied		-	-	-	-	-	-
Melan A	10% For	~10d	P	AU		EDTA	-	100°C<	~10m	0.5% Casein/TBS	~1hr
	10% For	~1w	P	MW		Citric acid BF	0.1M	100°C<	~30m	No information	-
	10% For	~1d	P	MW		Tris-EDTA (10 mM Tris/1 mM EDTA, pH 9.0)	1mM	70~100°C	~30m	5% Skim milk in PBS	~1hr
	10% For	~1w	P	AU		EDTA	-	100°C<	~5m	10% Goat Serum	~1hr
	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~30m	-	-
Melanoma	10% For	~1d	P	MW		Tris-EDTA (10 mM Tris/1 mM EDTA, pH 9.0)	1mM	70~100°C	~30m	5% Skim milk in PBS	~1hr
	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~30m	10% Goat Serum	~1hr
Mesothelin	10% For	1y~	P	AU		Citric acid BF	-	100°C<	~5m	4% Block Ace	~1hr
	10% For	~1w	P	Not complied		-	-	-	-	Block Ace	~1hr
	10% For	~1w	P	Not complied		-	-	-	-	Block Ace	~1hr
MHC Class II (RT1B)	Zamboni	~1w	P	Proteinase		-	-	RT	~10m	Goat Serum	~1hr
	PLP	~O/N	P	Proteinase / MW		- / Citric acid BF	100ug/ml / 0.01M	RT / 70~100°C	~10m / ~30m	5% Skim milk in PBS	~1hr

Supplementary Table 8-3 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody	Secondary antibody							Supplementary information	Figure No.
Antibody	Secondary antibody information	Supplier	Catalog No.	Incubation time	Temperature	Reagent	Incubation time		
	Product								
KIM-1/ Tim-1	Biotinylated Anti-Goat Immunoglobulins	Agilent Technology	-	~30m	37°C	DAB	~3m	-	79
	Biotinylated Rabbit Anti-Goat IgG Antibody	Vector Laboratories	BA-5000	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(G)	Nichirei	414331	~30m	RT	DAB	~3m	-	
	Histofine Simple Stain Rat MAX-PO(G)	Nichirei	414331	-	-	-	No information	-	
Laminin	EnVision+/HRP, Rabbit	Agilent Technology	-	~30m	37°C	DAB	~3m	-	
LAMP-1	Histofine Simple Stain Rat MAX-PO(R)	Nichirei	414181	~30m	RT	DAB	~5m	Contrast is better without antigen retrieval.	
	Histofine Simple Stain Rat MAX-PO(R)	Nichirei	414181	~30m	RT	DAB	~5m	-	
LAMP-2	Histofine Simple Stain mouse/rat MAX-PO(R)	Nichirei	414341/414181	~30m	RT	DAB	~3m	-	
	Envision+ / HRP, RUO Rabbit	Agilent Technology	K4002	~30m	RT	DAB	~10s	-	80
	Envision+ / HRP, RUO Rabbit	Agilent Technology	K4003	~30m	RT	DAB	~30s	-	
	Envision+ / HRP, RUO Rabbit	Agilent Technology	K4003	~30m	RT	DAB	~30s	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191F	~30m	RT	DAB	~1m	-	
	Histofine Simple Stain Rat MAX-PO(R)	Nichirei	414181	~30m	RT	DAB	~3m	-	
	Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	~30s	-	81
LC3	Histofine Simple Stain Rat MAX-PO(R)	Nichirei	414181	~30m	RT	DAB	~10m	-	
	EnVision+/HRP, Rabbit	Agilent Technology	-	~60m	RT	DAB	~5m	-	82
	Histofine Simple Stain rat MAX-PO(M)	Nichirei	414171	~60m	RT	DAB	~3m	-	
LDH	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	~10m	-	
<i>Dolichos biflorus</i> Lectin (DBA)	Not complied	-	-	-	-	DAB	~3m	-	
LH	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	-	-	-	No information	-	
Lipocalin-2 /NGAL	Histofine Simple Stain Rat MAX-PO(G)	Nichirei	414331	~30m	RT	DAB	~3m	-	
MAC-2	Histofine Simple Stain Mouse MAX-PO(Rat)	Nichirei	414311	~30m	RT	DAB	~5m	-	
	Rabbit Anti-Rat Immunoglobulins/Biotinylated / LSAB Kits, Universal, HRP, Rabbit/Mouse	Agilent Technology	E0468 / K0675	~30m	RT	DAB	~1m	E0468: Discontinued	83
MAC-3	Histofine Simple Stain Rat MAX-PO(R)	Nichirei	414181	~30m	37°C	DAB	~10m	-	84
Macrophage	Histofine Simple Stain Mouse MAX-PO(Rat)	Nichirei	414311	~30m	RT	DAB	~10m	-	
Myelin Basic Protein	Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	~60m	RT	DAB	~10m	-	85
	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	~3m	-	
	EnVision+/HRP, Rabbit	Agilent Technology	-	~30m	37°C	DAB	~3m	-	86
MCM7	Rabbit Immunoglobulins	Agilent Technology	E0431	~30m	RT	DAB	~5m	-	
MDA	Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	~30m	RT	DAB	20m<	-	87
Melan A	Histofine Simple Stain MAX-PO(MULTI)	Nichirei	424154	~30m	RT	DAB	~20m	-	88
	Histofine Simple Stain MAX-PO(M)	Nichirei	424131	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	~60m	RT	DAB	~10m	-	89
	EnVision+/HRP, Mouse	Agilent Technology	-	~30m	RT	DAB	~3m	-	
Melanoma	LSAB Kits, Universal, HRP, Rabbit/Mouse	Agilent Technology	K0675	~10m	RT	DAB	~10s	-	
	Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	~60m	RT	DAB	~10m	-	90
Mesothelin	EnVision+/HRP, Rabbit	Agilent Technology	-	~30m	RT	DAB	~3m	-	91
	EnVision+/HRP, Rabbit	Agilent Technology	-	~30m	37°C	DAB	~3m	-	92
	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	~5m	-	
MHC Class II (RT1B)	Histofine Simple Stain Mouse MAX-PO(R)	Nichirei	414341	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191F	~30m	RT	DAB	~1m	-	
	Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	~60m	RT	DAB	~10m	-	93



Supplementary Table 9-1 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody																				
Antibody						Species reactivity								Dilution	Incubation time	Temperature	Supplementary information	Positive control	Reactivity	
Antigen	Clone	Supplier	Catalog No.	Clonality	Host animal	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other							
MitF	34CA5	Novocastra (Leica Biosystems)	MITF-L	MoAb	Mo	-	-	-	-	-	○	-	-	~×1/100	O/N	4°C	-	Melanoma	○	
	C5	Exalpha Biologicals	X1405M	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Eye	○	
Mitochondrial Creatine Kinase	-	Bioss Inc	-	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Brain	○	
mTOR	7C10	Cell Signaling Technology	2983	MoAb	Rb	-	-	-	-	-	-	○	-	~×1/50	O/N	4°C	-	Vessel	○	
MUC-1	-	Boster Immunoleader	A00187	PoAb	Rb	○	-	-	-	○	-	-	-	~×1/500	~60m	RT	-	Lung	○	
MUM1protein	MUM1p	Agilent Technology	M725901-2	MoAb	Mo	-	-	-	-	-	○	-	-	~×1/25	O/N	4°C	-	Lymph node	○	
MyoD1	5.8A	Agilent Technology	M351201-2	MoAb	Mo	-	-	-	-	-	○	-	-	~×1/50	O/N	4°C	-	Labdomyosarcoma	○	
β2-microglobulin	-	Lifespan Biosciences	LS-B331	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/200	O/N	4°C	-	Kidney	○	
Myogenin	F5D	Abcam plc	ab1835	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Muscle	○	
Myoglobin	EP3081Y	Abcam plc	ab77232	MoAb	Rb	-	○	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Muscle	○	
				MoAb	Rb	○	-	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Muscle	○
Nephrin (c)	-	Immuno-Biological Laboratories Co., Ltd.	29070	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/25	O/N	4°C	-	Kidney	○	
Nestin	rat-401	Merck	MAB353	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Nerve	○	
				MoAb	Mo	○	○	-	-	-	-	-	-	-	-	~×1/500	~60m	RT	-	Brain
	N1602	Immuno-Biological Laboratories Co., Ltd.	18741	PoAb	Rb	-	-	-	-	-	○	-	-	~×1/25	~60m	RT	-	Brain	○	
NeuN	A60	Merck	MAB377	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Nerve	○	
				MoAb	Mo	○	-	-	-	-	○	-	-	-	-	~×1/1000	~60m	RT	-	Brain
Neurofilament	2F11	Agilent Technology	M076229-2	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/50	O/N	4°C	-	Brain	○	
				MoAb	Mo	-	○	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Brain	○
				MoAb	Mo	-	○	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Nerve	○
				MoAb	Mo	-	-	-	-	-	○	-	-	-	~×1/50	O/N	4°C	-	Eye	○
				MoAb	Mo	○	-	-	-	○	-	-	-	-	~×1/100	~60m	RT	-	Eye	○
		MoAb	Mo	○	○	-	-	-	-	-	-	-	~×1/100	~30m	RT	-	Nerve	○		
		Nichirei Biosciences	412551	MoAb	Mo	○	-	-	-	-	-	-	Prediluted	O/N	4°C	-	Spinal cord	○		
Neurofilament 200	NE14	Sigma-Aldrich	N5389	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Brain	○	
				MoAb	Mo	○	-	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Nerve	○
NG2	-	Merck	AB5320	PoAb	Rb	○	○	-	-	-	-	-	-	~×1/200	O/N	4°C	-	Skin	○	
NGAL or Lipocalin-2/NGAL	-	R&D Systems	AF1757	PoAb	Gt	○	-	-	-	-	-	-	-	~×1/25	~60m	RT	-	Kidney	○	
	17	BioPorto Diagnostics A/S	ABS 047-17	MoAb	Mo	-	-	-	-	○	-	-	-	~×1/1000	~60m	RT	-	Kidney	○	
3-Nitrotyrosine	39B6	Abcam plc	ab61392	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/50	O/N	4°C	-	Other	○	
nNOS	-	Thermo Fisher Scientific	61-7000	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/100	~60m	RT	-	Nerve	△	
Neuron-Specific Enolase	-	MBL International	PD002-H	PoAb	Rb	-	-	-	-	-	○	-	-	Prediluted	O/N	4°C	-	Brain	○	
8-OHdG	N45.1	Japan Institute for the Control of Aging	MOG-020P	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/200	O/N	4°C	-	Other	△	
	-			PoAb	Rb	○	-	-	-	-	-	-	-	~×1/500	~60m	RT	-	Spinal cord	○	
Olig2	-	Immuno-Biological Laboratories Co., Ltd.	18953	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Brain	○	
	-			PoAb	Rb	○	-	-	-	-	○	-	-	-	~×1/200	~60m	RT	-	Brain	○
	-			PoAb	Rb	○	-	-	-	-	○	-	-	-	~×1/200	~60m	RT	-	Brain	○
	211F1.1	Merck	MABN50	MoAb	Mo	○	-	-	-	-	○	-	-	~×1/200	~60m	RT	-	Brain	○	
	-		AB9610	PoAb	Rb	-	-	-	-	-	○	-	-	-	~×1/100	~60m	RT	-	Brain	○
-	Novus Biologicals	NBP1-28667	PoAb	Rb	-	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Brain	○	
Osteocalcin	R21C-01A	TAKARA Bio	M188	MoAb	Rt	-	○	-	-	-	-	-	-	~×1/200	~60m	RT	-	Bone	○	
	OCG3	Abcam plc	ab13420	MoAb	Mo	-	-	-	-	-	-	○	-	~×1/200	O/N	4°C	-	Bone	○	
Osterix	-	Abcam plc	ab22552	PoAb	Rb	-	○	-	-	-	-	-	-	~×1/200	O/N	4°C	-	Bone marrow	○	
				PoAb	Rb	○	-	-	-	-	-	-	-	-	~×1/200	O/N	4°C	-	Bone	○
				PoAb	Rb	○	○	-	-	-	-	-	-	-	~×1/200	O/N	4°C	-	Other	○

Supplementary Table 9-2 Immunological properties of primary antibodies and their respective IHC staining conditions

Antibody	Primary antibody									
	Fixing solution	Fixing time	Embedding	Antigen retrieval method	Solution	Concentration/pH/reagent	Incubation temperature	Incubation time	Blocking	
				Method					Blocking solution	Blocking time
MiTF	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	10% Goat Serum	~1hr
	PFA	~1d	P	AU	Citric acid BF	-	100°C<	~5m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
Mitochondrial Creatine Kinase	PFA	~1hr	F	Not complied	-	-	-	-	10% Goat Serum	~1hr
mTOR	10% For	~1m	P	AU	Citric acid BF	pH6.0	70~100°C	~60m	BSA	~1hr
MUC-1	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
MUM1protein	10% For	~1w	P	AU	Tris BF	-	100°C<	~10m	Blocking One	~1hr
MyoD1	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	10% Goat Serum	~1hr
β2-microglobulin	10% For	Unknown	P	MW	Citric acid BF	-	Unknown	~30m	Block Ace	~1hr
Myogenin	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	No information	-
Myoglobin	10% For	~1w	P	Not complied	-	-	-	-	No information	-
	10% For	~1w	P	Not complied	-	-	-	-	No information	-
Nephrin (c)	F, Sli, Ace	~1hr	F	Not complied	-	-	-	-	0.5% Casein/PBS	~1hr
Nestin	10% For	1y~	P	AU	Citric acid BF	-	100°C<	~5m	4% Block Ace	~1hr
	PFA	~2hr	P	MW	Citric acid BF	0.01 M	70~100°C	~30m	5% Skim milk in PBS	~1hr
	10% For	~1w	P	AU	EDTA	-	100°C<	~10m	0.3% H <sub>2</sub> O <sub>2</sub> / Methanol / Protein Block	~1hr
NeuN	10% For	1y~	P	AU	Citric acid BF	-	100°C<	~5m	4% Block Ace	~1hr
	10% For	~1d	P	MW	Citric acid BF	0.01 M	70~100°C	~30m	5% Skim milk in PBS	~1hr
Neurofilament	10% For	1y~	P	AU	Citric acid BF	-	100°C<	~5m	4% Block Ace	~1hr
	4% Zinc For	~2d	P	MW	Citric acid BF	-	100°C<	~30m	-	-
	10% For	~1w	P	AU	Citric acid BF	0.01M	100°C<	~30m	No information	-
	10% For	~1w	P	AU	Tris BF	-	100°C<	~10m	Blocking One	~1hr
	10% For	~1w	P	MW	Citric acid BF	pH6.0	100°C<	~10m	2% BSA/PBS	~1hr
	10% For	~1m	P	MW	Distilled water	-	70~100°C	~5m	-	-
Neurofilament 200	10% For	~4hr	P	Not complied	-	-	-	-	Swine serum(x500)	~1hr
	-	Unknown	P	Not complied	-	-	-	-	No information	-
	10% For	~1m	P	AU	Citric acid BF	pH6.0	70~100°C	~30m	BSA	~1hr
NG2	F, Sli, 10% For	~1hr	F	Not complied	-	-	-	-	Swine serum(x500)	~1hr
NGAL or Lipocalin-2/NGAL	PFA	~2d	P	AU	Citric acid BF	-	100°C<	~10m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~10m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
3-Nitrotyrosine	10% For	Unknown	P	MW	Citric acid BF	-	-	~30m	-	-
nNOS	10% For	~1w	P	Proteinase	-	0.04	RT	~10m	Goat Serum	~1hr
Neuron-Specific Enolase	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~10m	Blocking One	~1hr
8-OHdG	Bo	~O/N	P	Not complied	-	-	-	-	Rabbit serum	~1hr
Olig2	10% For	~1w	P	MW	Citric acid BF	-	70~100°C	~30m	Block Ace	~1hr
	10% For	~1w	P	MW	Citric acid BF	-	70~100°C	~30m	Block Ace	~1hr
	10% For	~1d	P	MW	Citric acid BF	0.01 M	70~100°C	~30m	5% Skim milk in PBS	~1hr
	10% For	~1d	P	MW	Citric acid BF	0.01 M	70~100°C	~30m	5% Skim milk in PBS	~1hr
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~10m	0.3% H <sub>2</sub> O <sub>2</sub> / Methanol / Protein Block	~1hr
	10% For	~1d	P	MW	Immunosaver	-	100°C<	~10m	No information	-
Osteocalcin	10% For	~1w	P	Proteinase	-	-	RT	~10m	-	-
Osteoclatin	10% For	~1w	P	Proteinase	-	-	37°C	~5m	Blocking One	~1hr
Osterix	10% For	1y~	P	AU	Citric acid BF	-	100°C<	~5m	4% Block Ace	~1hr
	10% For	~O/N	P	Boil	Citric acid BF	10mM pH6.0	70~100°C	~60m	Skim milk	~1hr
Sp7/Osterix	10% For	Unknown	P	Proteinase K	-	-	-	-	-	-

Supplementary Table 9-3 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody	Secondary antibody							Supplementary information	Figure No.	
Antibody	Secondary antibody information		Supplier	Catalog No.	Incubation time	Temperature	Reagent			Incubation time
	Product									
MitF	EnVision+/HRP, Mouse		Agilent Technology	-	~30m	RT	DAB	~3m	94	
	Envision+ / HRP, RUO Mouse		Agilent Technology	K4001	~30m	RT	DAB	~10m		
Mitochondrial Creatine Kinase	Histofine		Nichirei	-	~30m	RT	DAB	~3m	-	
mTOR	Polyclonal Goat Anti-Rabbit Immunoglobulins and Streptavidin/HRP with Tyramide (RENAISSANCE® TSATM BIOTIN SYSTEM: PerkinElmer, NEL700A)		Agilent Technology	E0432/P0397	~30m	RT	DAB	~10m	-	
MUC-1	Envision+ / HRP, RUO Rabbit		Agilent Technology	K4003	~30m	RT	DAB	~1m	-	
MUM1protein	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m	-	
MyoD1	EnVision+/HRP, Mouse		Agilent Technology	-	~30m	RT	DAB	~3m	95	
β2-microglobulin	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~3m		
Myogenin	VECTASTAIN Elite ABC Kit(mouse IgG)		Vector Laboratories	BA-2001	~30m	RT	DAB	~5m	96	
Myoglobin	Histofine Simple Stain Mouse MAX-PO(R) (Histo Stainer)		Nichirei	714341	~30m	RT	DAB	~10m		
	Histofine Simple Stain Rat MAX-PO(MULTI) (Histo Stainer)		Nichirei	714191	~30m	RT	DAB	~10m		
Nephrin (c)	Swine anti-rabbit immunoglobulins/FITC (affinity isolated)		Agilent Technology	F0205	~60m	RT	FITC	No information	97	
Nestin	EnVision+/HRP, Mouse		Agilent Technology	-	~30m	37°C	DAB	~3m	98	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~60m	RT	DAB	~10m		
	Envision+ / HRP, RUO Rabbit		Agilent Technology	K4003	~30m	RT	DAB	~10m		
NeuN	EnVision+/HRP, Mouse		Agilent Technology	-	~30m	37°C	DAB	~3m	99	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~60m	RT	DAB	~10m		
Neurofilament	EnVision+/HRP, Mouse		Agilent Technology	-	~30m	37°C	DAB	~3m	100	
	EnVision+ Dual Link, Single Reagents, HRP		Agilent Technology	K4063	~30m	RT	DAB	~3m		
	Rabbit Anti-Mouse Immunoglobulins/Biotine - Rabbit F(ab)2 (affinity isolated)		Agilent Technology	E0413	~30m	RT	DAB	~5m		
	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m		
	Histofine Simple Stain Rat MAX-PO(MULTI) (Histo Stainer)		Nichirei	714191	~30m	RT	DAB	~10m		
	Histofine Simple Stain Rat MAX-PO(M) (Histo Stainer)		Nichirei	714171	~30m	RT	DAB	~5m		
Neurofilament 200	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	37°C	DAB	~10m	101	
	VECTASTAIN Elite ABC Kit(mouse IgG)		Vector Laboratories	PK-6102	~30m	RT	DAB	~5m		
NG2	Polyclonal Rabbit Anti-Mouse Immunoglobulins and Streptavidin/HRP with Tyramide (RENAISSANCE® TSATM BIOTIN SYSTEM: PerkinElmer,		Agilent Technology	E0464/P0397	~30m	RT	DAB	~10m	102	
	Rabbit IgG (H+L), Alexa488		-	A11008	~30m	37°C	Other	No information		
NGAL or Lipocalin-2/NGAL	Histofine Simple Stain Rat MAX-PO(G)		Nichirei	414331	~60m	RT	DAB	~3m	-	
	Envision+ / HRP, RUO Mouse		Agilent Technology	K4001	~60m	RT	DAB	~3m		
3-Nitrotyrosine	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	No information	Soaked in acetone for 15 minutes after deparaffinization	
nNOS	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	~5m	103	
Neuron-Specific Enolase	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m	-	
8-OHdG	Histofine SAB-AP(M)		Nichirei	414022	~10m	RT	DAB	~5m	104	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	-	No information		
Olig2	Fluorophore labeled immunoglobulin		Thermo Fisher Scientific	A-21430	~30m	RT	DAPI (H-1200, VECTOR) (VECTASHIELD Mounting Medium)	Unknown	-	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~60m	RT	DAB	~10m	105	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~60m	RT	DAB	~10m		
	Envision+ / HRP, RUO Rabbit		Agilent Technology	K4003	~30m	RT	DAB	~3m	106	
	Histofine Simple Stain Mouse MAX-PO(R)		Nichirei	414341	~30m	RT	DAB	~20s		
Osteocalcin	Histofine Simple Stain Mouse MAX-PO(Rat)		Nichirei	414311	~30m	RT	DAB	~10m	-	
Osteoclatin	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m	-	
Osterix	EnVision+/HRP, Rabbit		Agilent Technology	-	~30m	37°C	DAB	~3m	-	
	EnVision+/HRP, Rabbit		Agilent Technology	-	~60m	RT	DAB	~5m		
Sp7/Osterix	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	-	-	-	No information	108	

Supplementary Table 10-1 Immunological properties of primary antibodies and their respective IHC staining conditions

		Primary antibody																			
		Antibody				Species reactivity									Dilution	Incubation time	Temperature	Supplementary information	Positive control	Reactivity	
Antigen	Clone	Supplier	Catalog No.	Clonality	Host animal	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other								
p40		Diagnostic Biosystems	RP163-05	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/100	O/N	RT	-	Kidney	○		
				PoAb	Rb	-	○	-	-	-	-	-	-	-	-	~×1/100	O/N	RT	-	Kidney	○
p53	DO-1	Bio-Rad Laboratories, Inc.	MCA1701	MoAb	Mo	-	-	-	-	-	○	-	-	~×1/25	O/N	4°C	-	Intestine	○		
	CM5	Leica Biosystems	NCL-p53-CM5p	PoAb	Rb	○	○	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Spleen	○		
p62/SQSTM1		MBL International	PM045	PoAb	Rb	○	○	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Other	○		
		Abcam plc	ab56416	MoAb	Mo	○	○	-	-	-	○	-	-	~×1/200	~60m	RT	-	Kidney	○		
p63	4A4	Abcam plc	ab735	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/200	O/N	4°C	-	Prostate	○		
	4A4	GeneTex	GTX23239	MoAb	Mo	-	-	-	-	-	○	-	-	~×1/200	O/N	4°C	-	Mammary gland	○		
Paraoxonase 2 (PON2)	-	Abcam plc	ab40969	PoAb	Rb	○	○	-	-	-	○	-	-	~×1/1000	O/N	4°C	-	Other	○		
Parathyroid Hormone	-	Yanaihara	Y421	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/50	~60m	RT	-	Thyroid	-		
Pax-5	DAK-Pax5	Agilent Technology	M730701-2	MoAb	Mo	-	-	-	-	-	○	-	-	~×1/25	O/N	4°C	-	Lymph node	○		
	-	Abcam plc	ab15164	PoAb	Rb	-	-	-	-	-	○	-	-	~×1/50	O/N	4°C	-	Lymph node	○		
Pax-6	-	Biologend	PRB-278P	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Eye	○		
PCNA	PC10	Agilent Technology	M087901-2	MoAb	Mo	○	○	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Liver	○		
				MoAb	Mo	○	-	-	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Intestine	○	
				MoAb	Mo	○	-	-	-	-	-	-	-	-	~×1/500	~60m	RT	-	Intestine	○	
				MoAb	Mo	○	-	-	-	-	○	-	-	-	~×1/1000	~60m	RT	-	Intestine	○	
				MoAb	Mo	○	○	-	-	-	-	-	-	-	~×1/200	~30m	RT	-	Liver	○	
				MoAb	Mo	○	○	-	-	-	○	-	-	-	~×1/100	~30m	4°C	-	Other	○	
				MoAb	Mo	-	○	-	-	-	-	-	-	-	Zebrafish	~×1/200	~60m	RT	-	Intestine	○
				MoAb	Mo	○	-	-	-	-	-	-	-	-	Zebrafish	~×1/200	~60m	RT	-	Intestine	○
				MoAb	Mo	-	-	-	-	-	○	-	-	-	-	~×1/200	O/N	4°C	-	Tumor tissue	○
				MoAb	Mo	○	-	○	-	-	-	-	-	-	-	~×1/500	~60m	RT	-	Eye	○
				MoAb	Mo	○	-	-	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Liver	○
				MoAb	Mo	-	-	-	-	-	-	-	-	○	-	~×1/200	O/N	4°C	-	Intestine	△
				MoAb	Mo	○	-	-	-	-	-	-	-	-	-	~×1/200	O/N	4°C	-	Other	○
				MoAb	Mo	○	-	-	-	-	-	-	-	-	-	~×1/500	~60m	RT	-	Ovary	○
				MoAb	Mo	○	○	-	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Liver	○
				PoAb	Mo	○	-	-	-	-	-	-	-	-	-	~×1/200	~60m	37°C	-	Brain	○
PoAb	Mo	○	-	-	-	-	-	-	-	-	-	~×1/100	~60m	RT	-	Liver	○				
PDX1	-	Trans Genic	KR059	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Pancreas	○		
Perilipin 1	-	Progen	GP29	PoAb	GP	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Mammary	○		
PGP-9.5		Agilent Technology	Z511601-2	PoAb	Rb	○	○	-	-	-	○	-	Cat	~×1/200	~60m	RT	-	Nerve	○		
				PoAb	Rb	○	-	-	-	-	-	-	-	-	~×1/25	O/N	4°C	-	Nerve	○	
	13C4/13C4	Abcam plc	ab8189	MoAb	Mo	○	○	-	○	-	○	-	-	~×1/100	O/N	4°C	-	Other	○		
				MoAb	Mo	-	-	-	-	○	-	-	~×1/500	O/N	4°C	-	Nerve	○			
Phospho-Histone H3	-	Cell Signaling Technology	9701	PoAb	Rb	○	○	-	-	-	-	-	-	~×1/200	O/N	4°C	-	Placenta	○		
Phospho-Histone H2A.X	Ser139/20E3	Cell Signaling Technology	9718	MoAb	Rb	○	-	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Liver	○		
PMP70	-	Abcam plc	ab3421	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/1000	~30m	RT	-	Liver	○		
Pneumocystis	-	Santa Cruz Biotechnology, Inc.	sc-71915	MoAb	Mo	-	-	-	-	-	-	-	○	~×1/100	O/N	4°C	-	Pneumocystis infected tissue	○		
Podoplanin	HG-19	AngioBio, Inc.	11-035	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Liver	○		
		SIGMA	P1995	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/1600	~60m	RT	-	Other	○		
Prosurfactant Protein C		Abcam plc	ab90716	PoAb	Rb	-	○	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Lung	○		
				PoAb	Rb	○	-	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Lung	○	
Progesteron Receptor	16	Leica Biosystems	NCL-PGR-312	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Other	○		

Supplementary Table 10-2 Immunological properties of primary antibodies and their respective IHC staining conditions

Antibody	Primary antibody										
	Fixing solution	Fixing time	Embedding	Antigen retrieval method		Solution	Concentration/pH/reagent	Incubation temperature	Incubation time	Blocking	
				Method						Blocking solution	Blocking time
p40	10% For	~60m	P	PC		Citric acid BF	-	100°C<	~10m	Goat Serum	~1hr
	10% For	~60m	P	PC		Citric acid BF	-	100°C<	~10m	Goat Serum	~1hr
p53	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~10m	Blocking One	~1hr
	10% For	Unknown	P	MW		Citric acid BF	-	-	~30m	-	-
p62/SQSTM1	10% For	Unknown	P	MW		HistoVT One	-	-	~30m	-	-
	PFA	~2d	P	AU		Citric acid BF	-	100°C<	~10m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
p63	10% For	~O/N	P	PC		Citric acid BF	-	70~100°C	~10m	VECTASTAIN Elite ABC Kit(mouse)	-
	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~30m	10% Goat Serum	~1hr
Paraoxonase 2 (PON2)	10% For	Unknown	P	MW		HistoVT One	-	-	~30m	-	-
Parathyroid Hormone	Unknown	Unknown	P	Boil		Citric acid BF	-	70~100°C	~30m	No information	-
Pax-5	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~10m	Blocking One	~1hr
	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~30m	10% Goat Serum	~1hr
Pax-6	PFA	~1d	P	MW		EDTA	-	70~100°C	~10m	3% H <sub>2</sub> O <sub>2</sub> /Rabbit serum/Protein Block	~1hr
PCNA	10% For	1y~	P	MW		Citric acid BF	-	70~100°C	~5m	4% Block Ace	~1hr
	10% For	~1m	P	PC		Tris BF	-	100°C<	~30m	Casein	O/N
	10% For	~1w	P	Boil		Distilled water	-	70~100°C	~30m	No information	-
	10% For	~1d	P	MW		Citric acid BF	0.01 M	70~100°C	~30m	5% Skim milk in PBS	~1hr
	10% For	~1y	P	MW		Distilled water	-	70~100°C	~5m	-	-
	10% For	Unknown	P	MW		Citric acid BF	-	-	~30m	-	-
	10% For	~1m	P	AU or MW		Citric acid BF	pH6.0	100°C<	~30m	Goat Serum	~1hr
	10% For	~1m	P	AU or MW		Citric acid BF	pH6.0	100°C<	~30m	Goat Serum	~1hr
	10% For	~1w	P	AU		Tris BF	-	100°C<	~10m	Blocking One	~1hr
	10% For	~1w	P	MW		Distilled water	-	100°C<	~10m	2% BSA/PBS	~1hr
	10% For	~1y	P	PC		Citric acid BF	-	100°C<	~5m	Skim milk	~1hr
	10% For	~2d	P	AU		Citric acid BF	pH6.0	70~100°C	~60m	BSA	~1hr
	DA	Unknown	P	MW		Citric acid BF	-	Unknown	~30m	Block Ace	~1hr
	10% For	~1w	P	MW		Citric acid BF	0.01M	70~100°C	~30m	No information	-
	10% For	~O/N	P	MW		Citric acid BF	-	70~100°C	~30m	No information	-
	10% For	~1d	P	Boil		Citric acid BF	-	70~100°C	~30m	No information	-
10% For	~1d	P	MW		Citric acid BF	-	70~100°C	~30m	Block Ace	~1hr	
PDX1	10% For	~O/N	P	PC		Citric acid BF	-	70~100°C	~10m	VECTASTAIN Elite ABC Kit(rabbit)	30min
Perilipin 1	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~30m	No information	-
PGP-9.5	10% For	~O/N	P	Not complied		-	-	-	-	Goat Serum	~1hr
	10% For	~1m	P	AU		Citric acid BF	pH6.0	70~100°C	~30m	BSA	~1hr
	10% For	Unknown	P	MW		HistoVT One	-	-	~30m	-	-
	10% For	~O/N	P	Boil		Citric acid BF	10mM pH6.0	70~100°C	~60m	Skim milk	~1hr
Phospho-Histone H3	10% For	~O/N	P	PC		Citric acid BF	-	70~100°C	~10m	VECTASTAIN Elite ABC Kit(rabbit)	30min
Phospho-Histone H2A.X	10% For	~O/N	P	PC		Citric acid BF	-	70~100°C	~10m	VECTASTAIN Elite ABC Kit(rabbit)	30min
PMP70	10% For	~1w	P	Boil		Tris BF	-	70~100°C	~10m	No information	-
Pneumocystis	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~10m	Blocking One	~1hr
Podoplanin	10% For	~1m	P	PC		Citric acid BF	-	100°C<	~30m	Casein	O/N
	10% For	~1m	P	Pepsin		-	-	37°C	~30m	Goat Serum	~1hr
Prosurfactant Protein C	10% For	~1w	P	MW		EDTA	1mM	100°C<	~30m	2.5% Normal serum	~1hr
	10% For	~1w	P	AU		Citric acid BF	-	100°C<	~30m	No information	-
Progesteron Receptor	10% For	Unknown	P	MW		Citric acid BF	-	-	~30m	-	-

Supplementary Table 10-3 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody	Secondary antibody							Supplementary information	Figure No.
Antibody	Secondary antibody information	Supplier	Catalog No.	Incubation time	Temperature	Reagent	Incubation time		
	Product								
p40	Histofine Simple Stain Rat MAX-PO(R)	Nichirei	414181	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Mouse MAX-PO(R)	Nichirei	414341	~30m	RT	DAB	~5m	-	
p53	Histofine Simple Stain MAX-PO(MULTI)	Nichirei	424154	~30m	37°C	DAB	~3m	-	
	-	-	-	-	-	-	No information	-	
p62/SQSTM1	Histofine Simple Stain Rat MAX-PO(R)	Nichirei	414181	-	-	-	No information	-	
	Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	~60m	RT	DAB	~3m	-	
p63	VECTASTAIN Elite ABC Kit(mouse IgG)	Vector Laboratories	PK-6102	~30m	RT	DAB	~3m	-	
	EnVision+/HRP, Mouse	Agilent Technology	-	~30m	RT	DAB	~3m	-	
Paraoxonase 2 (PON2)	Histofine Simple Stain Rat MAX-PO(R)	Nichirei	414181	-	-	-	No information	-	
Parathyroid Hormone	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	~10m	-	
Pax-5	Histofine Simple Stain MAX-PO(MULTI)	Nichirei	424154	~30m	37°C	DAB	~3m	-	
	EnVision+/HRP, Rabbit	Agilent Technology	-	~30m	RT	DAB	~3m	-	109
Pax-6	Anti rabbit IgG Goat/Biotinylated	Agilent Technology	E0432	~30m	RT	DAB	~1m	-	
PCNA	EnVision+/HRP, Mouse	Agilent Technology	-	~30m	37°C	DAB	~3m	-	
	EnVision+ Dual Link, Single Reagents, HRP	Agilent Technology	K4063	~30m	RT	DAB	~3m	-	110
	Rabbit Anti-Mouse Immunoglobulins/Biotine - Rabbit F(ab)2 (affinity isolated)	Agilent Technology	E0413	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	~60m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	~30m	RT	DAB	~5m	-	
	-	-	-	-	-	-	No information	-	
	Histofine MOUSESTAIN KIT	Nichirei	414321F	~30m	RT	DAB	~1m	-	
	Histofine Simple Stain Rat MAX PO (MULTI)	Nichirei	414191F	~30m	RT	DAB	~1m	-	
	Histofine Simple Stain MAX-PO(MULTI)	Nichirei	424154	~30m	37°C	DAB	~3m	-	
	Histofine Simple Stain Rat MAX-PO(R) (Histo Stainer)	Nichirei	714191	~30m	RT	DAB	~10m	-	
	Histofine SAB- PO(M)	Nichirei	424022	~10m	RT	DAB	~1m	-	
	Polyclonal Rabbit Anti-Mouse Immunoglobulins and Streptavidin/HRP	Agilent Technology	E0464/P0397	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	~3m	-	
	Rabbit Anti-Mouse Immunoglobulins/Biotine - Rabbit F(ab)2 (affinity isolated)	Agilent Technology	E0413	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat PO(MULTI)/ Rabbit Anti-Mouse Immunoglobulins/Biotin-RabbitF(ab)2(affinity isolated)	-	414191/ E0413	~30m	RT	DAB	~3m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	37°C	DAB	~10m	-	
Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	~3m	-		
PDX1	VECTASTAIN Elite ABC Kit(rabbit IgG)	Vector Laboratories	PK-6101	~30m	RT	DAB	~3m	-	
Perilipin 1	VECTASTAIN ABC-HRP Kit, Peroxidase (Guinea pig IgG)	Vector Laboratories	PK-4007	~30m	RT	DAB	~5m	-	111
PGP-9.5	Histofine Simple Stain MAX-PO(R), Rat: Histofine Simple Stain rat-PO(M) Mouse: Goat anti-Rabbit IgG (H+L) Highly Cross-Adsorbed, Mouse (fluorescence) Histofine Simple Stain mouse PO(M)	Nichirei	-	~30m	RT	DAB	~5m	-	112
	Polyclonal Goat Anti-Rabbit Immunoglobulins and Streptavidin/HRP	Agilent Technology	E0432/P0397	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	-	-	-	No information	-	
	EnVision+/HRP, Mouse	Agilent Technology	-	~60m	RT	DAB	~5m	-	113
Phospho-Histone H3	VECTASTAIN Elite ABC Kit(rabbit IgG)	Vector Laboratories	PK-6101	~30m	RT	DAB	~1m	-	
Phospho-Histone H2A.X	VECTASTAIN Elite ABC Kit(rabbit IgG)	Vector Laboratories	PK-6101	~30m	RT	DAB	~1m	-	
PMP70	Histofine Simple Stain Rat MAX-PO(MULTI)	Nichirei	414191	~30m	RT	DAB	~10m	-	
Pneumocystis	Histofine Simple Stain MAX-PO(MULTI)	Nichirei	424154	~30m	37°C	DAB	~3m	-	114
Podoplanin	EnVision+ Dual Link, Single Reagents, HRP	Agilent Technology	K4063	~30m	RT	DAB	~3m	-	115
	Histofine Simple Stain MAX-PO(MULTI)	Nichirei	414131F	~30m	RT	DAB	~1m	-	
Prosurfactant Protein C	VECTOR ImmPRESS HRP REAGENT Anti-Rabbit IgG	Vector Laboratories	MP-7451	~30m	RT	ImmPACT NovaRED	~3m	-	116
	Envision+ / HRP, RUO Rabbit	Agilent Technology	K4002	~30m	RT	DAB	~5m	-	
Progesteron Receptor	Histofine Simple Stain Rat MAX-PO(M)	Nichirei	414171	-	-	-	No information	-	

Supplementary Table 11-1 Immunological properties of primary antibodies and their respective IHC staining conditions

		Primary antibody																			
		Antibody				Species reactivity									Dilution	Incubation time	Temperature	Supplementary information	Positive control	Reactivity	
Antigen	Clone	Supplier	Catalog No.	Clonality	Host animal	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other								
Prohibitin	IL-14-10	Fitzgerald Industries International	10R-P140AX	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/50	O/N	4°C	-	Other	○		
	-	Proteintech	10787-1-AP	PoAb	Rb	○	○	-	-	-	○	-	-	~×1/50	O/N	4°C	-	Other	○		
	-	LifeSpan Biosciences (LSBio)	LS-C288770	PoAb	Rb	○	○	-	○	-	○	-	-	~×1/100	O/N	4°C	-	Other	○		
Prolactin	-	Santa Cruz Biotechnology, Inc.	sc-271758	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Pituitary	○		
	EPR19386	Abcam plc	183967	MoAb	Rb	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Pituitary	○		
Pseudorabies Virus	-	Abcam plc	ab3534	PoAb	Rb	-	-	-	-	-	-	-	○	~×1/500	O/N	4°C	-	Pesudorabies virus infected tissue	○		
Rabbit Macrophage	RAM11	Agilent Technology	M063301-8	MoAb	Mo	-	-	○	-	-	-	-	-	~×1/200	~60m	RT	-	Other	○		
				MoAb	Mo	-	-	○	-	-	-	-	-	-	-	~×1/50	O/N	4°C	-	Spleen	○
Rat Mast Cell Protease II	-	Moredu Scientific	MS-RM4	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/500	~60m	RT	-	Stomach	○		
Rhodopsin	RET-P1	Merck	MAB5316	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Eye	○		
RPE65	-	Abcam plc	ab77381	PoAb	Gt	○	-	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Eye	○		
S100	-	Agilent Technology	IR50461-2J	PoAb	Rb	○	-	-	-	-	○	-	-	Prediluted	~60m	RT	-	Nerve	○		
	PoAb			Rb	○	-	-	-	-	-	-	-	-	-	Prediluted	~60m	RT	-	Spinal cord	○	
	-		MoAb	Mo	-	-	-	-	-	-	○	-	-	-	Prediluted	~60m	37°C	-	Brain	○	
	4C49	Abcam plc	ab4066	MoAb	Mo	-	-	-	-	-	○	-	-	~×1/50	~30m	RT	-	Intestine	○		
	-	Nichirei Biosciences	422091	PoAb	Rb	○	-	-	-	-	○	-	-	-	Prediluted	~60m	RT	-	Nerve	○	
-	PoAb	Rb	-	-	-	-	-	-	○	○	-	-	-	Prediluted	O/N	4°C	-	Brain	○		
S100A9 + Calprotectin (S100A8/A9 complex)	MAC387	Abcam plc	ab22506	MoAb	Mo	-	○	○	-	-	-	-	-	~×1/1000	O/N	4°C	-	-	○		
Schwann Cell/Peripheral Myelin	Schwann/2E	Cosmo Bio Co., Ltd.	GU01-M01AS-A	MoAb	Mo	○	-	-	-	-	○	-	-	~×1/1000	~60m	RT	-	Nerve	○		
Sarcoplasmic/Endoplasmic Reticular Calcium ATPase 2	-	Abcam plc	ab3625	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Muscle	○		
SERCA2 ATPase	IID8	Abcam plc	ab2817	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Heart	○		
Steroidogenic Factor 1	N1665	Perseus Proteomics Inc	PP-N1665-00	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Pituitary	○		
	-	Abcam plc	ab65815	PoAb	Rb	-	-	-	-	○	-	-	-	~×1/500	~120m	RT	-	Kidney	○		
Slow Skeletal Myosin Heavy Chain	NOQ7.5.4D	Abcam plc	ab11083	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/1000	~30m	RT	-	Muscle	○		
Sox-10	-	Santa Cruz Biotechnology, Inc.	sc-365692	MoAb	Mo	-	-	-	-	-	○	-	-	~×1/500	~60m	RT	-	Eye	○		
SP-D	VIF11	Abcam plc	ab15688	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/25	~60m	RT	-	Lung	○		
	PSPD	Bioss Inc	bs-1583R	PoAb	Rb	-	○	-	-	-	-	-	-	~×1/25	O/N	4°C	-	Lung	○		
Synaptophysin	DAK-SYNAP	Agilent Technology	M731501-2	MoAb	Mo	-	-	-	-	○	-	-	-	~×1/50	O/N	4°C	-	Pancreas	○		
Alpha-synuclein (phospho S129)	EP1536Y	Abcam plc	ab51253	MoAb	Rb	-	○	-	-	○	-	-	-	~×1/1000	O/N	RT	-	Bone	○		
Talin	8d4	Sigma-Aldrich	T3287	MoAb	Mo	○	○	-	-	-	-	-	-	~×1/500	~60m	RT	-	Other	○		
TER-119/Erythroid Cells	TER-119	BioLegend	116201	MoAb	Rt	-	○	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Spleen	○		
Thyroid Transcription Factor 1	8G7G3/1	Progen	16108	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/25	~60m	RT	-	Thyroid	-		
		Agilent Technology	M357501-2	MoAb	Mo	○	○	-	-	-	-	-	-	-	~×1/100	~30m	RT	-	Lung	○	
	SPT24	Leica Biosystems	PA0364	MoAb	Mo	○	-	-	-	-	○	-	-	Prediluted	~60m	RT	-	Lung	○		
	EP1584Y	Abcam plc	ab76013	MoAb	Rb	-	○	-	-	-	-	-	-	~×1/100	O/N	4°C	-	Lung	○		
Thyroxine	-	Sigma-Aldrich	T2652	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/500	~60m	RT	-	Thyroid	○		
Tubulin βIII	TUJ1	BioLegend	MMS-435P	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Eye	○		
	TU-20	Abcam plc	ab7751	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/200	~60m	RT	-	Eye	-		
	5G8	Promega	G7121	MoAb	Mo	-	-	-	-	-	○	○	-	~×1/1000	O/N	4°C	-	Brain	○		
Tyrosine Hydroxylase	LNC1	Merck	MAB318	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/100	~30m	RT	Diluted with IMMUNOSHOT immunostaining Fine	Brain	○		
				MoAb	Mo	-	-	-	-	-	-	-	○	~×1/100	~30m	RT	-	Brain	○		
				MoAb	Mo	-	○	-	-	-	-	-	-	-	-	~×1/100	~30m	RT	Diluted with IMMUNOSHOT immunostaining Fine	Brain	○
				MoAb	Mo	-	○	-	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Brain	○
	-	Abcam plc	ab112	PoAb	Rb	○	○	-	-	○	○	-	-	~×1/1000	~60m	RT	-	Brain	○		
-	Enzo Life Sciences	BML-TZ1010-0050	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Brain	○			

Supplementary Table 11-2 Immunological properties of primary antibodies and their respective IHC staining conditions

Antibody	Primary antibody										
	Fixing solution	Fixing time	Embedding	Antigen retrieval method		Solution	Concentration/pH/reagent	Incubation temperature	Incubation time	Blocking	
				Method						Blocking solution	Blocking time
Prohibitin	10% For	Unknown	P	MW	HistoVT One	-	-	~30m	-	-	
	10% For	Unknown	P	MW	HistoVT One	-	-	~30m	-	-	
	10% For	~1w	P	MW	HistoVT One	-	-	~30m	-	-	
Prolactin	10% For	Unknown	P	Not complied	-	-	-	-	-	-	
	10% For	~1m	P	Proteinase	-	-	RT	~10m	Goat Serum	~1hr	
Pseudorabies Virus	10% For	~1w	P	MW	Citric acid BF	-	100°C<	~30m	Blocking One	~1hr	
Rabbit Macrophage	10% For	~1m	P	Not complied	-	-	-	-	Goat Serum	~1hr	
	10% For	~1m	P	Not complied	-	-	-	-	BSA	~1hr	
Rat Mast Cell Protease II	10% For	~1w	P	Not complied	-	-	-	-	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr	
Rhodopsin	DA	Unknown	P	PC	EDTA	-	Unknown	~5m	Block Ace	~1hr	
RPE65	DA	Unknown	P	MW	Citric acid BF	-	Unknown	~10m	Block Ace	~1hr	
S100	10% For	~1d	P	Not complied	-	-	-	-	5% Skim milk in PBS	~1hr	
	10% For	~O/N	P	Proteinase	-	×1000	37°C	~10m	VECTASTAIN Elite ABC Kit(rabbit)	30min	
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~10m	Blocking One	~1hr	
	10% For	~1w	P	MW	Citric acid BF	0.1M	100°C<	~30m	No information	-	
	10% For	~1d	P	Not complied	-	-	-	-	5% Skim milk in PBS	~1hr	
	10% For	~1w	P	Not complied	-	-	-	-	10% Goat Serum	~1hr	
S100A9 + Calprotectin (S100A8/A9 complex)	10% For	Unknown	P	MW	HistoVT One	-	-	~30m	-	-	
Schwann Cell/Peripheral Myelin	10% For	~1d	P	Proteinase	-	100ug/ml	RT	~10m	5% Skim milk in PBS	~1hr	
Sarcoplasmic/Endoplasmic Reticular Calcium ATPase 2	10% For	~1w	P	Trypsin	Not complied	-	37°C	~30m	No information	-	
SERCA2 ATPase	10% For	~1w	P	Proteinase	-	-	RT	~5m	No information	-	
Steroidogenic Factor 1	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	No information	-	
	10% For	~10d	P	AU	Citric acid BF	0.01mol/L	100°C<	~5m	0.5% Casein/PBS	~1hr	
Slow Skeletal Myosin Heavy Chain	PFA	~1w	P	PC	EDTA	1mbol/L	100°C<	~10m	Protein block serum	~1hr	
Sox-10	10% For	~1w	P	PC	Citric acid BF	-	100°C<	~10m	Goat Serum	~1hr	
SP-D	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr	
	10% For	Unknown	P	Proteinase	-	-	RT	~5m	Block Ace	~1hr	
Synaptophysin	10% For	~1w	P	AU	Tris BF	-	100°C<	~10m	Blocking One	~1hr	
Alpha-synuclein (phospho S129)	10% For	~1y	P	AU	Citric acid BF	0.01mol/L	100°C<	~10m	10% BoVine Serum/PBS	~1hr	
Talin	PFA	Unknown	P	Not complied	-	-	-	-	-	-	
TER-119/Erythroid Cells	10% For	~1w	P	MW	Distilled water	-	70~100°C	~30m	No information	-	
Thyroid Transcription Factor 1	Unknown	Unknown	P	MW	Immunosaver	-	70~100°C	~30m	No information	-	
	10% For	~1m	P	Boil	Citric acid BF	-	70~100°C	~120m	-	-	
	10% For	~1d	P	MW	Tris-EDTA (10 mM Tris/1 mM EDTA, pH 9.0)	1mM	70~100°C	~30m	5% Skim milk in PBS	~1hr	
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	No information	-	
Thyroxin	10% For	~O/N	P	Not complied	-	-	-	-	VECTASTAIN Elite ABC Kit(rabbit)	30min	
Tubulin βIII	PFA	~1d	P	AU	Citric acid BF	-	100°C<	~5m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr	
	10% For	~1w	P	MW	Citric acid BF	-	70~100°C	~30m	No information	-	
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	10% Goat Serum	~1hr	
Tyrosine Hydroxylase	10% For	~1w	P	PC	-	-	100°C<	~10m	Block Ace	~1hr	
	10% For	~1w	P	PC	-	-	100°C<	~10m	Block Ace	~1hr	
	10% For	~1w	P	PC	-	-	100°C<	~10m	Block Ace	~1hr	
	10% For	Unknown	P	Boil	Citric acid BF	-	Unknown	~10m	Block Ace	~1hr	
	10% For	~2m	P	Not complied	-	-	-	-	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr	
	10% For	~O/N	P	Not complied	-	-	-	-	VECTASTAIN Elite ABC Kit(rabbit)	30min	



Supplementary Table 11-3 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody	Secondary antibody							Supplementary information	Figure No.	
Antibody	Secondary antibody information		Supplier	Catalog No.	Incubation time	Temperature	Reagent			Incubation time
	Product									
Prohibitin	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	~3m	-	
	Histofine Simple Stain Rat MAX-PO(R)		Nichirei	414181	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(R)		Nichirei	414181	-	-	DAB	~3m	-	
Prolactin	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	-	-	-	No information	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191F	~30m	RT	DAB	~1m	-	
Pseudorabies Virus	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m	-	
Rabbit Macrophage	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191F	~30m	RT	DAB	~1m	-	
	Polyclonal Rabbit Anti-Mouse Immunoglobulins and Streptavidin/HRP		Agilent Technology	E0464/P0397	~30m	RT	DAB	~1m	-	
Rat Mast Cell Protease II	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	~20s	-	
Rhodopsin	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~3m	-	
RPE65	Histofine Simple Stain Rat MAX-PO(G)		Nichirei	414331	~30m	RT	DAB	~3m	-	
S100	Histofine Simple Stain Rat MAX-PO(R)		Nichirei	414181	~60m	RT	DAB	~10m	-	
	VECTASTAIN Elite ABC Kit(rabbit IgG)		Vector Laboratories	PK-6101	~30m	RT	DAB	~3m	-	
	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m	-	
	Histofine Simple Stain MAX-PO(M)		Nichirei	424131	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(R)		Nichirei	414181	~60m	RT	DAB	~10m	-	
	EnVision+/HRP, Rabbit		Agilent Technology	-	~30m	RT	DAB	~3m	-	
S100A9 + Calprotectin (S100A8/A9 complex)	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~1m	-	
Schwann Cell/Peripheral Myelin	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~60m	RT	DAB	~10m	-	
Sarcoplasmic/Endoplasmic Reticular Calcium ATPase 2	VECTASTAIN Elite ABC Kit(rabbit IgG)		Vector Laboratories	PK-6101	~30m	RT	DAB	~5m	-	
SERCA2 ATPase	Rabbit Anti-Mouse Immunoglobulins/Biotin - Rabbit F(ab)2 (affinity isolated)		Agilent Technology	E0413	~30m	RT	DAB	~5m	-	
Steroidogenic Factor 1	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	~3m	-	
	Histofine Simple Stain MAX-PO(R)		Nichirei	424141	~30m	RT	DAB	~3m	-	
Slow Skeletal Myosin Heavy Chain	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~30s	-	
Sox-10	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	~5m	-	
SP-D	Histofine Simple Stain Mouse MAX-PO(R)		Nichirei	414341	~30m	RT	DAB	~3m	-	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	~5m	-	
Synaptophysin	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m	-	
Alpha-synuclein (phospho S129)	VECTOR Biotin anti-rabbitIgG +ABC standard Kit(PK4000)		Vector Laboratories	PK4000	~120m	RT	DAB	20m<	-	
Talin	-		-	-	-	-	-	No information	For fluorescent antibody method	
TER-119/Erythroid Cells	Discontinued		-	-	-	-	DAB	~5m	-	
Thyroid Transcription Factor 1	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~60m	RT	DAB	~10m	-	
	Envision+ / HRP, RUO Rabbit		Agilent Technology	K4002	~30m	RT	DAB	~5m	-	
Thyroxin	VECTASTAIN Elite ABC Kit(rabbit IgG)		Vector Laboratories	PK-6101	~30m	RT	DAB	~30s	-	
	Envision+ / HRP, RUO Mouse		Agilent Technology	K4001	~30m	RT	DAB	~1m	-	
Tubulin βIII	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~5m	Eyes fixed by Davidson's fixative	
	EnVision+ / HRP, RUO Rabbit		Agilent Technology	-	~30m	RT	DAB	~3m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~10m	-	
Tyrosine Hydroxylase	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain Mouse MAX-PO(R)		Nichirei	414341	~10m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(R)		Nichirei	414181	~10m	RT	DAB	~10m	-	
	Envision+ / HRP, RUO Rabbit		Agilent Technology	K4003	~30m	RT	DAB	~1m	-	
	VECTASTAIN Elite ABC Kit(rabbit IgG)		Vector Laboratories	PK-6101	~30m	RT	DAB	~1m	-	

Supplementary Table 12-1 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody																					
Antibody					Species reactivity									Dilution	Incubation time	Temperature	Supplementary information	Positive control	Reactivity		
Antigen	Clone	Supplier	Catalog No.	Clonality	Host animal	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other								
Tyrosine Tubulin	TUB-1A2	Sigma-Aldrich	T9028	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Testis	○		
Uroplakin III	AU1	Progen	651108	MoAb	Mo	○	-	-	-	-	-	-	-	Prediluted	O/N	4°C	-	Kidney	○		
				MoAb	Mo	-	-	-	-	-	-	-	-	-	~×1/10	~60m	37°C	-	Urinary	○	
				MoAb	Mo	○	-	-	-	-	-	-	-	-	-	Prediluted	~60m	RT	-	Kidney	○
Uteroglobin	EOR19846	Abcam plc	ab213203	MoAb	Rb	○	-	-	-	-	-	-	~×1/5000	~30m	RT	-	Lung	○			
VC1.1 (HNK-1/N-CAM)	VC1.1	Sigma-Aldrich	C6680	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/100	~60m	RT	-	Eye	○		
VE-Cadherin	-	Abcam plc	ab33168	PoAb	Rb	-	-	○	-	-	-	-	-	~×1/1000	O/N	4°C	-	Vessel	○		
Vascular Endothelial Growth Factor A	-	Aviva Systems Biology Corp.	ARP60981_P050	PoAb	Rb	-	-	-	-	-	○	-	-	~×1/500	~60m	RT	-	Hemangiosarcoma	○		
Vimentin	V9	Agilent Technology	IR63061-2J	MoAb	Mo	○	-	○	-	-	○	-	-	Prediluted	~60m	RT	~×1/5	-	○		
				MoAb	Mo	○	-	-	-	-	-	-	Marmoset	Prediluted	~60m	RT	-	Kidney	○		
				MoAb	Mo	-	-	-	-	-	-	○	○	-	Prediluted	O/N	4°C	-	Skin	○	
				MoAb	Mo	-	-	-	-	-	-	○	○	-	Prediluted	~60m	37°C	-	Lung	○	
				MoAb	Mo	-	-	-	-	-	-	○	-	Cow	Prediluted	~30m	RT	-	Intestine	○	
			Merck	IF 01	MoAb	Mo	○	-	○	-	○	-	-	~×1/100	~60m	RT	-	Eye	○		
		D21H3	Cell Signaling Technology	5741	MoAb	Rb	-	○	-	-	-	-	-	~×1/500	O/N	4°C	-	Skin	○		
		-	Santa Cruz Biotechnology, Inc.	sc-7557	PoAb	Rb	-	○	-	-	-	-	-	~×1/500	O/N	4°C	-	Skin	○		
	EPR3776	Abcam plc	ab92547	MoAb	Rb	○	○	-	-	-	○	-	Cat	~×1/1000	~60m	RT	-	Liver	○		
Vinculin	V284	Merck	05-386	MoAb	Mo	○	○	○	-	-	-	-	-	~×1/100	~60m	RT	-	Other	○		
Von Willebrand Factor	F8/86	Agilent Technology	M061601-2	MoAb	Mo	-	-	-	-	-	○	-	-	~×1/50	O/N	4°C	-	Spleen	○		
	-	Abcam plc	ab6994	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Liver	○		
	-			PoAb	Rb	○	-	-	-	-	○	-	-	-	~×1/1000	~60m	RT	-	Vessel	○	
	-			PoAb	Rb	○	-	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Vessel	○	
	-			PoAb	Rb	-	○	-	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Liver	○
	-			PoAb	Rb	○	-	-	-	-	-	-	-	-	-	~×1/1000	~60m	RT	-	Liver	○
Willms' Tumor 1	-	Santa Cruz Biotechnology, Inc.	SC-192	PoAb	Rb	-	-	-	-	-	○	○	-	~×1/500	O/N	4°C	-	Nephroblastoma	○		
	-			PoAb	Rb	○	-	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Kidney	○		
	6F-H2	Agilent Technology	IS05530-2	MoAb	Mo	○	-	-	-	-	-	-	-	~×1/50	~60m	RT	-	Kidney	○		
	CAN-R9(IHC)-56-2	Abcam plc	ab89901	MoAb	Rb	-	○	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Kidney	○		
	-	Abcam plc	ab15249	PoAb	Rb	-	○	-	-	-	-	-	-	~×1/1000	O/N	4°C	-	Kidney	○		
	6F-H2	Thermo Fisher Scientific	MS-1837	MoAb	Mo	○	-	-	-	-	○	-	-	~×1/500	~60m	RT	-	Kidney	○		
YM1/Chitinase 3-like 3	281926	R&D Systems	MAB2446	MoAb	Rt	-	○	-	-	-	-	-	-	~×1/200	~60m	RT	-	Liver	○		
ZO-1	-	Thermo Fisher Scientific	61-7300	PoAb	Rb	○	-	-	-	-	-	-	-	~×1/50	O/N	4°C	-	Other	○		
γH2AX	-	Bethyl Laboratories, Inc.	IHC-00059	PoAb	Rb	-	○	-	-	-	-	-	-	~×1/500	O/N	4°C	-	Other	△		

Supplementary Table 12-2 Immunological properties of primary antibodies and their respective IHC staining conditions

Antibody	Primary antibody									
	Fixing solution	Fixing time	Embedding	Antigen retrieval method	Solution	Concentration/pH/reagent	Incubation temperature	Incubation time	Blocking	
				Method					Blocking solution	Blocking time
Tyrosine Tubulin	10% For	Unknown	P	Not complied	-	-	-	-	-	-
Uroplakin III	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	Protein block serum	~1hr
	10% For	~1w	P	MW	Citric acid BF	-	100°C<	~30m	Blocking One	~1hr
	10% For	~1m	P	AU	Citric acid BF	pH6.0	100°C<	~10m	Goat Serum	~1hr
Uteroglobin	10% For	~1m	P	Boil	Citric acid BF	-	70~100°C	~30m	-	-
VC1.1 (HNK-1/N-CAM)	PFA	~1d	P	AU	Citric acid BF	-	100°C<	~5m	3% H <sub>2</sub> O <sub>2</sub> /Protein Block	~1hr
VE-Cadherin	10% For	~1m	P	AU	Citric acid BF	pH6.0	70~100°C	~30m	Block Ace	~1hr
Vascular Endothelial Growth Factor A	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~10m	Blocking One	~1hr
Vimentin	10% For	~1d	P	MW	Citric acid BF	0.01 M	70~100°C	~30m	5% Skim milk in PBS	~1hr
	10% For	~10d	P	PC	Citric acid BF	10mM	100°C<	~10m	Block Ace	~1hr
	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	10% Goat Serum	~1hr
	10% For	~1w	P	MW	Citric acid BF	-	100°C<	~30m	Blocking One	~1hr
	10% For	~1w	P	MW	Citric acid BF	0.1M	100°C<	~30m	No information	-
	10% For	~1w	P	Not complied	-	-	-	-	2% BSA/PBS	~1hr
	10% For	~1w	P	PC	Citric acid BF	0.01M	100°C<	~5m	3% H <sub>2</sub> O <sub>2</sub>	~1hr
	10% For	~1m	P	AU	Citric acid BF	pH6.0	100°C<	~30m	Goat Serum	~1hr
	10% For	~1w	P	Boil	EDTA	-	100°C<	~10m	Goat Serum	~1hr
Vinculin	PFA	Unknown	-	Not complied	-	-	-	-	-	
Von Willebrand Factor	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	-	-
	10% For	~1m	P	Proteinase	-	0.4mg/mL	-	-	Casein	O/N
	10% For	~1d	P	Proteinase	-	100ug/ml	RT	~10m	5% Skim milk in PBS	~1hr
	10% For	~O/N	P	Proteinase	-	×1000	37°C	~10m	VECTASTAIN Elite ABC Kit(rabbit)	30min
	10% For	~1w	P	Proteinase	-	-	RT	~5m	No information	-
	10% For	~1w	P	Proteinase	-	-	RT	~5m	No information	-
Willms' Tumor 1	10% For	~1w	P	AU	Citric acid BF	-	100°C<	~30m	10% Goat Serum	~1hr
	10% For	~1y	P	AU	Citric acid BF	0.01mol/L	100°C<	~5m	0.5% Casein/PBS	~1hr
	10% For	~O/N	P	PC	Citric acid BF	-	70~100°C	~10m	VECTASTAIN Elite ABC Kit(mouse)	30min
	10% For	~1w	P	MW	EDTA	1mM	100°C<	~30m	2.5% Normal serum	~1hr
	10% For	~1m	P	AU	Citric acid BF	pH6.0	100°C<	~10m	Goat Serum	~1hr
YM1/Chitinase 3-like 3	10% For	~O/N	P	PC	EDTA	-	100°C<	~10m	Goat Serum	~1hr
ZO-1	10% For	Unknown	P	MW	HistoVT One	-	-	~30m	-	-
γH2AX	F, Sli, 10% For	~1hr	F	Not complied	-	-	-	-	Swine serum(x500)	~1hr

Supplementary Table 12-3 Immunological properties of primary antibodies and their respective IHC staining conditions

Primary antibody	Secondary antibody							Supplementary information	Figure No.	
Antibody	Secondary antibody information		Supplier	Catalog No.	Incubation time	Temperature	Reagent			Incubation time
	Product									
Tyrosine Tubulin	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~1m	-	
Uroplakin III	Envision+ / HRP, RUO Mouse		Agilent Technology	K4001	~30m	RT	DAB	~5m	130	
	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m	-	
Uteroglobin	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	414131F	~30m	RT	DAB	~1m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~5m	-	
VC1.1 (HNK-1/N-CAM)	Envision+ / HRP, RUO Mouse		Agilent Technology	K4001	~30m	RT	DAB	~3m	-	
VE-Cadherin	Histofine Simple Stain Rat MAX-PO(R)		Nichirei	414181	~30m	RT	DAB	~3m	-	
Vascular Endothelial Growth Factor A	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m	-	
	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~60m	RT	DAB	~10m	-	
Vimentin	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~3m	-	
	EnVision+/HRP, Mouse		Agilent Technology	-	~30m	RT	DAB	~3m	131	
	Histofine Simple Stain MAX-PO(MULTI)		Nichirei	424154	~30m	37°C	DAB	~3m	-	
	Histofine Simple Stain MAX-PO(M)		Nichirei	424131	~30m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI) (Histo Stainer)		Nichirei	714191	~30m	RT	DAB	~10m	-	
	EnVision+ Dual Link, Single Reagents, HRP		Agilent Technology	K4063	~30m	RT	DAB	~3m	132	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191F	~30m	RT	DAB	~1m	-	
	Histofine Simple Stain Rat MAX-PO(R)		Nichirei	414181	~30m	RT	DAB	~5m	133	
Vinculin	-		-	-	-	-	No information	For fluorescent antibody method	-	
Von Willebrand Factor	LSAB Kits, Universal, HRP, Rabbit/Mouse		Agilent Technology	K0675	~10m	RT	DAB	~10s	-	
	EnVision+ Dual Link, Single Reagents, HRP		Agilent Technology	K4063	~30m	RT	DAB	~3m	-	
	Histofine Simple Stain Rat MAX-PO(R)		Nichirei	414181	~60m	RT	DAB	~10m	134	
	VECTASTAIN Elite ABC Kit(rabbit IgG)		Vector Laboratories	PK-6101	~30m	RT	DAB	~1m	-	
	Histofine Simple Stain Mouse MAX-PO(R) (Histo Stainer)		Nichirei	714341	~30m	RT	DAB	~5m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI) (Histo Stainer)		Nichirei	714191	~30m	RT	DAB	~5m	-	
Willms' Tumor 1	EnVision+/HRP, Rabbit		Agilent Technology	-	~30m	RT	DAB	~3m	135	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191	~30m	RT	DAB	~3m	-	
	VECTASTAIN Elite ABC Kit(mouse IgG)		Vector Laboratories	PK-6102	~30m	RT	DAB	~3m	-	
	VECTOR ImmPRESS HRP REAGENT Anti-Rabbit IgG		Vector Laboratories	MP-7451	~30m	RT	ImmPACT NovaRED	~3m	-	
	Histofine Simple Stain Rat MAX-PO(MULTI)		Nichirei	414191F	~30m	RT	DAB	~1m	-	
YM1/Chitinase 3-like 3	Histofine Simple Stain Rat MAX-PO(M)		Nichirei	414171	~60m	RT	DAB	~10m	-	
	Histofine Simple Stain Rat MAX-PO(Rat)		Nichirei	414311	~30m	RT	DAB	~5m	136	
ZO-1	Histofine Simple Stain Rat MAX-PO(R)		Nichirei	414181	-	-	-	No information	-	
γH2AX	Rabbit IgG (H+L), Alexa488		-	A11008	~30m	37°C	Other	No information	-	

-: Not applicable or implementec

Clonality	MoAb, Monoclonal ; PoAb, Polyclonal
Animal species	Rt, Rat; Mo, Mouse; Rb, Rabbit; GP, Guinea pig; Pri, Primate; Dog, Dog; Sw, Swine; Other, Other.
Reactivity	○, good; △, conditional; ×, inappropriate
Fixing solution	For, Buffered formalin; PFA, Paraformaldehyde; Zinc For, Zinc formalin; DA, Davidson; PLP, Periodate lysine paraformaldehyde; F, Sli, Frozen, Slice; Bo, Bouin Solution
Embedding	F, Frozen; P, Paraffin
Antigen retrieval method	MW, Microwave; AU, Autoclave; PC, Pressure cooker; Boil, Boiling
Solution	BF, Buffer
Time	s, second; m, minute; hr, hour; o/n, over night; d, day; w, week; m, month; y, year.
Blocking	H <sub>2</sub> O <sub>2</sub> , Hydrogen peroxide; BSA, Bovine serum albumin; PBS, Phosphate buffered salt
Temperature	RT, Room temperature.
Coloring Reagent	NF, New Fuchsin; DAB, Diaminobenzidine; FITC, Fluorescein isothiocyanate