J Toxicol Pathol 2021; 34: 161–180

Technical Report

Databases for technical aspects of immunohistochemistry: 2021 update

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Abstract: With the aim of sharing information about the technical aspects of immunohistochemistry (IHC) and facilitating the selection of suitable antibodies for histopathological examination, this technical report describes the results of a questionnaire distributed during the period of 2018 to 2019 among members of the Conference on Experimental Animal Histopathology. Additionally, it describes the immunological properties and supplier details (clone, supplier, catalog number, species reactivity, etc.) as well as the IHC staining conditions (fixing solution, fixing time, embedding, antigen retrieval method, antibody dilution, incubation time, incubation temperature, positive control tissue, blocking condition, secondary antibody information, etc.) for a total of 509 primary antibodies (comprising 220 different types). These survey results were an update on the contents reported by CEAH in 2017. (DOI: 10.1293/tox.2021-0006; J Toxicol Pathol 2021; 34: 161–180)

Key words: antibody, immunohistochemistry, toxicological pathology, experimental animal

Immunohistochemistry (IHC) is a biochemical method that involves the utilization of an antibody-based strategy for identifying a specific antigen, in order to understand the distribution as well as localization of biomarkers and differentially expressed proteins in different regions of a biological tissue[1]. IHC is widely used for diagnostic interpretation and understanding of pathogenesis, whereby it has become a routine tool for toxicological pathology. In 2017 (survey period: 2014 to 2015), the IHC database summarized various IHC staining conditions, as reported by the Conference on Experimental Animal Histopathology (CEAH), which includes 89 research institutes—such as pharmaceutical companies, chemical companies, universities, public research institutes, and contract research organizations—involved in experimental animal pathological research in Japan and Korea[2]. Since the IHC database is of particular significance to pathologists, it is important to provide the latest information on IHC and to revise the discontinued antibodies or changes in supplier name. Therefore, a questionnaire about IHC was distributed during the period of 2018 to 2019 among members of the CEAH, and the database was updated based on its results. In addition, blocking condition information has been added to this updated database.

A total of 509 primary antibodies (comprising 220 different types) were available from 62 research institutes, according to the responses to the questionnaire. With the aim of sharing information about the technical aspects of IHC and facilitating the selection of suitable antibodies for histopathological examination, the present technical report describes the IHC questionnaire results. Moreover, the IHC histological photographs of some primary antibodies have been provided in the figures to clarify the antigen localization and staining conditions in the respective tissues. The immunological properties and supplier details of primary antibodies (clone, supplier, catalog number, species reactivity, etc.), as well as IHC staining conditions (fixing solution, fixing time, embedding, antigen retrieval method, antibody dilution, incubation time, incubation temperature, positive control tissue, blocking condition, secondary antibody information, etc.) are presented in Table 1–9 and Supplementary Table 1–12: online only, while Fig. 1–136 depict IHC histological photographs.

Received: 25 January 2021, Accepted: 27 January 2021
Published online in J-STAGE: 25 February 2021
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Table 1. Immunological Properties of Primary Antibodies and Their Respective IHC Staining Conditions

Primary antibody												Figure No.
Antibody			Species reactivity									
Antigen	Clone	Supplier	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other	Dilution	
ACTH	SPM333	Santa Cruz Biotechnology, Inc.	○	○	-	-	-	-	-	-	~×1/100	
	02A3	Agilent Technology	○	-	-	-	-	-	-	-	~×1/500	
Actin, β	AC-74	Sigma-Aldrich	○	○	○	-	-	○	-	-	~×1/500	
Actin, muscle	HHF35	Agilent Technology	○	-	-	-	-	-	-	-	~×1/100	
Actin, sarcomeric	Alpha-Sr-1	Agilent Technology	○	-	-	-	-	-	-	-	×1/10	
			○	-	-	-	-	-	-	-	~×1/100	
			○	-	-	-	-	-	-	-	~×1/50	
Actin, α-smooth muscle	1A4	Agilent Technology	○	-	-	-	-	○	-	-	~×1/50	
			○	○	-	-	-	-	-	-	~×1/100	
			○	○	-	-	-	-	-	-	~×1/50	1
			-	-	-	-	-	○	○	-	~×1/200	
			○	-	-	-	-	-	-	-	~×1/1,000	
			○	-	-	-	-	-	-	Marmoset	~×1/100	
			-	○	-	-	-	-	-	-	~×1/100	
			○	-	-	-	-	-	-	-	~×1/500	
			○	-	-	-	-	○	-	-	~×1/1,000	
			○	-	-	-	-	-	-	-	~×1/100	
			-	-	-	-	-	○	-	Cow	~×1/1,000	
			-	-	-	-	-	○	-	-	Prediluted	
		Nichirei Biosciences	○	○	-	-	-	-	-	-	Prediluted	2
	E184	Abcam plc	○	-	-	-	-	-	-	-	~×1/500	
			○	○	-	-	-	-	-	-	~×1/500	
	EPR5368	Abcam plc	-	○	-	-	-	-	-	-	~×1/500	
Adipophilin	-	Progen	○	-	-	-	-	-	-	-	~×1/100	
			○	○	-	-	-	-	-	-	~×1/100	
			○	○	-	-	-	-	-	-	~×1/1,000	
			-	○	-	-	-	-	-	○	~×1/100	
	AP125		○	-	-	-	-	○	-	-	Prediluted	3
			○	-	-	-	-	○	-	-	Prediluted	
			○	-	-	-	-	-	-	Marmoset	~×1/200	
			○	-	-	-	-	-	-	-	Prediluted	
			○	-	-	-	-	-	-	-	Prediluted	
		Acris Antibodies GmbH	○	-	-	-	-	-	-	-	~×1/50	4
	-	Novus Biologicals	-	○	-	-	-	-	-	-	~×1/20,000	
Albumin	-	Agilent Technology	○	-	-	-	-	-	-	-	~×1/1,000	
Amylase 2A	-	Proteintech	○	-	-	-	-	-	-	-	~×1/200	
β-Amyloid	6E10	Covance	-	○	-	-	-	-	-	-	~×1/500	
	82E1	Immuno-Biological Laboratories Co., Ltd.	-	○	-	-	-	-	-	-	~×1/200	
Androgen receptor	G122-25	BD Pharmingen Inc.	-	-	○	-	-	-	-	-	~~×1/100	
Anti-Human Macrophage Scavenger Receptor A (MSR-A:CD204)	SRA-E5	Trans Genic	-	-	-	-	○	-	-	-	~×1/500	5
Aquaporin 1	1/22	Abcam plc	○	○	-	-	○	-	-	-	~×1/200	6
	1/A5F6	GeneTen	○	○	-	-	-	-	-	-	~×1/1,000	7
	-	Merck	○	-	-	-	-	-	-	-	×1/1,000	8
Aquaporin 2	-	Prosci	○	-	-	-	-	-	-	-	~×1/1,000	9
ATG5	-	Novus Biologicals	○	-	-	-	-	-	-	-	~×1/500	
ATP synthase C	SCMAS	Abcam plc	-	○	-	-	-	-	-	-	~×1/200	
Bcl-2	124	Agilent Technology	○	-	-	-	-	-	-	-	~×1/100	
BCRP	BXP-53	Enzo Life Sciences	○	○	-	-	-	○	-	-	~×1/1,000	
	BXP-21	Cell Science	-	-	-	-	-	-	-	Xenograft (Human)	~×1/1,000	
BrdU	Bu20a	Agilent Technology	○	○	-	-	-	-	-	-	~×1/1,000	10
			○	-	-	-	-	-	-	-	~×1/100	
			○	-	-	-	-	-	-	-	~×1/100	
			-	○	-	-	-	-	-	-	~×1/100	
	IIB5	Abcam plc	○	○	-	-	-	-	-	-	~×1/1,000	
	Bu20a	Bio-Rad Laboratories, Inc.	○	-	-	-	-	-	-	-	~×1/1,000	
N-cadherin	3B9	Thermo Fisher Scientific	○	-	-	-	-	○	-	-	~×1/100	11
			-	○	-	-	-	-	-	-	~×1/100	
Calbindin D28K	CB-955	Sigma-Aldrich	-	○	-	-	-	-	-	-	~×1/1,000	
			-	-	○	-	-	-	-	-	~×1/1,000	12
		Abcam plc	-	-	-	-	-	○	-	-	~×1/200	
	D1I4Q	Cell Signaling Technology	○	-	-	-	○	-	-	-	~×1/1,000	13
Calponin	CALP	Thermo Scientific	○	-	-	-	-	○	-	-	~×1/1,000	14
	hCP	Sigma-Aldrich	-	-	-	-	-	○	-	-	~×1/1,000	15

- : Not applicable or implemented. Animal species: Rt, Rat; Mo, Mouse; Rb, Rabbit; GP, Guinea pig; Pri, Primate; Dog, Dog; Sw, Swine; Other, Other. Reactivity: ○, good; ×, inappropriate.

Table 2. Immunological Properties of Primary Antibodies and Their Respective IHC Staining Conditions

Primary antibody												Figure No.
Antibody			Species reactivity									
Antigen	Clone	Supplier	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other	Dilution	
Calretinin	DAK-Calret1	Agilent Technology	○	-	-	-	-	-	-	-	~×1/50	
	6B8.2	Merck	-	-	○	-	-	-	-	-	~×1/500	16
Carcinoembryonic Antigen	II-7	Agilent Technology	-	-	-	-	-	○	-	-	~×1/25	
Caspase-3	-	Promega	○	○	-	-	-	-	-	-	~×1/200	
	-	Cell Signaling Technology	○	-	-	-	-	-	-	-	~×1/200	
Cleaved Caspase-3	-	Cell Signaling Technology	○	-	-	-	-	-	-	-	~×1/1,000	
			○	○	-	-	-	○	-	-	~×1/200	
			○	-	-	-	-	-	-	-	~×1/500	
			-	○	-	-	-	-	-	-	~×1/500	
			○	○	-	-	-	-	-	-	~×1/1,000	
Catalase	-	Abcam plc	○	-	-	-	-	-	-	-	~×1/200	
	-		-	○	-	-	-	-	-	-	~×1/200	
β catenin	E247	Abcam plc	-	○	-	-	-	-	-	-	~×1/500	
			-	-	-	-	-	-	-	Marmoset	~×1/500	
	14	BD Transduction Laboratories	-	○	-	-	-	-	-	-	~×1/1,000	
			-	○	-	-	-	-	-	-	~×1/1,000	17
			○	-	-	-	-	-	-	-	~×1/100	
Cathepsin K	-	Abcam plc	-	○	-	-	-	-	-	-	~×1/200	
CD3	F7.2.38	Agilent Technology	-	-	-	-	-	○	-	Cow	~×1/100	
			○	-	-	-	-	-	-	-	~×1/50	
			○	-	-	-	-	-	-	-	~×1/100	18
			○	-	-	-	-	○	-	-	~×1/1,000	
	SP-7	Abcam plc	○	-	-	-	-	-	-	-	~×1/200	
			○	○	-	-	-	-	-	Cat	~×1/100	
		Nichirei Biosciences	○	○	-	-	-	○	-	-	Prediluted	
	-	Abcam plc	-	○	-	-	-	-	-	-	~×1/100	19
	-	Agilent Technology	-	-	-	-	-	○	-	-	Prediluted	20
			-	-	-	-	○	-	-	-	Prediluted	
			○	-	-	-	-	-	-	-	Prediluted	
	-	Sigma-Aldrich	-	-	-	-	-	○	○	-	~×1/1,000	21
	-	Santa Cruz Biotechnology, Inc.	○	○	-	-	-	-	-	-	~×1/100	22
	HH3E	Dianova	-	○	-	-	-	-	-	-	~×1/100	
	-	Agilent Technology	-	-	-	-	-	○	-	Cow, Cat	~×1/50	
CD3e	-	Nichirei Biosciences	○	○	-	-	-	-	-	-	Prediluted	
CD4	-	Biorbyt	○	○	○	-	-	×	-	-	~×1/100	
	OTI10B5	OriGene	○	-	-	-	-	-	-	-	~×1/50	
	1F6	Nichirei Biosciences	-	-	-	-	○	-	-	-	Prediluted	
	-	Santa Cruz Biotechnology, Inc.	-	○	-	-	-	-	-	-	~×1/1,000	
CD10	56C6	Thermo Fisher Scientific	-	-	-	-	-	○	-	-	~×1/500	
CD11b	OX42	Bio-Rad Laboratories, Inc.	○	-	-	-	-	-	-	-	~×1/500	23
CD20	-	Lab Vision (Thermo Fisher Scientific)	-	-	-	-	-	○	-	Cow	~×1/500	
	-		-	-	-	-	-	○	-	Cat	~×1/200	24
	-	Biocare Medical, LLC	-	-	-	-	-	○	-	-	~×1/100	25
	-	Thermo Scientific	-	○	-	-	-	-	-	-	~×1/500	
CD20cy	L26	Agilent Technology	-	-	-	-	○	-	-	-	Prediluted	26
CD31	-	Abcam plc	-	○	-	-	-	-	-	-	~×1/100	
	MEC13.3	BD Pharmingen Inc.	-	○	-	-	-	-	-	-	~×1/200	27
CD34	-	Boster Immunoleader	○	-	-	-	-	-	-	-	~×1/200	28
			○	○	-	-	-	-	-	-	~×1/1,000	
CD36	-	Novus Biologicals	○	○	-	-	-	-	-	-	~×1/1,000–5,000	
CD45R	RA3-6B2	BD Pharmingen Inc.	-	○	-	-	-	-	-	-	~×1/50	29
			-	○	-	-	-	-	-	-	~×1/100	
			-	○	-	-	-	-	-	-	~×1/100	
		R&D Systems	-	○	-	-	-	-	-	-	~×1/500	
		Santa Cruz Biotechnology, Inc.	○	○	-	-	-	-	-	-	~×1/500	
CD61	Y2/51	Agilent Technology	-	-	-	-	-	○	-	-	~×1/50	

- : Not applicable or implemented. Animal species: Rt, Rat; Mo, Mouse; Rb, Rabbit; GP, Guinea pig; Pri, Primate; Dog, Dog; Sw, Swine; Other, Other. Reactivity: ○, good; ×, inappropriate.

Table 3. Immunological Properties of Primary Antibodies and Their Respective IHC Staining Conditions

Primary antibody												Figure No.
Antibody			Species reactivity									
Antigen	Clone	Supplier	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other	Dilution	
CD68	ED1	Bio-Rad Laboratories, Inc.	○	-	-	-	-	-	-	-	~×1/1,000	
			○	-	-	-	-	-	-	-	~×1/100	30
			○	-	-	-	-	-	-	-	~×1/100	
			○	-	-	-	-	-	-	-	~×1/500	
		BMA Biomedicals	○	-	-	-	-	-	-	-	~×1/100	
			○	○	-	-	-	-	-	-	~×1/500	
			○	-	-	-	-	-	-	-	~×1/100	
		Merck	○	-	-	-	-	-	-	-	~×1/500	
			○	-	-	-	-	-	-	-	~×1/200	
		Bio-Rad Laboratories, Inc.	○	-	-	-	-	-	-	-	~×1/100	
			○	-	-	-	-	-	-	-	~×1/200	
		Abcam plc	○	-	-	-	-	-	-	-	~×1/500	31
	KP1	Agilent Technology	-	-	-	-	○	-	-	-	~×1/50	32
			-	-	-	-	○	-	-	-	Prediluted	33
CD79α	HM57	Abcam plc	○	-	-	-	-	○	-	-	~×1/4,000	
CD117/c-kit	-	Agilent Technology	○	-	-	-	-	-	-	-	~×1/100	
			-	-	-	-	-	○	-	-	~×1/200	34
			-	-	-	-	-	○	-	Cat	~×1/500	
			-	-	-	-	-	○	-	-	~×1/500	
			-	-	-	-	○	-	-	-	~×1/500	
CD138	281-2	BD Pharmingen Inc.	-	○	-	-	-	-	-	-	~×1/1,000	
CD163	ED2	Bio-Rad Laboratories, Inc.	○	-	-	-	-	-	-	-	~×1/200	35
			○	-	-	-	-	-	-	-	~×1/100	
			○	-	-	-	-	-	-	-	~×1/50	
		BMA Biomedicals	○	-	-	-	-	-	-	-	~×1/200	
Cdc2	-	Santa Cruz Biotechnology, Inc.	○	○	-	-	-	-	-	-	~×1/1,000	
c-erb-2	-	Agilent Technology	-	-	-	-	-	○	-	-	~×1/500	
			-	-	-	-	○	-	-	-	~×1/200	
Chitinase 3-like 1 (CHI3L1)	-	Abcam plc	-	○	-	-	-	-	-	-	~×1/500	36
Chromogranin A	-	Nichirei Biosciences	-	-	-	-	-	○	-	-	Prediluted	
			-	-	-	-	-	○	-	-	~×1/100	37
	-	Abcam plc	○	-	-	-	-	-	-	-	~×1/500	
Chx10	-	Exalpha biologicals	○	-	-	-	-	-	-	-	~×1/50	
Claudin 11	-	Novus Biologicals	○	○	-	-	-	-	-	-	~×1/100	
	-	Thermo Fisher Scientific	○	○	-	-	-	-	-	-	~×1/100	
Clusterin	-	R&D Systems	○	-	-	-	-	-	-	-	~×1/50	
			○	-	-	-	-	-	-	-	~×1/50	
Collagen type I	-	Abcam plc	○	-	-	-	-	-	-	-	~×1/200	
			-	-	-	-	-	-	-	○	~×1/500	
Collagen typeII	II-4C11	KYOWA PHARMA CHEMICAL	○	-	-	-	-	-	-	-	~×1/100	
			-	-	-	-	-	-	○	-	~×1/100	
Collagen type III	FH-7A	Abcam plc	○	-	-	-	-	-	-	-	~×1/1,000	
Collagen type IV	-	Bio-Rad Laboratories, Inc.	○	○	-	-	-	-	-	-	~×1/500	
Cox-2	33	BD Transduction Laboratories	-	○	-	-	-	-	-	-	~×1/50	
			-	○	-	-	-	-	-	-	~×1/100	
	-	Immuno-Biological Laboratories Co., Ltd.	○	-	-	-	-	-	-	-	~×1/50	38
	33	BD Transduction Laboratories	○	-	○	-	-	○	-	-	~×1/200	
	-	Cayman Chemical	○	-	-	-	-	-	-	-	~×1/1,000	
CXCR3	-	Bioss Inc	○	○	-	○	-	○	-	-	~×1/100	
Cyclin D1	DCS6	Cell Signaling Technology	○	○	-	-	-	-	-	-	~×1/100	
Cystatin C	-	Abcam plc	○	-	-	-	-	-	-	-	~×1/1,000	
Cytokeratin or Keratin/ cytokeratin	AE1/AE3	Agilent Technology	○	○	-	-	-	-	-	-	Prediluted	
			○	-	○	-	-	○	-	-	Prediluted	
			○	-	-	-	-	-	-	Marmoset	Prediluted	
			-	-	-	-	-	○	-	-	Prediluted	39
			○	-	-	-	-	-	-	-	Prediluted	
			-	-	-	-	○	-	-	-	Prediluted	
		Nichirei Biosciences	-	-	-	-	-	○	○	-	Prediluted	
			○	-	-	-	-	○	-	Zebrafish	Prediluted	40
			-	○	-	-	-	-	-	-	Prediluted	
			○	○	-	-	-	○	-	-	Prediluted	
			○	-	-	-	-	-	-	-	Prediluted	
Cytokeratin	-	Nichirei Biosciences	○	-	-	-	-	-	-	-	Prediluted	41
Cytokeratin 6	-	Abcam plc	-	○	-	-	-	-	-	-	~×1/500	

- : Not applicable or implemented. Animal species: Rt, Rat; Mo, Mouse; Rb, Rabbit; GP, Guinea pig; Pri, Primate; Dog, Dog; Sw, Swine; Other, Other. Reactivity: ○, good; ×, inappropriate.

Table 4. Immunological Properties of Primary Antibodies and Their Respective IHC Staining Conditions

Primary antibody												Figure No.
Antibody			Species reactivity									
Antigen	Clone	Supplier	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other	Dilution	
Cytokeratin 7	OV-TL 12/30	Agilent Technology	-	○	-	-	-	○	-	Cat	~×1/25	42
			○	-	-	-	-	○	-	Cat	~×1/25	
Cytokeratin 8	Ks8.7	Progen	-	○	-	-	-	-	-	-	~×1/20	
Cytokeratin 8/18	-	Progen	-	○	-	-	-	-	-	-	~×1/100	
			○	○	-	-	-	-	-	-	~×1/1,000	
Cytokeratin 10	DE-K10	Abcam plc	○	○	-	-	-	-	-	-	~×1/500	
Cytokeratin 14	-	GeneTex	○	-	-	-	-	-	-	-	~×1/500	43
Cytokeratin 18	Ks18.04	Progen	-	○	-	-	-	-	-	-	~×1/100	
	C-04	Abcam plc	○	-	-	-	-	-	-	Cat	~×1/100	
		Santa Cruz Biotechnology, Inc.	○	-	-	-	-	-	-	-	~×1/100	44
Cytokeratin 19	b170	Leica Biosystems	○	-	-	-	-	○	-	○	~×1/200	45
			-	○	-	-	-	-	-	-	~×1/150	
	-	Agilent Technology	-	-	-	-	-	○	-	-	~×1/50	46
	-	Abcam plc	○	○	-	-	-	○	-	Cat	~×1/100	47
			○	-	-	-	-	-	-	-	~×1/50	
	BA17	R&D Systems	○	-	-	-	-	-	-	-	~×1/500	
Desmin	D33	Agilent Technology	○	-	-	-	-	○	-	-	Prediluted	
			○	-	-	-	-	-	-	-	Prediluted	
			-	-	-	-	-	○	-	○	Prediluted	48
			○	-	-	-	-	-	-	-	Prediluted	
			○	-	-	-	-	-	-	Marmoset	Prediluted	
			○	-	-	-	-	-	-	-	Prediluted	
		Nichirei Biosciences	-	-	-	-	-	○	-	-	Prediluted	
Dityrosine (DT)	1C3	Japan Institute for the Control of Aging, NIKKEN SEIL Co, Ltd.	○	○	-	-	-	○	-	-	~×1/200	
Dog IgG	-	Bethyl Laboratories, Inc.	-	-	-	-	-	○	-	-	~×1/200	
Dog IgM	-	Bethyl Laboratories, Inc.	-	-	-	-	-	○	-	-	~×1/200	
E.coli	-	USBiological	-	○	-	-	-	-	-	-	~×1/500	
E-cadherin	36/E-Cadherin	BD Transduction Laboratories	○	-	-	-	-	○	-	-	~×1/500	49
	-	Santa Cruz Biotechnology, Inc.	○	-	-	-	-	-	-	-	~×1/50	
Estrogen receptor α (ERα)	-	Santa Cruz Biotechnology, Inc.	○	-	-	-	-	-	-	-	~×1/200	50
	6F11	Thermo Fisher	○	-	-	-	-	-	-	-	~×1/100	
Endothelin-1 (ET-1)	-	Immuno-Biological Laboratories Co., Ltd.	-	-	-	-	-	○	-	-	~×1/25	51
Endothelin-A (ET-A)	A-405	Immuno-Biological Laboratories Co., Ltd.	-	-	-	-	-	○	-	-	~×1/25	52
Endothelin-B (ET-B)	8Z11	Immuno-Biological Laboratories Co., Ltd.	-	-	-	-	-	○	-	-	~×1/50	53
F4/80	CI:A3-1	Abcam plc	-	○	-	-	-	-	-	-	~×1/500	
	BM8	eBioscience (Thermo Fisher Scientific)	○	○	-	-	-	-	-	-	~×1/100	
Fas	-	Abnova	○	-	-	-	-	-	-	-	~×1/500	
Fascin	EP5902	Abcam plc	○	-	-	-	-	-	-	-	~×1/1,000	54
Fibrinogen	-	Agilent Technology	○	-	-	-	-	-	-	-	~×1/200	
FosB	-	Santa Cruz Biotechnology, Inc.	-	-	-	-	○	-	-	-	~×1/100	55
Foxp3	FJK-16s	eBioscience (Thermo Fisher Scientific)	○	○	-	-	-	○	-	-	~×1/100	
FSH	-	Bio-Rad Laboratories, Inc.	○	-	-	-	-	-	-	-	~×1/1,000	56
Galectin-1	-	R&D Systems	-	○	-	-	-	-	-	-	~×1/50	
Glial Fibrillary Acidic Protein (GFAP)	-	Agilent Technology	○	-	-	-	-	○	-	-	Prediluted	57
	-		-	-	-	-	-	○	-	-	Prediluted	
	-		○	-	-	-	-	-	-	Marmoset	Prediluted	
			-	○	-	-	-	-	-	-	Prediluted	
	6F2		○	-	-	-	○	-	-	-	~×1/100	
	GA5	Nichirei Biosciences	○	-	-	-	-	-	-	-	Prediluted	58
	GA5	Cell Signaling Technology	○	-	-	-	-	○	-	-	~×1/1,000	59
			○	-	-	-	-	-	-	-	~×1/1,000	
Growth Hormone	222540	R&D Systems	○	-	-	-	-	-	-	-	~×1/1,000	60
α2u-globulin	-	R&D Systems	○	-	-	-	-	-	-	-	~×1/100	
			○	-	-	-	-	-	-	-	~×1/500	
			○	-	-	-	-	-	-	-	~×1/200–300	
			○	-	-	-	-	-	-	-	~×1/1,000	
	-		○	-	-	-	-	-	-	-	~×1/100	61
α2u-globulin (Biotinylated)	129736	R&D Systems	○	-	-	-	-	-	-	-	~×1/100	62
Glucagon	K79bB10	Abcam plc	○	-	-	-	-	-	-	-	~×1/4,000	63
Glucose transporter 1 (GLUT1)	-	Abcam plc	○	-	-	-	-	-	-	-	~×1/200	
Glutamine Synthetase	GS-6	Merck	○	-	-	-	-	-	-	-	~×1/200	

- : Not applicable or implemented. Animal species: Rt, Rat; Mo, Mouse; Rb, Rabbit; GP, Guinea pig; Pri, Primate; Dog, Dog; Sw, Swine; Other, Other. Reactivity: ○, good; ×, inappropriate.

Table 5. Immunological Properties of Primary Antibodies and Their Respective IHC Staining Conditions

Primary antibody												Figure No.
Antibody			Species reactivity									
Antigen	Clone	Supplier	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other	Dilution	
Glutatione S-transferase Placental	-	MBL International	○	-	-	-	-	-	-	-	~×1/1,000	
type	-		○	-	-	-	-	-	-	-	~×1/1,000	
	-		○	-	-	-	-	-	-	-	~×1/1,000	
	-		-	○	-	-	-	-	-	-	~×1/1,000	
	-		○	-	-	-	-	-	-	-	~×1/200	64
	-		○	○	-	-	-	-	-	-	~×1/1,000	
	-		○	-	-	-	-	-	-	-	Prediluted	65
	-		○	-	-	-	-	-	-	-	Prediluted	
Hemoglobin	-	MP Biomedicals	-	○	-	-	-	-	-	-	~×1/1,000	
Hepatocyte	OCH1E5	Agilent Technology	-	-	-	-	-	○	-	-	~×1/25	
			-	-	-	-	-	○	-	-	Prediluted	66
Hexanoyl lysine (HEL)	5F12	Japan Institute for the Control of Aging, NIKKEN SEIL Co, Ltd.	○	-	-	-	-	○	-	-	~×1/100	
HLA-DR(MHC class II)/TAL.1B5	TAL.1B5	Agilent Technology	-	-	-	-	-	○	-	-	~×1/500	67
Heat Shock Protein 60 (HSP60)	D6F1	Cell Signaling Technology	○	○	-	-	-	○	-	-	~×1/500	
Heat Shock Protein 70 (HSP70)	-	Santa Cruz Biotechnology, Inc.	-	○	-	-	-	-	-	-	~×1/500	
T-bet/TBX21	-	LifeSpan BioSciences	-	-	-	-	-	○	-	-	~×1/100	
4-Hydroxy-2-nonenal	HNEJ-2	Japan Institute for the Control of Aging, NIKKEN SEIL Co, Ltd.	○	-	-	-	-	-	-	-	~×1/100	
Iba1	-	FUJIFILM Wako Pure Chemical Corporation	○	-	-	-	-	-	-	-	~×1/1,000	
			-	-	-	-	-	○	-	Cow	~×1/200	
			○	○	-	-	-	-	-	-	~×1/500	68
			○	-	-	-	-	○	-	-	~×1/2,000	
			-	-	-	-	-	○	-	Cow, Cat	~×1/50	
			-	○	-	-	-	-	-	-	~×1/1,000	
			○	-	-	-	-	-	-	○	~×1/500	
			-	○	-	-	-	-	-	-	~×1/500	
			○	-	-	-	-	-	-	-	~×1/1,000	
			-	○	-	-	-	-	-	-	~×1/1,000	
			○	-	-	-	-	○	-	-	~×1/1,000	
			-	-	-	-	-	○	-	-	~×1/500	69
			-	○	-	-	-	-	-	-	~×1/500	
			○	-	-	-	-	-	-	-	~×1/1,000	
			-	-	-	-	○	-	-	-	~×1/1,000	
	-	Bioss Inc	○	-	-	-	-	-	-	-	~×1/500	
IgG	-	Agilent Technology	-	-	-	-	○	-	-	-	Prediluted	
IL-17	-	Abcam plc	○	○	-	-	-	○	-	-	~×1/200	
Influenza A Virus	-	Merck	-	-	-	-	-	○	-	-	~×1/100	
iNOS	-	Abcam plc	-	-	-	-	-	○	-	-	~×1/200	70
Insulin	-	Agilent Technology	-	-	-	-	○	-	-	-	Prediluted	71
	K36aC10	Abcam plc	○	-	-	-	-	○	-	-	~×1/1,000	72
Intrinsic factor	-	Fitzgerald Industries International	○	-	-	-	-	-	-	-	~×1/1,000	73
Kappa Light Chains	-	Agilent Technology	-	-	-	-	-	○	-	-	Prediluted	74
Ki-67	-	Agilent Technology	-	-	-	-	-	○	-	-	Prediluted	75
	-	Leica Biosystems	○	○	-	-	-	○	-	-	~×1/100	
	SP6	Nichirei Biosciences	○	○	-	-	○	-	-	-	Prediluted	76
			○	-	-	-	-	-	-	-	Prediluted	
			○	-	-	-	-	○	-	-	Prediluted	
	-	Novus Biologicals	-	○	-	-	-	-	-	-	~×1/1,000	77
	MKI67	Novus Biologicals	-	○	-	-	-	-	-	-	~×1/200	
	-	Abcam plc	○	-	-	-	-	-	-	-	~×1/500	78
	-	Merck	-	○	-	-	-	-	-	-	~×1/1,000	
	-	Novus Biologicals	○	○	-	-	-	-	-	-	~×1/500	
	MIB-1	Agilent Technology	-	-	-	-	-	○	-	Cow, Cat	~×1/100	
			-	-	-	-	-	-	○	-	~×1/500	
			-	-	○	-	-	○	-	-	~×1/200	
KIM-1/ Tim-1	-	R&D Systems	○	-	-	-	-	-	-	-	~×1/100	79
	-		○	-	-	-	-	-	-	-	~×1/1,000	
	-		○	-	-	-	-	-	-	-	~×1/200	
	-		○	-	-	-	-	-	-	-	~×1/200	
Laminin	-	Sigma-Aldrich	○	-	-	-	-	-	-	-	~×1/100	
LAMP-1	-	Sigma-Aldrich	○	○	-	-	-	-	-	-	~×1/100	
	-	Abcam plc	○	○	-	-	-	○	-	-	~×1/200	

- : Not applicable or implemented. Animal species: Rt, Rat; Mo, Mouse; Rb, Rabbit; GP, Guinea pig; Pri, Primate; Dog, Dog; Sw, Swine; Other, Other. Reactivity: ○, good; ×, inappropriate.

Table 6. Immunological Properties of Primary Antibodies and Their Respective IHC Staining Conditions

Primary antibody												Figure No.
Antibody			Species reactivity									
Antigen	Clone	Supplier	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other	Dilution	
LAMP-2	AMC2	Thermo Fisher Scientific	○	○	-	-	-	-	-	-	~×1/200	
			○	-	-	-	-	-	-	-	~×1/500	80
			○	○	-	-	-	-	-	-	~×1/500	
			○	-	-	-	-	-	-	-	~×1/500	
			○	○	-	-	-	-	-	-	~×1/1,000	
			○	○	-	-	-	-	-	-	~×1/1,000	
	-	LifeSpan Biosciences (LSBio)	○	○	-	-	-	-	-	-	~×1/500	
	-		-	-	-	-	-	○	-	-	~×1/1,000	81
	-		-	-	-	-	-	○	-	-	~×1/1,000	
LC3	-	MBL International	○	○	-	-	-	○	-	-	~×1/1,000	
	-		-	○	-	-	○	-	-	-	~×1/500	82
	5F10	NanoTools	○	-	-	-	-	-	-	-	~×1/200	
LDH	-	Santa Cruz Biotechnology, Inc.	○	-	-	-	-	-	-	-	~×1/200	
Dolichos biflorus Lectin (DBA)	Labeled antigen	EY Laboratories	○	-	-	-	-	-	-	-	~×1/25	
LH	-	Thermo Scientific	○	○	-	-	-	-	-	-	~×1/100	
Lipocalin-2 /NGAL	-	R&D Systems	○	-	-	-	-	-	-	-	~×1/200	
MAC-2	M3/38	Cedarlane Laboratories	-	○	-	-	-	-	-	-	~×1/1,000	
			-	○	-	-	-	-	-	-	~×1/50	83
MAC-3	M3/84	BD Pharmingen Inc.	-	○	-	-	-	-	-	-	~×1/50	84
Macrophage	RM0029-11H3	Abcam plc	-	○	-	-	-	-	-	-	~×1/100	
Myelin Basic Protein	26	Merck	○	-	-	-	-	○	-	-	~×1/1,000	85
	-	Abcam plc	○	-	-	-	-	-	-	-	~×1/100	
	-	Sigma-Aldrich	○	○	-	-	-	-	-	-	~×1/100	86
MCM7	EP1974Y	Abcam plc	○	○	-	-	-	-	-	-	~×1/1,000	
MDA	1F83	Japan Institute for the Control of Aging	○	-	-	-	-	-	-	-	~×1/100	87
Melan A	A103	Agilent Technology	-	-	-	-	○	-	-	-	~×1/50	88
			-	-	-	-	-	○	-	Cow	~×1/200	
			○	-	-	-	-	○	-	-	~×1/200	89
			-	-	-	-	-	○	-	-	~×1/50	
	M2-7C10	Nichirei	-	-	-	-	-	○	-	-	Prediluted	
Melanoma	PNL2	Abcam plc	○	-	-	-	-	○	-	-	~×1/100	90
		Santa Cruz Biotechnology, Inc.	-	-	-	-	-	○	-	-	Prediluted	91
Mesothelin	-	Immuno-Biological Laboratories Co., Ltd.	○	-	-	-	-	-	-	-	~×1/200	92
	-		○	-	-	-	-	-	-	-	~×1/200	
	-		-	○	-	-	-	-	-	-	~×1/200	
MHC Class II (RT1B)	OX-6	Bio-Rad Laboratories, Inc.	○	○	-	-	-	-	-	-	~×1/100	
			○	-	-	-	-	-	-	-	~×1/500	93
MiTF	34CA5	Novocastra (Leica Biosystems)	-	-	-	-	-	○	-	-	~×1/100	94
	C5	Exalpha Biologicals	○	-	-	-	-	-	-	-	~×1/1,000	
Mitochondrial Creatine Kinase	-	Bioss Inc	○	-	-	-	-	-	-	-	~×1/500	
mTOR	7C10	Cell Signaling Technology	-	-	-	-	-	-	○	-	~×1/50	
MUC-1	-	Boster Immunoleader	○	-	-	-	○	-	-	-	~×1/500	
MUM1protein	MUM1p	Agilent Technology	-	-	-	-	-	○	-	-	~×1/25	
MyoD1	5.8A	Agilent Technology	-	-	-	-	-	○	-	-	~×1/50	95
β2-microglobulin	-	Lifespan Biosciences	○	-	-	-	-	-	-	-	~×1/200	
Myogenin	F5D	Abcam plc	○	-	-	-	-	-	-	-	~×1/1,000	96
Myoglobin	EP3081Y	Abcam plc	-	○	-	-	-	-	-	-	~×1/1,000	
			○	-	-	-	-	-	-	-	~×1/1,000	
Nephrin (c)	-	Immuno-Biological Laboratories Co., Ltd.	○	-	-	-	-	-	-	-	~×1/25	97
Nestin	rat-401	Merck	○	-	-	-	-	-	-	-	~×1/100	98
			○	○	-	-	-	-	-	-	~×1/500	
	N1602	Immuno-Biological Laboratories Co., Ltd.	-	-	-	-	-	○	-	-	~×1/25	
NeuN	A60	Merck	○	-	-	-	-	-	-	-	~×1/100	99
			○	-	-	-	-	○	-	-	~×1/1,000	
Neurofilament	2F11	Agilent Technology	○	-	-	-	-	-	-	-	~×1/50	100
			-	○	-	-	-	-	-	-	~×1/100	
			-	○	-	-	-	-	-	-	~×1/1,000	
			-	-	-	-	-	○	-	-	~×1/50	
			○	-	-	-	○	-	-	-	~×1/100	
			○	○	-	-	-	-	-	-	~×1/100	
		Nichirei Biosciences	○	-	-	-	-	-	-	-	Prediluted	101
Neurofilament 200	NE14	Sigma-Aldrich	○	-	-	-	-	-	-	-	~×1/1,000	
			○	-	-	-	-	-	-	-	~×1/1,000	

- : Not applicable or implemented. Animal species: Rt, Rat; Mo, Mouse; Rb, Rabbit; GP, Guinea pig; Pri, Primate; Dog, Dog; Sw, Swine; Other, Other. Reactivity: ○, good; ×, inappropriate.

Table 7. Immunological Properties of Primary Antibodies and Their Respective IHC Staining Conditions

Primary antibody												Figure No.
Antibody			Species reactivity									
Antigen	Clone	Supplier	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other	Dilution	
NG2	-	Merck	○	○	-	-	-	-	-	-	~×1/200	102
NGAL or Lipocalin-2/NGAL	-	R&D Systems	○	-	-	-	-	-	-	-	~×1/25	
	17	BioPorto Diagnostics A/S	-	-	-	-	○	-	-	-	~×1/1,000	
3-Nitrotyrosine	39B6	Abcam plc	○	-	-	-	-	-	-	-	~×1/50	
nNOS	-	Thermo Fisher Scientific	○	-	-	-	-	-	-	-	~×1/100	103
Neuron-Specific Enolase	-	MBL International	-	-	-	-	-	○	-	-	Prediluted	
8-OHdG	N45.1	Japan Institute for the Control of Aging	○	-	-	-	-	-	-	-	~×1/200	104
Olig2	-	Immuno-Biological Laboratories Co., Ltd.	○	-	-	-	-	-	-	-	~×1/500	
	-		○	-	-	-	-	-	-	-	~×1/1,000	
	-		○	-	-	-	-	○	-	-	~×1/200	105
	211F1.1	Merck	○	-	-	-	-	○	-	-	~×1/200	106
	-		-	-	-	-	-	○	-	-	~×1/100	
	-	Novus Biologicals	-	○	-	-	-	-	-	-	~×1/1,000	107
Osteocalcin	R21C-01A	TAKARA Bio	-	○	-	-	-	-	-	-	~×1/200	
	OCG3	Abcam plc	-	-	-	-	-	○	-	-	~×1/200	
Osterix	-	Abcam plc	-	○	-	-	-	-	-	-	~×1/200	
			○	-	-	-	-	-	-	-	~×1/200	108
			○	○	-	-	-	-	-	-	~×1/200	
p40	-	Diagnostic Biosystems	○	-	-	-	-	-	-	-	~×1/100	
			-	○	-	-	-	-	-	-	~×1/100	
p53	DO-1	Bio-Rad Laboratories, Inc.	-	-	-	-	-	○	-	-	~×1/25	
	CM5	Leica Biosystems	○	○	-	-	-	-	-	-	~×1/1,000	
p62/SQSTM1	-	MBL International	○	○	-	-	-	-	-	-	~×1/1,000	
	-	Abcam plc	○	○	-	-	-	○	-	-	~×1/200	
p63	4A4	Abcam plc	○	-	-	-	-	-	-	-	~×1/200	
	4A4	GeneTex	-	-	-	-	-	○	-	-	~×1/200	
Paraoxonase 2 (PON2)	-	Abcam plc	○	○	-	-	-	○	-	-	~×1/1,000	
Parathyroid Hormone	-	Yanaihara	○	-	-	-	-	-	-	-	~×1/50	
Pax-5	DAK-Pax5	Agilent Technology	-	-	-	-	-	○	-	-	~×1/25	
	-	Abcam plc	-	-	-	-	-	○	-	-	~×1/50	109
Pax-6	-	Biolegend	○	-	-	-	-	-	-	-	~×1/1,000	
PCNA	PC10	Agilent Technology	○	○	-	-	-	-	-	-	~×1/1,000	
			○	-	-	-	-	-	-	-	~×1/500	110
			○	-	-	-	-	-	-	-	~×1/500	
			○	-	-	-	-	○	-	-	~×1/1,000	
			○	○	-	-	-	-	-	-	~×1/200	
			○	○	-	-	-	○	-	-	~×1/100	
			-	○	-	-	-	-	-	Zebrafish	~×1/200	
			○	-	-	-	-	-	-	Zebrafish	~×1/200	
			-	-	-	-	-	○	-	-	~×1/200	
			○	-	○	-	-	-	-	-	~×1/500	
			○	-	-	-	-	-	-	-	~×1/1,000	
			-	-	-	-	-	-	○	-	~×1/200	
			○	-	-	-	-	-	-	-	~×1/200	
			○	-	-	-	-	-	-	-	~×1/500	
			○	○	-	-	-	-	-	-	~×1/1,000	
			○	-	-	-	-	-	-	-	~×1/200	
			○	-	-	-	-	-	-	-	~×1/100	
PDX1	-	Trans Genic	○	-	-	-	-	-	-	-	~×1/100	
Perilipin 1	-	Progen	○	-	-	-	-	-	-	-	~×1/1,000	111
PGP-9.5	-	Agilent Technology	○	○	-	-	-	○	-	Cat	~×1/200	112
			○	-	-	-	-	-	-	-	~×1/25	
	13C4/I3C4	Abcam plc	○	○	-	○	-	○	-	-	~×1/100	
			-	-	-	-	○	-	-	-	~×1/500	113
Phospho-Histone H3	-	Cell Signaling Technology	○	○	-	-	-	-	-	-	~×1/200	
Phospho-Histone H2A.X	Ser139/20E3	Cell Signaling Technology	○	-	-	-	-	-	-	-	~×1/100	
PMP70	-	Abcam plc	○	-	-	-	-	-	-	-	~×1/1,000	
Pneumocystis	-	Santa Cruz Biotechnology, Inc.	-	-	-	-	-	-	-	○	~×1/100	114
Podoplanin	-	AngioBio, Inc.	○	-	-	-	-	-	-	-	~×1/500	115
	HG-19	SIGMA	○	-	-	-	-	-	-	-	~×1/1,600	
Prosurfactant Protein C	-	Abcam plc	-	○	-	-	-	-	-	-	~×1/500	116
			○	-	-	-	-	-	-	-	~×1/1,000	
Progesteron Receptor	16	Leica Biosystems	○	-	-	-	-	-	-	-	~×1/500	

- : Not applicable or implemented. Animal species: Rt, Rat; Mo, Mouse; Rb, Rabbit; GP, Guinea pig; Pri, Primate; Dog, Dog; Sw, Swine; Other, Other. Reactivity: ○, good; ×, inappropriate.

Table 8. Immunological Properties of Primary Antibodies and Their Respective IHC Staining Conditions

Primary antibody												
Antibody			Species reactivity									Figure No.
Antigen	Clone	Supplier	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other	Dilution	
Prohibitin	II-14-10	Fitzgerald Industries International	○	-	-	-	-	-	-	-	~×1/50	
	-	Proetintech	○	○	-	-	-	○	-	-	~×1/50	
	-	LifeSpan Biosciences (LSBio)	○	○	-	○	-	○	-	-	~×1/100	
Prolactin	-	Santa Cruz Biotechnology, Inc.	○	-	-	-	-	-	-	-	~×1/500	
	EPR19386	Abcam plc	○	-	-	-	-	-	-	-	~×1/1,000	
Pseudorabies Virus	-	Abcam plc	-	-	-	-	-	-	-	○	~×1/500	117
Rabbit Macrophage	RAM11	Agilent Technology	-	-	○	-	-	-	-	-	~×1/200	
			-	-	○	-	-	-	-	-	~×1/50	
Rat Mast Cell Protease II	-	Moredun Scientific	○	-	-	-	-	-	-	-	~×1/500	118
Rhodopsin	RET-P1	Merck	○	-	-	-	-	-	-	-	~×1/1,000	
RPE65	-	Abcam plc	○	-	-	-	-	-	-	-	~×1/500	
S100	-	Agilent Technology	○	-	-	-	-	○	-	-	Prediluted	119
	-		○	-	-	-	-	-	-	-	Prediluted	
	-		-	-	-	-	-	○	-	-	Prediluted	
	4C49	Abcam plc	-	-	-	-	-	○	-	-	~×1/50	120
	-	Nichirei Biosciences	○	-	-	-	-	○	-	-	Prediluted	121
			-	-	-	-	-	○	○	-	Prediluted	
S100A9 + Calprotectin (S100A8/A9 complex)	MAC387	Abcam plc	-	○	○	-	-	-	-	-	~×1/1,000	
Schwann Cell/Peripheral Myelin	Schwann/2E	Cosmo Bio Co., Ltd.	○	-	-	-	-	○	-	-	~×1/1,000	122
Sarcoplasmic/Endoplasmic Reticulum Calcium ATPase 2	-	Abcam plc	○	-	-	-	-	-	-	-	~×1/1,000	123
SERCA2ATPase	IID8	Abcam plc	○	-	-	-	-	-	-	-	~×1/1,000	
Steroidogenic Factor 1	N1665	Perseus Proteomics Inc	○	-	-	-	-	-	-	-	~×1/1,000	124
	-	Abcam plc	-	-	-	-	○	-	-	-	~×1/500	
Slow Skeletal Myosin Heavy Chain	NOQ7.5.4D	Abcam plc	○	-	-	-	-	-	-	-	~×1/1,000	
Sox-10	-	Santa Cruz Biotechnology, Inc.	-	-	-	-	-	○	-	-	~×1/500	125
SP-D	VIF11	Abcam plc	○	-	-	-	-	-	-	-	~×1/25	
	PSPD	Bioss Inc	-	○	-	-	-	-	-	-	~×1/25	
Synaptophysin	DAK-SYNAP	Agilent Technology	-	-	-	-	-	○	-	-	~×1/50	126
Alpha-synuclein (phospho S129)	EP1536Y	Abcam plc	-	○	-	-	○	-	-	-	~×1/1,000	
Talin	8d4	Sigma-Aldrich	○	○	-	-	-	-	-	-	~×1/500	
TER-119/Erythroid Cells	TER-119	BioLegend	-	○	-	-	-	-	-	-	~×1/1,000	
Thyroid Transcription	8G7G3/1	Progen	○	-	-	-	-	-	-	-	~×1/25	
Factor 1		Agilent Technology	○	○	-	-	-	-	-	-	~×1/100	31
	SPT24	Leica Biosystems	○	-	-	-	-	○	-	-	Prediluted	127
	EP1584Y	Abcam plc	-	○	-	-	-	-	-	-	~×1/100	128
Thyroxine	-	Sigma-Aldrich	○	-	-	-	-	-	-	-	~×1/500	
Tubulin βIII	TUJ1	BioLegend	○	-	-	-	-	-	-	-	~×1/1,000	
	TU-20	Abcam plc	○	-	-	-	-	-	-	-	~×1/200	
	5G8	Promega	-	-	-	-	-	○	○	-	~×1/1,000	129
Tyrosine Hydroxylase	LNC1	Merck	○	-	-	-	-	-	-	-	~×1/100	
			-	-	-	-	-	-	-	○	~×1/100	
			-	○	-	-	-	-	-	-	~×1/100	
			-	○	-	-	-	-	-	-	~×1/1,000	
	-	Abcam plc	○	○	-	-	○	○	-	-	~×1/1,000	
	-	Enzo Life Sciences	○	-	-	-	-	-	-	-	~×1/1,000	
Tyrosine Tubulin	TUB-1A2	Sigma-Aldrich	○	-	-	-	-	-	-	-	~×1/1,000	
Uroplakin III	AU1	Progen	○	-	-	-	-	-	-	-	Prediluted	130
			-	-	-	-	-	-	-	Cow	~×1/10	
			○	-	-	-	-	-	-	-	Prediluted	
Uteroglobin	EOR19846	Abcam plc	○	-	-	-	-	-	-	-	~×1/5,000	
VC1.1 (HNK-1/N-CAM)	VC1.1	Sigma-Aldrich	○	-	-	-	-	-	-	-	~×1/100	
VE-Cadherin	-	Abcam plc	-	-	○	-	-	-	-	-	~×1/1,000	
Vascular Endothelial Growth Factor A	-	Aviva Systems Biology Corp.	-	-	-	-	-	○	-	-	~×1/500	
Vimentin	V9	Agilent Technology	○	-	○	-	-	○	-	-	Prediluted	
			○	-	-	-	-	-	-	Marmoset	Prediluted	
			-	-	-	-	-	○	○	-	Prediluted	131
			-	-	-	-	-	○	○	-	Prediluted	
			-	-	-	-	-	○	-	Cow	Prediluted	
		Merck	○	-	○	-	○	-	-	-	~×1/100	
	D21H3	Cell Signaling Technology	-	○	-	-	-	-	-	-	~×1/500	132
	-	Santa Cruz Biotechnology, Inc.	-	○	-	-	-	-	-	-	~×1/500	
	EPR3776	Abcam plc	○	○	-	-	-	○	-	Cat	~×1/1,000	133

- : Not applicable or implemented. Animal species: Rt, Rat; Mo, Mouse; Rb, Rabbit; GP, Guinea pig; Pri, Primate; Dog, Dog; Sw, Swine; Other, Other. Reactivity: ○, good; ×, inappropriate.

Table 9. Immunological Properties of Primary Antibodies and Their Respective IHC Staining Conditions

Primary antibody											Figure No.
Antibody			Species reactivity								
Antigen	Clone	Supplier	Rt	Mo	Rb	GP	Pri	Dog	Sw	Other	Dilution	
Vinculin	V284	Merck	○	○	○	-	-	-	-	-	~×1/100	
Von Willebrand Factor	F8/86	Agilent Technology	-	-	-	-	-	○	-	-	~×1/50	
	-	Abcam plc	○	-	-	-	-	-	-	-	~×1/1,000	
	-		○	-	-	-	-	○	-	-	~×1/1,000	134
	-		○	-	-	-	-	-	-	-	~×1/100	
	-		-	○	-	-	-	-	-	-	~×1/1,000	
	-		○	-	-	-	-	-	-	-	~×1/1,000	
Wilms' Tumor 1	-	Santa Cruz Biotechnology, Inc.	-	-	-	-	-	○	○	-	~×1/500	135
	-		○	-	-	-	-	-	-	-	~×1/1,000	
	6F-H2	Agilent Technology	○	-	-	-	-	-	-	-	~×1/50	
	CAN-R9(IHC)-56-2	Abcam plc	-	○	-	-	-	-	-	-	~×1/500	
	-	Abcam plc	-	○	-	-	-	-	-	-	~×1/1,000	
	6F-H2	Thermo Fisher Scientific	○	-	-	-	-	○	-	-	~×1/500	
YM1/Chitinase 3-like 3	281926	R&D Systems	-	○	-	-	-	-	-	-	~×1/200	136
ZO-1	-	Thermo Fisher Scientific	○	-	-	-	-	-	-	-	~×1/50	
γH2AX	-	Bethyl Laboratories, Inc.	-	○	-	-	-	-	-	-	~×1/500	

- : Not applicable or implemented. Animal species: Rt, Rat; Mo, Mouse; Rb, Rabbit; GP, Guinea pig; Pri, Primate; Dog, Dog; Sw, Swine; Other, Other. Reactivity: ○, good; ×, inappropriate.

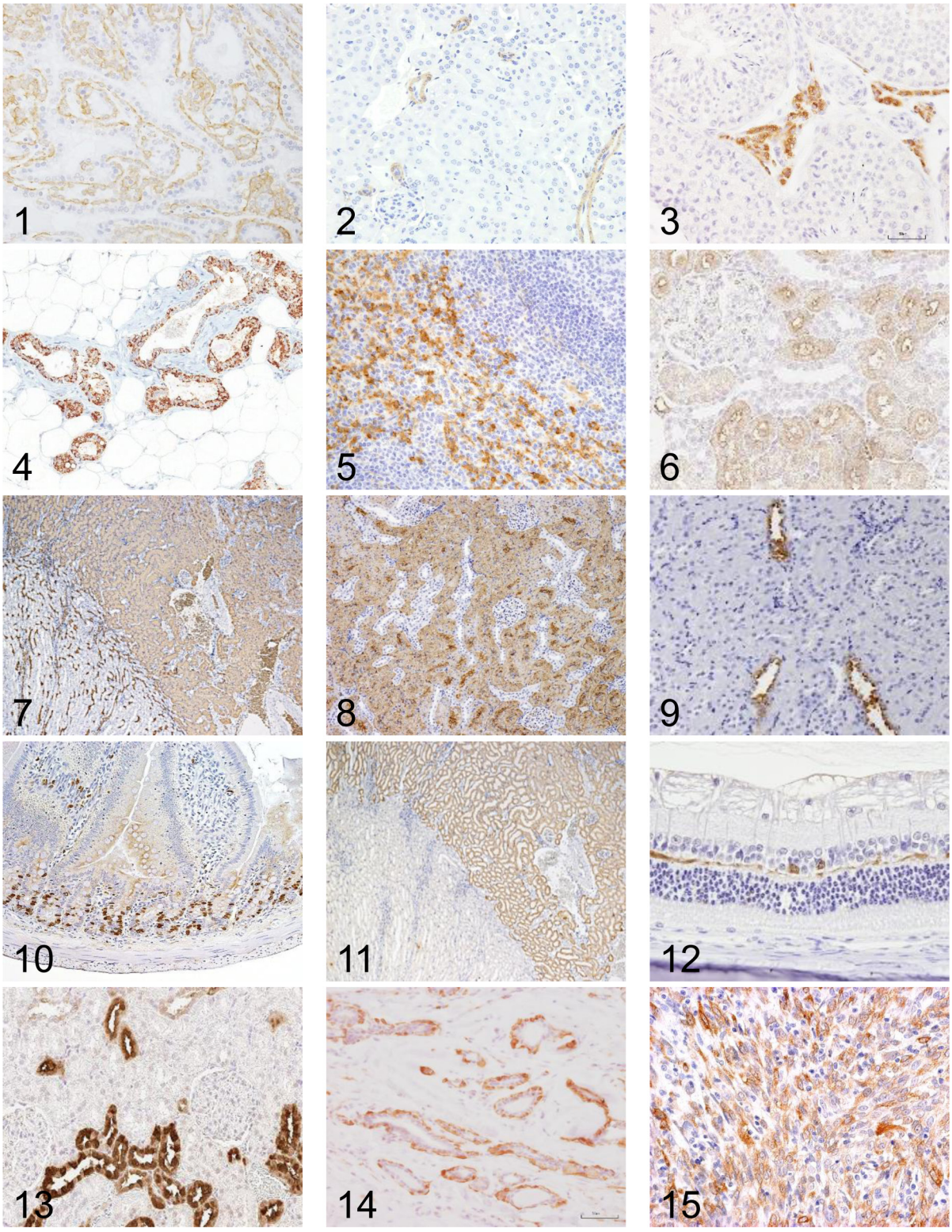

Fig. 1. Actin, α-smooth muscle /1A4 /Agilent Technology /M085129-2, Mammary gland /Rat. **Fig. 2.** Actin, α-smooth muscle /1A4 /Nichirei Biosciences /412021, Kidney /Mouse. **Fig. 3.** Adipophilin /AP125 /Progen /651102, Testis /Rat. **Fig. 4.** Adipophilin /AP125 /Acris Antibodies GmbH /BM5051, Mammary gland /Rat. **Fig. 5.** Anti-Human Macrophage Scavenger Receptor A (MSR-A: CD204) /SRA-E5 /Trans Genic Inc /KT022, Spleen /Primate. **Fig. 6.** Aquaporin 1 /1/22 /Abcam plc /ab9566, Kidney /Rat. **Fig. 7.** Aquaporin 1 /1/A5F6 /GeneTex /GTX11023, Kidney /Rat. **Fig. 8.** Aquaporin 1 /- /Merck /AB2219, Kidney /Rat. **Fig. 9.** Aquaporin 2 /- /Prosci /50-225, Kidney /Rat. **Fig. 10.** BrdU /Bu20a /Agilent Technology /M074401-8, Small Intestine /Rat. **Fig. 11.** N-cadherin /3B9 /Thermo Fisher Scientific /33-3900, Kidney /Rat. **Fig. 12.** Calbindin D28K /CB-955 /Sigma-Aldrich /C9848, Eye /Rabbit. **Fig. 13.** Calbindin D28K /D1I4Q /Cell Signaling Technology / #13176, Kidney /Rat. **Fig. 14.** Calponin / CALP /Thermo Scientific /MA5-11620, Mammary gland /Dog. **Fig. 15.** Calponin /hCP /Sigma-Aldrich /C2687, Complex carcinoma, eyelid /Dog.

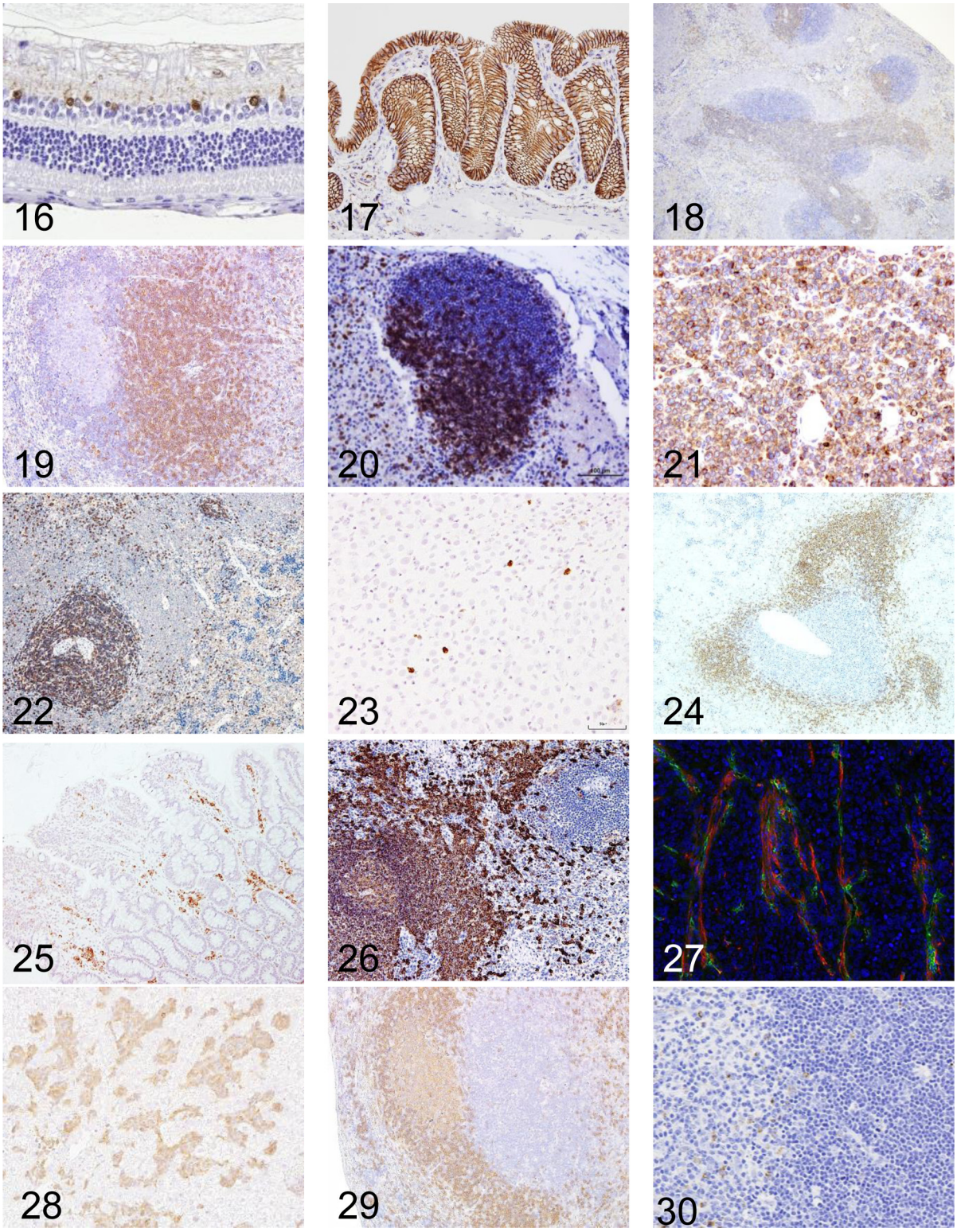

Fig. 16. Calretinin /6B8.2 /Merck /MAB1568, Eye /Rabbit. **Fig. 17.** β catenin /14 /BD Transduction Laboratories /610153, Colon /Mouse. **Fig. 18.** CD3 /F7.2.38 /Agilent Technology /M725401-2, Spleen /Rat. **Fig. 19.** CD3 /- /Abcam plc /ab5690, Lymph node /Mouse. **Fig. 20.** CD3 /- /Agilent Technology /IS50330-2J, Lymph node /Dog. **Fig. 21.** CD3 /- /Sigma-Aldrich /C7930, T cell lymphoma /Dog. **Fig. 22.** CD3 /Santa Cruz Biotechnology, Inc. /sc-1127, Spleen /Rat. **Fig. 23.** CD11b /OX42 /Bio-Rad Laboratories, Inc. /MCA74G, Liver /Rat. **Fig. 24.** CD20 /- /Lab Vision™ (Thermo Fisher Scientific)/RB-9013, Spleen /Dog. **Fig. 25.** CD20 /- /Biocare Medical, LLC /ACR 3004 A, Intestine /Dog. **Fig. 26.** CD20cy / L26 /Agilent Technology /IS60430-2J, Spleen /Primate. **Fig. 27.** Green, CD31 /MEC13.3 /BD Pharmingen Inc. /550274, Tumor /Mouse. **Fig. 28.** CD34 /- /Boster Immunoleader /PA1334, Hemangiosarcoma, liver /Rat. **Fig. 29.** CD45R /RA3-6B2 /BD Pharmingen Inc. /550280, Lymph node /Mouse. **Fig. 30.** CD68 /ED-1 /Bio-Rad Laboratories, Inc. /MCA341GA, Thymus /Rat.

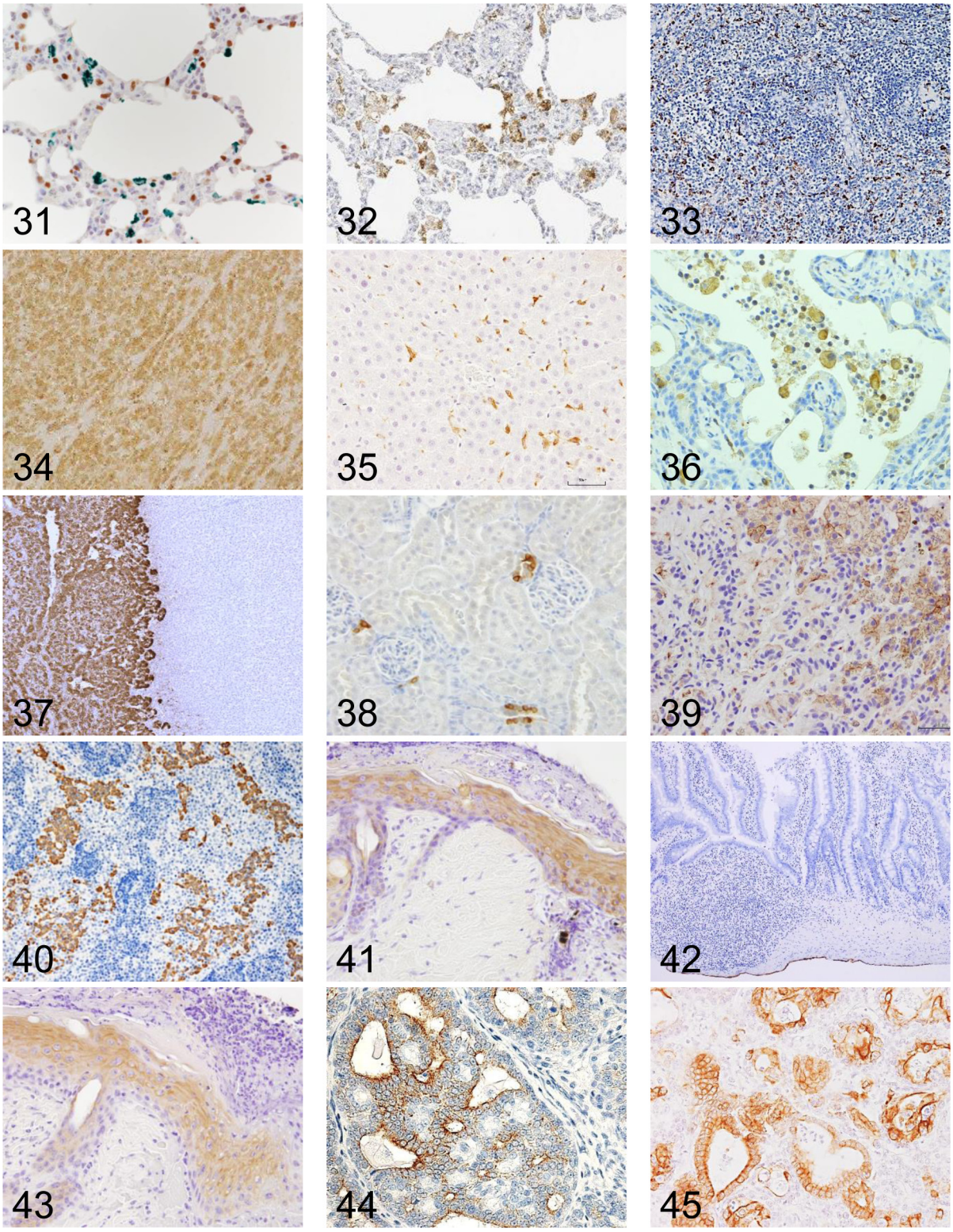

Fig. 31. Green, CD68 /ED-1 /Abcam plc /ab31630, Lung /Rat. Brown, Thyroid Transcription Factor 1 /8G7G3/1 / Agilent Technology /M357501-2, Lung /Rat. **Fig. 32.** CD68 /KP1 /Agilent Technology /M081401-2, Lung /Monkey. **Fig. 33.** CD68 /KP1 /Agilent Technology /IS61330-2, Spleen /Primate. **Fig. 34.** CD117/c-kit /- /Agilent Technology /A450229-2, GIST /Dog. **Fig. 35.** CD163 /ED2 /Bio-Rad Laboratories, Inc. /MCA342R, Liver /Rat. **Fig. 36.** CHI3L1 /- /Abcam plc /ab77528, Liver /Mouse. **Fig. 37.** Chromogranin A /- /Nichirei Biosciences /412751, Adrenal gland / Dog. **Fig. 38.** Cox-2 /- /Immuno-Biological Laboratories Co., Ltd. /18955, Kidney /Rat. **Fig. 39.** Cytokeratin /AE1/AE3 /Agilent Technology / IR05361-2J, Hepatic carcinoid /Dog. **Fig. 40.** Keratin /cytokeratin /AE1/AE3 /Nichirei Biosciences /412811, Mesothelial cell in thoracic mass /Dog. **Fig. 41.** Keratin /cytokeratin /- /Nichirei Biosciences /422061, Skin /Rat. **Fig. 42.** Cytokeratin 7 /OV-TL 12/30 /Agilent Technology / M701801-2, Ileum /Rat. **Fig. 43.** Cytokeratin 14 /- /GeneTex /GTX104124, Skin /Rat. **Fig. 44.** Cytokeratin 18 /C-04 /Santa Cruz Biotechnology, Inc. /SC-51582, Mammary gland /Rat. **Fig. 45.** Cytokeratin 19 /b170 /Leica Biosystems /NCL-CK19, Bile duct carcinoma /Dog.

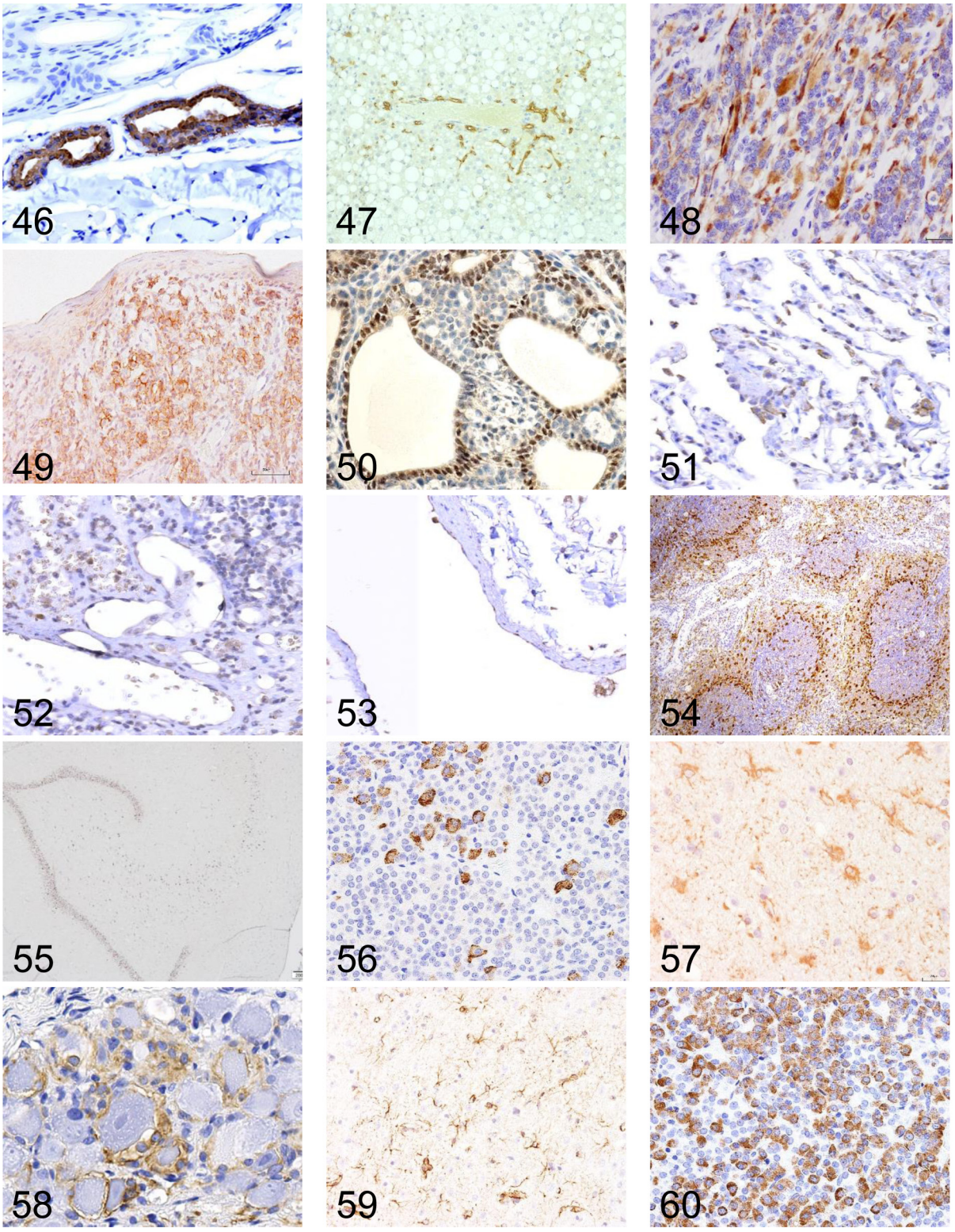

Fig. 46. Cytokeratin 19 /- /Agilent Technology /M088801-2, Skin /Dog. **Fig. 47.** Cytokeratin 19 /- /Abcam plc /ab15463, Liver /Mouse. **Fig. 48.** Desmin /D33 /Agilent Technology /IR60661-2J, Rhabdomyosarcoma /Cow. **Fig. 49.** E-cadherin /36/E-Cadherin /BD Transduction Laboratories /610181, Cutaneous histiocytoma /Dog. **Fig. 50.** Estrogen receptor α (ERα) /Santa Cruz Biotechnology, Inc. /SC-543, Mammary gland /Rat. **Fig. 51.** Endothelin-1 (ET-1) /- /Immuno-Biological Laboratories Co., Ltd. /18201, Lung /Dog. **Fig. 52.** Endothelin-A(ET-A) /A-405 /Immuno-Biological Laboratories Co., Ltd. /16201, Liver /Dog. **Fig. 53.** Endothelin-B (ET-B) /8Z11 /Immuno-Biological Laboratories Co., Ltd. /10253, Lung /Dog. **Fig. 54.** Fascin /EP5902 /Abcam plc /ab126772, Spleen /Rat. **Fig. 55.** FosB /- /Santa Cruz Biotechnology, Inc. /sc-7203, Brain /Primate. **Fig. 56.** FSH /- /Bio-Rad Laboratories, Inc. /4561-6959, Pituitary gland /Rat. **Fig. 57.** Glial Fibrillary Acidic Protein (GFAP) /- /Agilent Technology /IR52461-2J, Brain /Dog. **Fig. 58.** Glial Fibrillary Acidic Protein (GFAP) /GA5 /Nichirei Biosciences /422261, Dorsal root ganglion /Rat. **Fig. 59.** Glial Fibrillary Acidic Protein (GFAP) /GA5 /Cell Signaling Technology /3670, Brain /Rat. **Fig. 60.** Growth Hormone /222540 /R&D Systems /MAB1566, Pituitary gland /Rat.

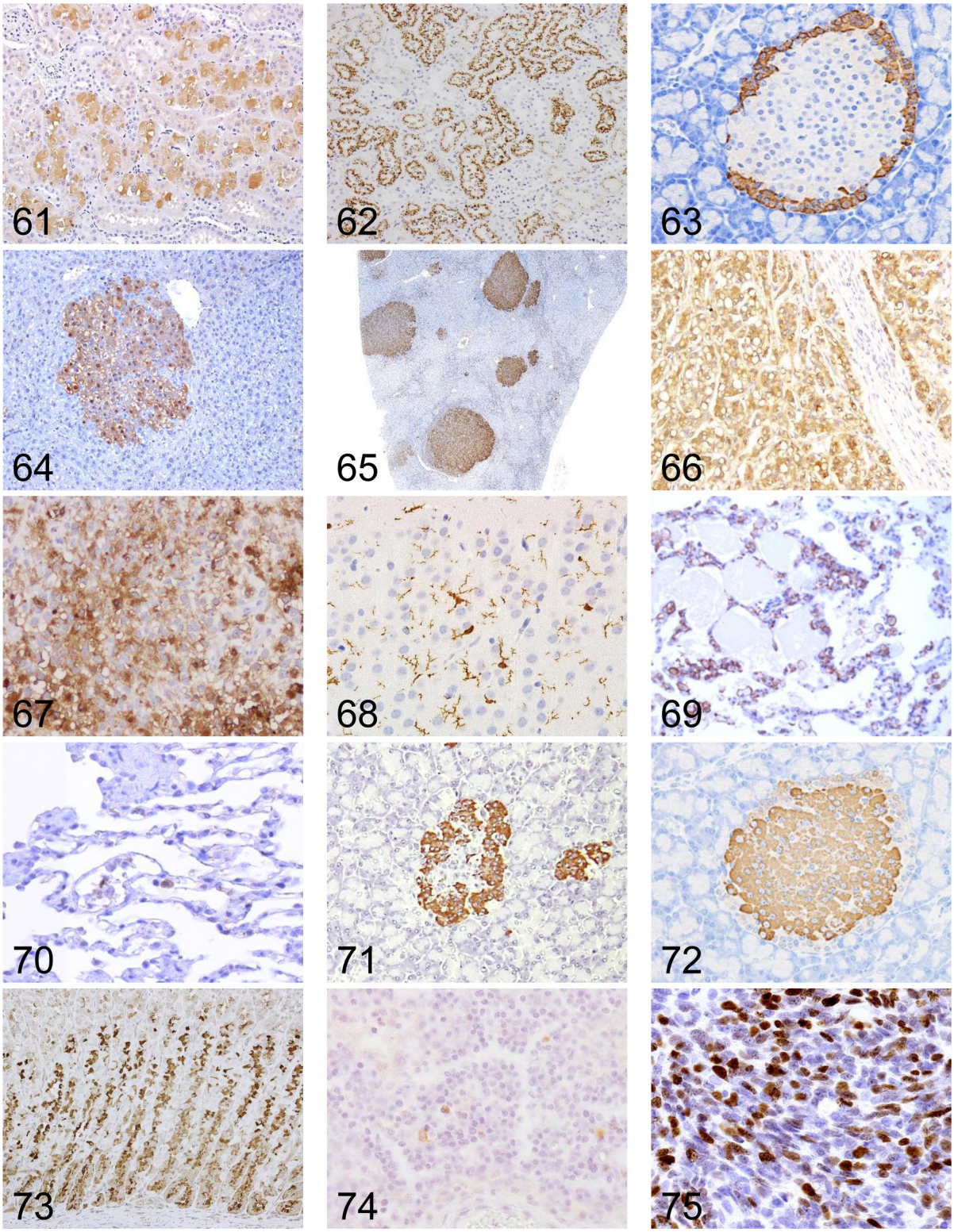

Fig. 61. α2u-globulin /- /R&D Systems /AF 586, Kidney /Rat. **Fig. 62.** α2u-globulin (Biotinylated) /129736 /R&D Systems /BAM586, Rat / Kidney. **Fig. 63.** Glucagon /K79bB10 /Abcam plc /ab10988, Pancreas /Rat. **Fig. 64.** Glutathione S-transferase Placental type /- /MBL International /311, Liver /Rat. **Fig. 65.** Glutathione S-transferase Placental type /- /MBL International /311-H, Liver /Rat. **Fig. 66.** Hepatocyte /OCH1E5 /Agilent Technology /M715801-2, Hepatocellular carcinoma /Dog. **Fig. 67.** HLA-DR (MHC class II)/TAL.1B5 /TAL.1B5 /Agilent Technology /M074601-2, Histiocytic sarcoma /Dog. **Fig. 68.** Iba 1 /- /FUJIFILM Wako Pure Chemical Corporation /019-19741, Brain /Rat. **Fig. 69.** Iba 1 /- /FUJIFILM Wako Pure Chemical Corporation /019-19741, Lung /Dog. **Fig. 70.** iNOS /- /Abcam plc /AB3523, Lung /Dog. **Fig. 71.** Insulin /- / Agilent Technology /IR00261-2J, Pancreas /Primate. **Fig. 72.** Insulin /K36aC10 /Abcam plc /ab6995, Pancreas /Rat. **Fig. 73.** Intrinsic factor /- / Fitzgerald Industries International /20-IR51, Stomach /Rat. **Fig. 74.** Kappa Light Chains /- /Agilent Technology /IR50661-2J, Lymph node /Dog. **Fig. 75.** Ki-67 /- /Agilent Technology /IR62661-2, Odontogenic tumor /Dog.

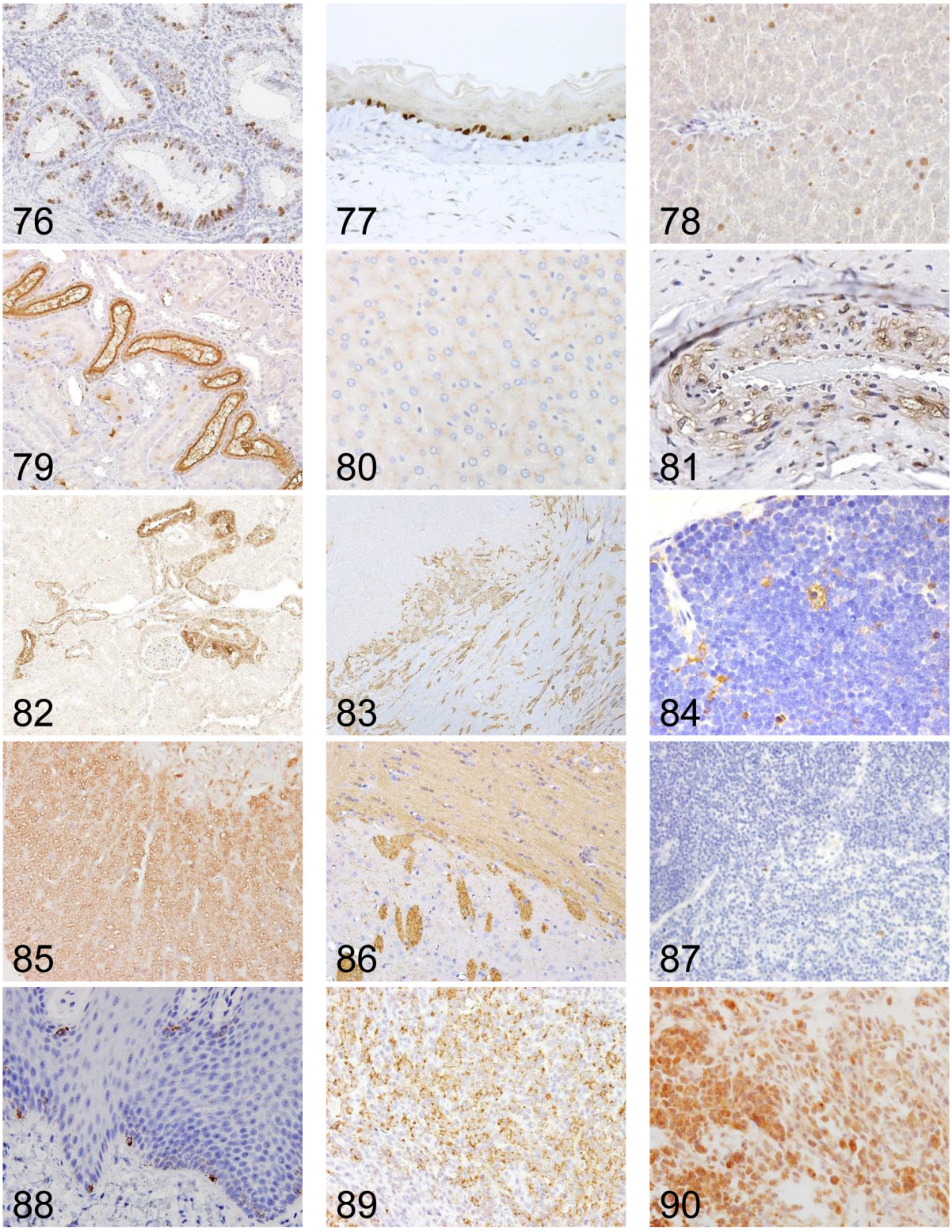

Fig. 76. Ki-67 /SP6 /Nichirei Biosciences /418071, Uterus /Monkey. **Fig. 77.** Ki-67 /- /Novus Biologicals /NB110-89717SSP, Esophagus /Mouse. **Fig. 78.** Ki-67 /- /Abcam plc /AB15580, Liver /Rat. **Fig. 79.** KIM-1/ Tim-1 /- /R&D Systems /AF3689, Kidney /Rat. **Fig. 80.** LAMP-2 /AMC2 / Thermo Fisher Scientific /51-2200, Liver /Rat. **Fig. 81.** LAMP-2 /- /LifeSpan BioSciences (LSBio) /LS-B3144-50, Coronary artery /Dog. **Fig. 82.** LC3 /- /MBL International /PM036, Kidney /Monkey. **Fig. 83.** MAC-2 /M3/38 /Cedarlane Laboratories /CL8942AP, Skin /Mouse. **Fig. 84.** MAC-3 /M3/84 /BD Pharmingen Inc. /550292, Thymus /Mouse. **Fig. 85.** Myelin Basic Protein /26 /Merck /MAB384, Spinal cord /Rat. **Fig. 86.** Myelin Basic Protein /- /Sigma-Aldrich /M3821, Brain /Rat. **Fig. 87.** MDA /1F83 /Japan Institute for the Control of Aging /MMD-030n, Thymus /Rat. **Fig. 88.** Melan A /A103 /Agilent Technology /M719601-2, Skin /Primate. **Fig. 89.** Melan A /A103 /Agilent Technology /M719629-2, Malignant melanoma /Dog. **Fig. 90.** Melanoma /PNL2 /Abcam plc /ab12502, Malignant melanoma /Dog.

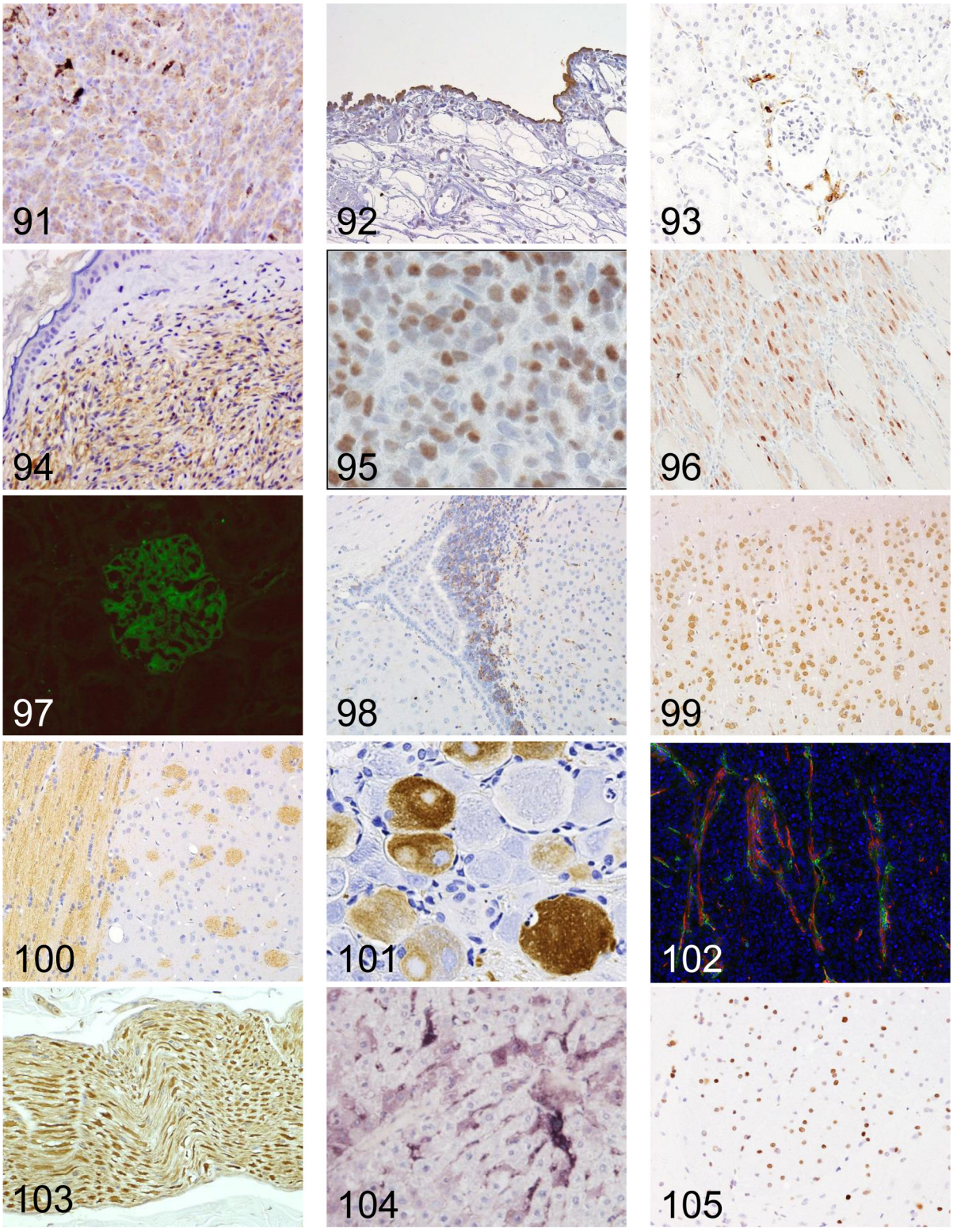

Fig. 91. Melanoma /PLN.2 /Santa Cruz Biotechnology, Inc. /SC-59306, Melanoma /Dog. **Fig. 92.** Mesothelin /- /Immuno-Biological Laboratories Co., Ltd. /28001, Mesothelial cell /Rat. **Fig. 93.** MHC Class II (RT1B) /OX-6 /Bio-Rad Laboratories, Inc. /MCA46GA, Kidney /Rat. **Fig. 94.** MiTF /34CA5 /Novocastra (Leica Biosystems) /MITF-L, Peripheral nerve sheath tumor /Dog. **Fig. 95.** MyoD1 /5.8A /Agilent Technology /M351201-2, Rhabdomyosarcoma /Dog. **Fig. 96.** Myogenin /F5D /Abcam plc /ab1835, Myoblast /Rat. **Fig. 97.** Nephrin (c)/- /Immuno-Biological Laboratories Co., Ltd. /29070, Kidney /Rat. **Fig. 98.** Nestin /Rat-401 /Merck /MAB353, Brain /Rat. **Fig. 99.** NeuN /A60 /Merck /MAB377, Brain /Rat. **Fig. 100.** Neurofilament /2F11 /Agilent Technology /M076229-2, Brain /Rat. **Fig. 101.** Neurofilament /2F11 /Nichirei Biosciences /412551, Dorsal root ganglion /Rat. **Fig. 102.** Red, NG2 /- /Merck /AB5320, Pericyte in tumor /Mouse. **Fig. 103.** nNOS /- /Thermo Fisher Scientific /61-7000, Nerve /Rat. **Fig. 104.** 8-OHdG /N45.1 /Japan Institute for the Control of Aging /MOG-020P, Liver /Rat. **Fig. 105.** Olig2 /- /Immuno-Biological Laboratories Co., Ltd. /18953, Spinal cord /Rat.

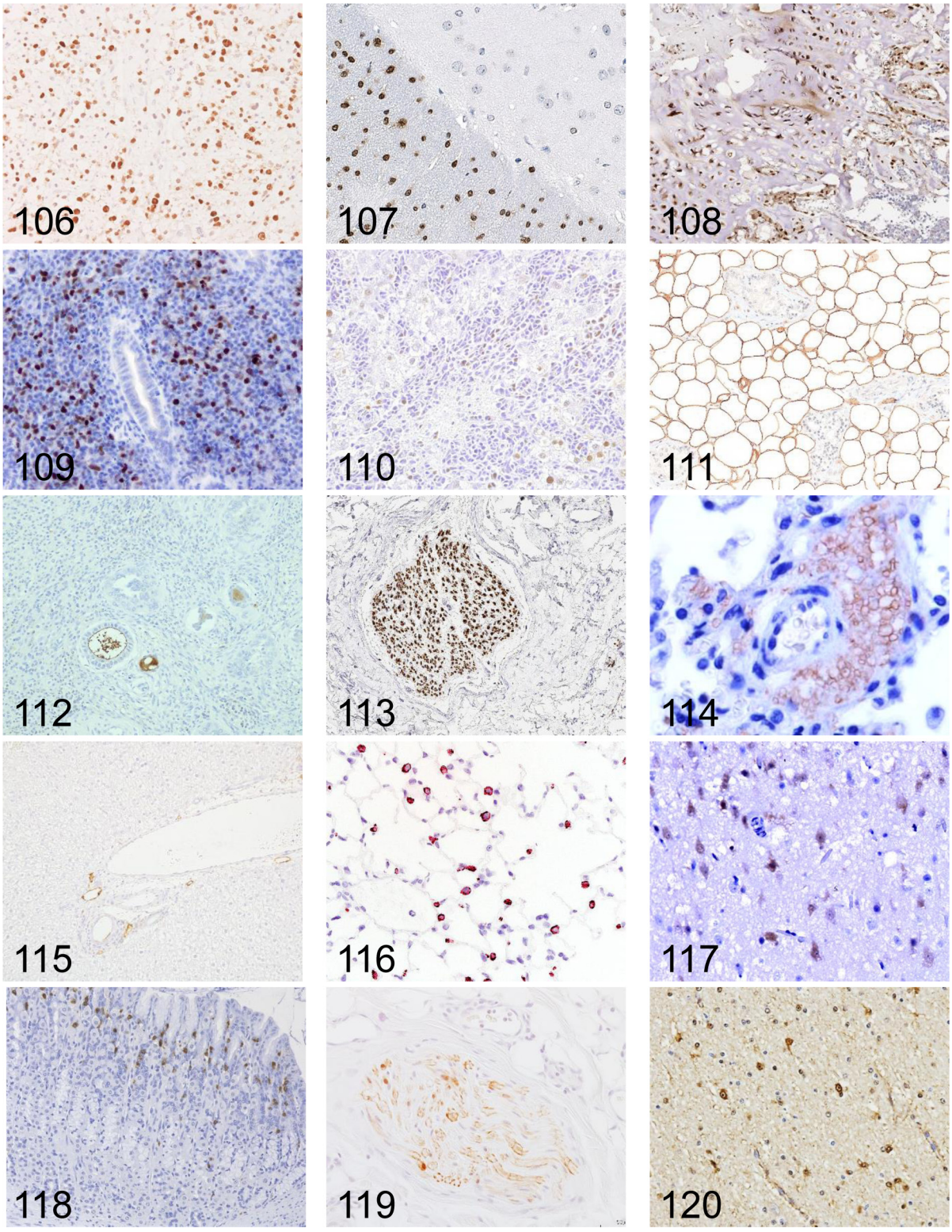

Fig. 106. Olig2 /211F1.1 /Merck /MABN50, Oligodendroglioma /Dog. **Fig. 107.** Olig2 /- /Novus Biologicals /NBP1-28667, Cerebrum /Mouse **Fig. 108.** Osterix /- /Abcam plc /ab22552, Femur /Rat. **Fig. 109.** Pax-5 /- /Abcam plc /ab15164, Intestinal B cell lymphoma /Dog. **Fig. 110.** PCNA /PC10 /Agilent Technology /M087901-2, Hemangiosarcoma, liver /Rat. **Fig. 111.** Perilipin 1 /- /Progen /GP29, Adipose tissue /Rat. **Fig. 112.** PGP-9.5 /- /Agilent Technology /Z511601-2, Ovary /Dog. **Fig. 113.** PGP-9.5 /13C4/I3C4 /Abcam plc /ab8189, Peripheral nerve /Monkey. **Fig. 114.** Pneumocystis /- /Santa Cruz Biotechnology, Inc. /sc-71915, Lung /Dog. **Fig. 115.** Podoplanin /- /AngioBio, Inc. /11-035, Liver /Rat. **Fig. 116.** Prosurfactant Protein C /- /Abcam plc /ab90716, Lung /Mouse. **Fig. 117.** Pseudorabies Virus /- /Abcam plc /ab3534, Cerebrum /Dog. **Fig. 118.** Rat Mast Cell Protease II /- /Moredun Scientific /MS-RM4, Glandular stomach /Rat. **Fig. 119.** S100 /- /Agilent Technology /IR50461-2J, Skin / Dog. **Fig. 120.** S100 /4c49 /Abcam /ab4066, Brain /Cow.

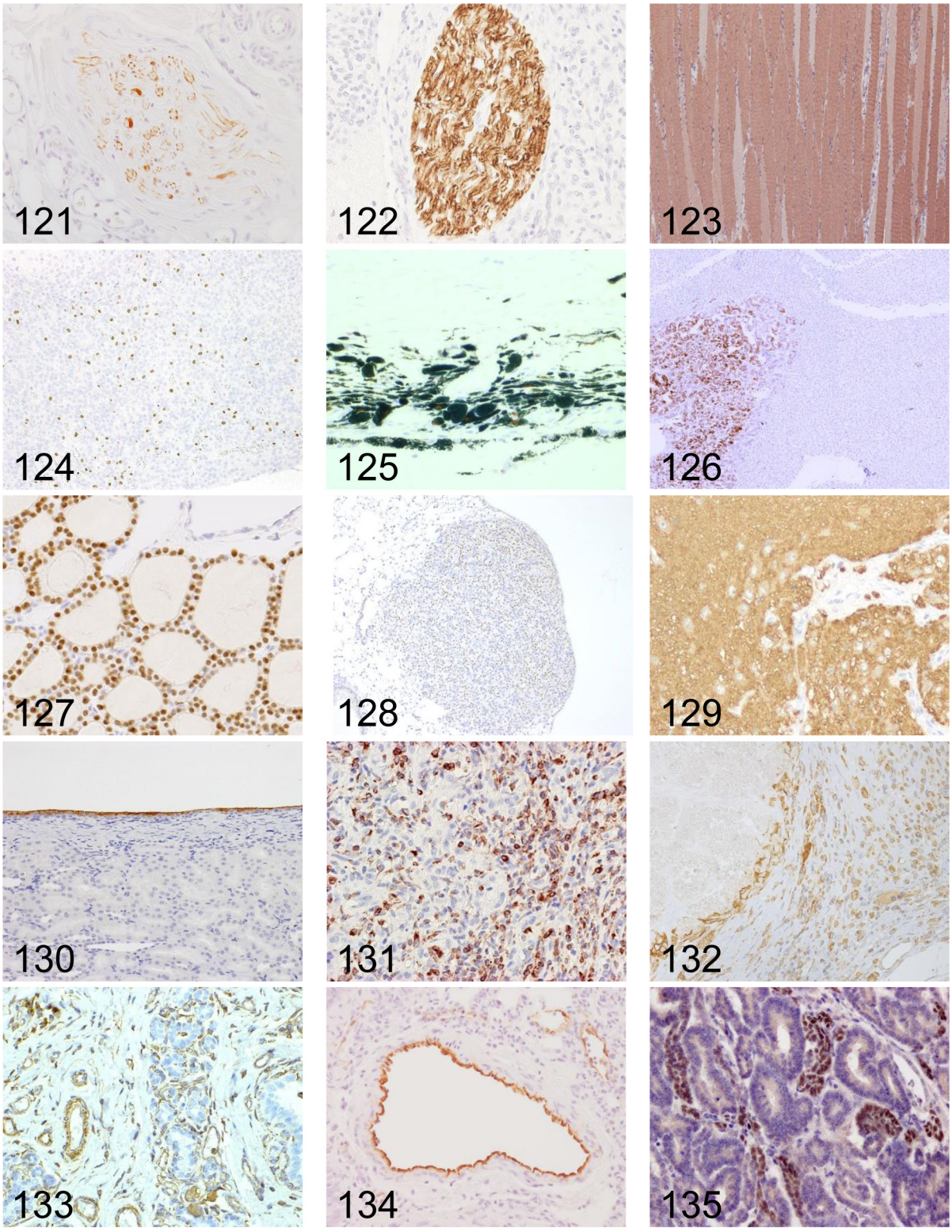

Fig. 121. S100 /- /Nichirei Biosciences /422091, Skin /Dog. **Fig. 122.** Schwann Cell/Peripheral Myelin /Schwann/2E /Cosmo Bio Co., Ltd. / GU01-M01AS-A, Nerve /Rat. **Fig. 123.** Sarcoplasmic/Endoplasmic Reticulum Calcium ATPase 2 /- /Abcam plc /ab3625, Soleus /Rat. **Fig. 124.** Steroidogenic Factor 1 /N1665 /Perseus Proteomics Inc. /PP-N1665-00, Pituitary gland /Rat. **Fig. 125.** Sox-10 / Santa Cruz Biotechnology, Inc. /sc-365692, Eye /Dog. **Fig. 126.** Synaptophysin /DAK-SYNAP /Agilent Technology /M731501-2, Adrenal gland /Dog. **Fig. 127.** Thyroid Transcription Factor 1 /SPT24 /Leica Biosystems /PA0364, Thyroid gland /Rat. **Fig. 128.** Thyroid Transcription Factor 1 /EP1584Y /Abcam plc /ab76013, Lung /Mouse. **Fig. 129.** Tubulin βIII /5G8 /Promega /G7121, Brain /Dog. **Fig. 130.** Uroplakin III /AU1 /Progen /651108, Kidney /Rat. **Fig. 131.** Vimentin /V9 /Agilent Technology /IR63061-2J, Complex carcinoma, eyelid /Dog. **Fig. 132.** Vimentin /D21H3 /Cell Signaling Technology /5741, Skin /Mouse. **Fig. 133.** Vimentin /EPR3776 /Abcam plc /ab92547, Mammary gland /Dog. **Fig. 134.** Von Willebrand Factor /- /Abcam plc /ab6994, Lung /Rat. **Fig. 135.** Wilms' Tumor 1 /- /Santa Cruz Biotechnology, Inc. /SC-192, Nephroblastoma /Pig.

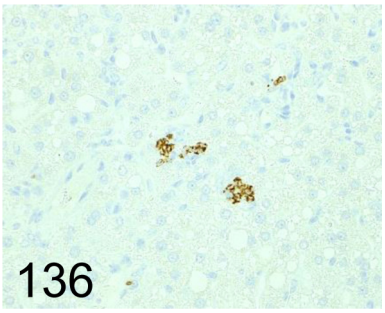

Fig. 136. YM1/Chitinase 3-like 3 /281926 /R&D Systems / MAB2446, Liver /Mouse.

Disclosure of Potential Conflicts of Interest: The authors declare that they have no potential conflicts of interest.

Acknowledgments: The authors would like to thank the cooperating research institutes, part of the CEAH, for generously providing the data.

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