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Technical Report

Databases for technical aspects of immunohistochemistry

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Abstract: With the aims of sharing information about the technical aspects of immunohistochemistry (IHC) and making it possible to make a suitable choice of antibody for histopathological examination, this technical report describes the results of a questionnaire administered during the period of 2014 to 2015 to members of the Conference on Experimental Animal Histopathology. It also describes the immunological properties of primary antibodies (clone, supplier, catalog number, species reactivity, etc.) and the IHC staining conditions (fixing solution, fixing time, embedding, antigen retrieval method, antibody dilution, incubation time, incubation temperature, positive control tissue, secondary antibody information, etc.) for a total number of 733 primary antibodies (425 kinds of primary antibody). (DOI: 10.1293/tox.2016-0047; J Toxicol Pathol 2017; 30: 79–107)

Key words: antibody, immunohistochemistry, toxicological pathology

Immunohistochemistry (IHC) is a biochemical method that applies to any use of an antibody-based method to identify a specific antigen in order to understand the distribution and localization of biomarkers and differentially expressed proteins in different parts of a biological tissue[1]. IHC is widely utilized for diagnostic interpretation and understanding of pathogenesis and has become a routine tool for toxicological pathology. However, the variable staining conditions of IHC, such as those relating to the antibody clone/supplier, fixation, antigen retrieval, antigen-antibody reactions, positive controls, antibody dilution, and incubation time, raise many challenges for pathologists. A questionnaire about IHC was administered during the period of 2014 to 2015 to members of the Conference on Experimental Animal Histopathology (CEAH), which is composed of 93 research institutes involved in experimental animal pathological research in Japan and Korea, such as pharmaceutical companies, chemical companies, universities, public research institutes and contract research organizations. A total of 733 primary antibodies (425 kinds of primary antibody) were available from 47 research institutes according to the responses to the questionnaire. With the aims of sharing information about the technical aspects of IHC and making it possible to make a suitable choice of antibody for histopathological examination, the present technical report describes the IHC questionnaire results. In addition, the IHC histological photographs of some primary antibodies are provided in the figures to clarify the antigen localization and staining condition in the tissues.

The immunological properties of primary antibodies (clone, supplier, catalog number, species reactivity, etc.) and IHC staining conditions (fixing solution, fixing time, embedding, antigen retrieval method, antibody dilution, incubation time, incubation temperature, positive control tissue, secondary antibody information, etc.) are shown in Tables 1–12 and Supplementary Tables 1–15: on-line only, and IHC histological photographs are shown in Figs. 1–235.

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Disclosure of Potential Conflicts of Interest: The authors declare that there is no conflict of interest.

Reference

1. Ramos-Vara JA, and Miller MA. When tissue antigens and antibodies get along: revisiting the technical aspects of immunohistochemistry--the red, brown, and blue technique. Vet Pathol. **51**: 42–87. 2014. [Medline] [CrossRef]

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Table 1. Immunological Properties of Primary Antibodies and IHC Staining Conditions

No.	Primary antibody																	Photo. No.
	Antibody			Species reactivity													Dilution	
	Antigen	Clone	Supplier	All	Rat	Mou	Dog	GP	Hum	Mon	Rab	Cat	Pig	Cow	Chi	Other		
1	ACTH	SPM333	Santa Cruz		○	○			○								1/100	
2	Actin	AC40	Sigma-Aldrich										○				1/200	Photo. 1
3	Actin, muscle	HHF35	Dako		○		○										1/200	
					○												1/100	
4	Actin, sarcomeric	Alpha-Sr-1	Dako		○												1/50	
					○	○											1/100	Photo. 2
					○												1/10	
5	Actin, α-smooth muscle	1A4	Dako		○												Ready to use	
					○												Ready to use	
							○										Ready to use	
							○						○	○			Ready to use	
					○	○											Ready to use	Photo. 3
							○										1/200	
					○	○											1/100	
							○										1 μg/mL	
							○							○			1/1000	
					○												1/1000	
					○					○							1/100	
					○		○										1/100	
					○	○											1/50	
													○				1/200	
										○							1/1000	
					○												1/100	
					○												1/100~500	
					○		○										1/50	
					○	○											1/100	Photo. 4
							○										1/1000	
					○												1/200	
							○										1/300	
					○												1/1000 (Cat, 1/500)	
					○												1/500	
					○												1/100	
			Invitrogen	○													1/100~200	
			Nichirei		○	○											Ready to use	Photo. 5
		ASM-1	Progen		○	○											0.5 μg/mL	Photo. 6
		E184	Abcam		○												1/500	Photo. 7
					○												1/500	
6	Actin, β	AC-74	Sigma-Aldrich		○	○	○	○		○	○		○				1/500	
7	Active-β-catenin	8E7	Millipore		○												1/50	Photo. 8
8	Adiponectin	-	BioVision		○	○											1/50	Photo. 9
9	Adipophilin	AP125	Acris Antibodies GmbH		○												1/ 50	Photo. 10
			American Research Products		○												1/200	Photo. 11
			Progen		○												1/100	
					○	○	×										Ready to use (1/1~2)	
					○												Ready to use	
					○												1/200	
		-	Progen		○												1/100	
					○												1/400	
					○	○											1/1000	Photo. 12
					○	○											1/1000	
10	Adrenocorticotropin (ACTH)	02A3	Dako		○												1/500	
11	Amelogenin	-	Hokudo					○									1/5000	
12	Amylase	-	Santa Cruz		○												1/100	Photo. 13
13	Amylase 2A	-	Proteintech		○												1/200	Photo. 14
14	Amyloid A	KM268	Kyowa Medex											○			1/200	Photo. 15
															○		1/500~2000	
15	β-Amyloid	6E10	Covance			○											1/500	
		6F/3D	Dako			○											1/200	Photo. 16
		82E1	IBL			○											1/200	Photo. 17
16	Androgen Receptor	G122-25	BD Biosciences								○						1/100	Photo. 18
		-	Santa Cruz		○												1/50	Photo. 19
17	Angiotensin II type 1 Receptor	-	Abcam		○												1/300	
18	Aquaporin 1	1/22	Abcam		○	○	×			○							1/200	Photo. 20
		-	Millipore		○												1/5000	Photo. 21

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

No.	Primary antibody																Photo. No.
	Antibody			Species reactivity												Dilution	
	Antigen	Clone	Supplier	All	Rat	Mou	Dog	GP	Hum	Mon	Rab	Cat	Pig	Cow	Chi	Other		
19	Aquaporin 2	-	ProSci		○												1/5000	Photo. 22
20	Bcl-2	124	Dako		○												1/100	
		-	Millipore			○											1/40	
21	Bcl-6	-	Santa Cruz		○												1/1000	
						○											1/50	
						○											1/1000	
22	BrdU	BU1/75	Abcam	○													1/40	
		Bu20a	AbD serotec	○													1/50000	Photo. 23
			Dako		○	○											1/1000	Photo. 24
					○												1/1000	
					○												1/100	
						○											1/30	
					○												1/100	
					○												1/250	
						○											1/200	
					○												1/100	
		MoBu-1	Abcam	○													1/100	
23	Breast Cancer Resistance Protein/CD338	BXP-21	AbD serotec						○								1/1000	
		BXP-53	Enzo Life Sciences		○	○	○										1/1000	
24	Calbindin D28K	CB-955	Abcam				○										1/200	Photo. 25
			Sigma-Aldrich			○											1/3000	Photo. 26
					○												1/500	Photo. 27
		-	Abcam		○												1/5000	
25	Calcitonin	-	Dako		○												1/400	
							○										Ready to use	
					○												1/2	
			GeneTex		○												1/100	Photo. 28
			Nichirei		○												Ready to use	
26	Calponin	hCP	Sigma-Aldrich				○										1/1000	Photo. 29
27	Calretinin	6B8.2	Millipore		○												1/300	Photo. 30
		DAK-Calret 1	Dako											×			1/50~100	
		-	Acris Antibodies GmbH		○	○											1/50	Photo. 31
28	*Candida albicans*	-	Abnova								○						1/50	Photo. 32
29	Caspase-3	-	Cell Signaling Technology		○	○			○	○							1/200	
			Promega		○	○											1/250	Photo. 33
30	Catalase	-	Abcam							○							1/200	
					○												1/200	
31	β-catenin	14/Beta-Catenin	BD Transduction			○											1/1000	
					○	○											1/1000	
32	CC10	-	Santa Cruz			○											1/5000	Photo. 34
33	CD3	1F4	AbD serotec		○												1/20	Photo. 35
		F7.2.38	Dako						○								2.5 μg/mL	
										○							2.5 μg/mL	
							○							○			1/25~50	
					○		○										1/500	
							○										1/100	
		G4,18	BD Biosciences		○												1/50	
					○												1/50	Photo. 36
		SP7	Abcam							○			○				1/200	
					○	○						○					1/100	Photo. 37
			Nichirei		○	○	○										Ready to use (1/1~2)	
		-	Abcam			○											1/100	Photo. 38
						○											1/100	
					○												1/100	
			Dako							○							Ready to use	
										○							Ready to use	
					○												Ready to use	
									○								Ready to use	
							○										Ready to use	
										○							Ready to use	Photo. 39
			Invitrogen							○							1/100	Photo. 40
			Santa Cruz		○	○											1/1000	
					○	○											1/100	Photo. 41
			Sigma-Aldrich				○						○	○			1/3000	Photo. 42
										○							1/2000	

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

No.	Primary antibody																Photo. No.
	Antibody			Species reactivity												Dilution	
	Antigen	Clone	Supplier	All	Rat	Mou	Dog	GP	Hum	Mon	Rab	Cat	Pig	Cow	Chi	Other	
34	CD3e	145-2C11	BD Biosciences			○											1/50	Photo. 43
		SP7	Nichirei		○	○											Ready to use	
						○											Ready to use	Photo. 44
35	CD4	1F6	Nichirei		×	×				○							Ready to use	
		10B5	OriGene		○		○		○								1/50	
		GK1.5	Santa Cruz			○											1/500~1/1000	Photo. 45
		H129.19	BD Biosciences			○											1/50	
		OX-38	BD Biosciences		○												1/50	Photo. 46
		RIV6	Lifespan Biosciences					○									1/800	
		RM4-5	BD Biosciences			○											1/50	Photo. 47
						○											1/50	
		-	Biorbyt		○	○	○		○		○						1/100	
36	CD8α	53-6.7	BD Biosciences			○											1/50	
						○											1/50	Photo. 48
		OX-8	BD Biosciences		○												1/50	Photo. 49
			AbD serotec		○												1/100	Photo. 50
					○												1/100	
37	CD11b	M1/70.15	AbD serotec		○												1/500	
38	CD11 c	-	Bioss Inc		○	○	○										1/400	
39	CD20	E17-P	Acris Antibodies GmbH							○							1/600	
		-	Acris Antibodies GmbH				○						○	○			1/20	Photo. 51
			Spring Bioscience				○										Ready to use	
							○										-	
			Affinity Bioreagents			○	○		○			○		○			1/400	
40	CD20cy	L26	Dako						○	○							Ready to use	
										○							Ready to use	Photo. 52
41	CD21	EP3093	Abcam							○							1/200	Photo. 53
42	CD31	JC70A	Dako							○							1/2	
									○	○							2 μg/mL	
							○										Ready to use	Photo. 54
		MEC 13.3	BD Biosciences						○								1/50	
		SZ31	dianova GmbH			○											2 μg/mL	Photo. 55
		-	Abcam			○											1/100	Photo. 56
			Santa Cruz		○	○											1/100	Photo. 57
43	CD34	-	BOSTER		○	○											1/5000	
			R&D systems		○												1/20	
					○												1/500	
					○												1/100	Photo. 58
44	CD45R	RA3-6B2	Abcam			○							○				1/200	
			AbD serotec			○											1/100	
			BD Biosciences			○											1/200	
						○											1/50	Photo. 59
			Santa Cruz			○											2.5 μg/mL	
45	CD45RA	OX33	AbD serotec		○												1/100	Photo. 60
			BD Biosciences		○												1/50	Photo. 61
			Bio-Rad Laboratories							○							P, 1/10000; F, 1/4000	Photo. 62
46	CD61	Y2/51	Dako				○										1/50~100	
										○							1/100	
47	CD68	ED1	AbD serotec		○												1/100	Photo. 63
					○												1/100	
					○												1/100	
					○												1/300	
					○												1/1000	
					○	○											1/500	
					○		×										1/100	
					○												1/200	
			Acris Antibodies GmbH		○												1/100	Photo. 64
			BMA Biomedicals		○	○											1/500	
					○												1/100	
					○												1/800~40000	Photo. 65
					○												1/100	

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

No.	Primary antibody																Photo. No.
	Antibody			Species reactivity												Dilution	
	Antigen	Clone	Supplier	All	Rat	Mou	Dog	GP	Hum	Mon	Rab	Cat	Pig	Cow	Chi	Other		
47	CD68	ED1	Millipore		○												1/2000	Photo. 66
					○												1/500	
					○												1/200~400	
					○												1/100	
		Ki-M2R	BMA Biomedicals		○												1/40	
		KP1	Dako				○										Ready to use	
										○							1 μg/mL	
					×	×				○							1/50	Photo. 67
										○							1/2000	
		PG-M1	Dako						○								1 μg/mL	
		-	Abcam			○											1/250	
48	CD77	38.13	Beckman Coulter			○											1/100	Photo. 68
49	CD79α	HM57	Nichirei		○							○					1/50	Photo. 69
			Abcam		○	×	○										1/4000	
		SP18	Nichirei		○	×	○										-	
		-	Spring Bioscience		○												1/200	
50	CD90/Thy 1	OX-7	Cedarlane Laboratories		○												1/200	Photo. 70
51	CD117/c-kit	-	Dako		○		○										1/50	Photo. 71
							○										1/400~600	
							○										1/200	
							○										1/400~600	
					○												1/100	
			Santa Cruz		○												1/100	
52	CD138	281-2	BD Biosciences			○											1/1000	
53	CD163	ED2	AbD serotec		○												1/100	
					○												1/100	
					○												1/300	
			Acris Antibodies GmbH		○												1/100	Photo. 72
			BMA Biomedicals		○												1/200	
54	CD204	SRA-E5	Trans Genic							○							1/500	
							○										1/800	
							○										1/200	Photo. 73
					○		○										1/500	
55	Cdc2	17	Santa Cruz		○	○			○								1/1000	
56	Cdk2	-	Santa Cruz		○	○			○								1/1000	
57	CDX2	DAK-CDX2	Dako		○												1/50	
58	Chlamydia	-	Abcam		○	○											1/8000	
59	Chromogranin A	-	Abcam		△												1/1000	
60	Claudin 11	-	Invitrogen		○	○											1/100	
			Novus Biologicals		○	○											1/100	
61	Cleaved Caspase-3	5A1E	Cell Signaling Technology		○	○			○	○							1/800	
		-	Cell Signaling Technology		○												1/3000	
					○												1/600	
62	Clusterin	-	R&D systems		○												1/50	Photo. 74
63	c-Met	-	Abcam		○												1/50	
			Santa Cruz						○								2 μg/mL	
64	Collagen type I	-	Abcam			○											1/1600	
					○												1/200	
			BioLogo		○												1/500	Photo. 75
65	Collagen type II	II-4C11	Daiichi Fine Chemical										○				1/100	Photo. 76
66	Collagen type III	III-53	Daiichi Fine Chemical								○						1/50	
		FH-7A	Abcam		○												1/12000	
		-	BioLogo		○												1/200	Photo. 77
67	Collagen type IV	-	AbD serotec		○	○											1/500	
68	Connexin 32	-	Abcam		○	○			○								1/50	
			-		○												1/1000	
69	CXCR3	-	Bioss		○	○	○	○					○	○			1/100	
70	Cyclin D1	SP4	Nichirei			○											Ready to use	
					○												Ready to use	Photo. 78
71	Cyclooxygenase-2	33/Cox-2	BD Transduction		○	○											1/50	
					○	○											1/100	
		Clone33	BD Biosciences		○	○	○		○		○						1/200	
		-	Cayman Chemical		○												1/600	

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

No.	Primary antibody																Dilution	Photo. No.
	Antibody			Species reactivity														
	Antigen	Clone	Supplier	All	Rat	Mou	Dog	GP	Hum	Mon	Rab	Cat	Pig	Cow	Chi	Other		
72	Cystatin C	EPR4413	Abcam		○												1/1000	Photo. 79
73	Cytochrome P450 3A1	-	Millipore			○											1/5000	Photo. 80
74	Cytochrome P450 CYP2B1	-	Nosan Corporation		○												1/2000	
75	Cytokeratin	AE-1	Sanbaio				○								○		1/200	
		AE-3	Progen				○							○			1/100	
		AE1/AE3	Dako		○	○											Ready to use	
							○										Ready to use	
					○												Ready to use	
					○					○							Ready to use	
							○										Ready to use	
					○	○											Ready to use	Photo. 81
					○												Ready to use	
							○										Ready to use	
					○												1/100	Photo. 82
			Nichirei						○								Ready to use	
					○	○	○										Ready to use	
							○										Ready to use	
		-	Invitrogen	○													1/400	
			Nichirei			○											Ready to use	Photo. 83
76	Cytokeratin Low Molecular Weight	CAM 5.2	BD Biosciences				○										Ready to use	Photo. 84
77	Cytokeratin High Molecular Weight	34βE12	Dako		○												Ready to use	
							○										5 μg/mL	
					○												1/100	Photo. 85
78	Cytokeratin 5	-	Abcam								○						1/300	Photo. 86
79	Cytokeratin 7	OV-TL 12/30	Dako				○										1/50~100	
80	Cytokeratin 8	Ks8.7	Progen			○											1/20	
					○												Ready to use	Photo. 87
81	Cytokeratin 8/18	Zym5.2 (UCD/PR.10-11)	Zymed				○										-	
		-	Progen		○	○			○					○	○	○	1/600	
82	Cytokeratin 10	DE-K10	Abcam		○	○											1/400	Photo. 88
83	Cytokeratin 13	-	Abcam									○					1/50	
84	Cytokeratin 14	LL002	Acris Antibodies GmbH		○												1/200	Photo. 89
			BioGenex				○										1/50	Photo. 90
		RCK107	Millipore											○		○	1/75	Photo. 91
85	Cytokeratin 18	C-04	Abcam									○					1/100	
			Santa Cruz		○												1/100	Photo. 92
		Ks18.04	Progen			○											1/100	
86	Cytokeratin 19	BA17	Abcam				○										Ready to use	
		b170	Leica			○											1/150	
					○		○										Ready to use	
		EPNCIR127B	Epitomics			○											1/1000	Photo. 93
		RCK108	Dako				○										1/50~100	
		-	Abcam		○												1/50	Photo. 94
87	Cytokeratin 20	IT-Ks20.10	Progen				○										-	
		KS20.8	Dako				○										1/25~50	
88	DEAD box Protein 4/DDX-4	-	Abcam		○												1/200	
89	Desmin	D33	Dako		○												Ready to use	
							○										Ready to use	
					○												Ready to use	
							○							○			Ready to use	
					○		○										Ready to use	
					○	○											Ready to use	Photo. 95
					○												Ready to use	
					○												Ready to use	
			Nichirei				○										Ready to use	
		-	Abcam		○	○											1/1500	Photo. 96
90	Dityrosine	1C3	JalCA		○	○	○										1/200	
91	*Dolichos biflorus* Lectin	-	EY		○												1/50	
92	Doublecortin	-	Santa Cruz		○	○											1/100	Photo. 97
93	E-cadherin	36/E-Cadherin	BD Biosciences		○		○										1/500	
					○		○										1/500	Photo. 98
		DECMA-1	Santa Cruz		○		○										1/50	
		NCH-38	Dako						○	○							5 μg/mL	Photo. 99

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

No.	Primary antibody																Photo. No.
	Antibody			Species reactivity												Dilution	
	Antigen	Clone	Supplier	All	Rat	Mou	Dog	GP	Hum	Mon	Rab	Cat	Pig	Cow	Chi	Other		
94	EGF Receptor	D38B1	Cell Signaling Technology						○								1/100	Photo. 100
		EGFR.1	BD Biosciences						○								5 μg/mL	
95	ERCC	-	Santa Cruz		○												1/800	Photo. 101
96	Estrogen Receptor α	-	Santa Cruz		○	○			○								1/100	
					○												1/200	Photo. 102
97	Estrogen Receptor β	-	Millipore		○												1/100	
			Santa Cruz		○	○			○								1/100	
98	F4/80	AI-3	Abcam			○											1/500	
			Acris Antibodies GmbH			○											1/100	Photo. 103
		BM8	BMA Biomedicals			○											1/200	
						○											1/200	Photo. 104
99	Fas	-	Abnova		○												1/500	
100	Fas Ligand	-	Abnova		○				○								1/500	
101	Fibronectin	-	Sigma-Aldrich		○												1/200	
102	Follicle Stimulating Hormone	-	AbD serotec		○												1/5000	Photo. 105
			Biogenesis		○	○											1/1000	
			Millipore		○												1/4000	
103	Foxp3	FJK-16s	eBioscience		○	○	○					○	○	○			1/800	
					○	○	○		○								1/800	
104	GADD 153	-	Santa Cruz			○											1/500	Photo. 106
105	Galectin-1	-	R&D Systems			○											1/30	
106	Glial Fibrillary Acidic Protein	2E1	BD Biosciences		○	○	○										1/100	
		6F2	Dako				○										1/50	
					○												1/50~1/100	Photo. 107
		GA5	Cell Signaling Technology		○		○										1/2500	
					○												1/1000	
		-	Dako		○	○											Ready to use	Photo. 108
					○					○							Ready to use	
					○		○										Ready to use	
							○										Ready to use	
							○						○	○			Ready to use	
					○	○	○										Ready to use	
						○											Ready to use	
			ZYM	○													1/500	
107	α2μ-globulin	129736	R&D systems		○												1/100	Photo. 109
		-	R&D systems		○												1/2000	
					○												1/200~300	
					○												1/100	Photo. 110
					○												1/100	
					○												1/600	
					○												1/300	
					○												1/100	
108	Glucagon	K79bB10	Abcam							○							1/1000	Photo. 111
					○												1/4000	
			Sigma-Aldrich				○										1/5000	Photo. 112
					○		○										1/12000	
		-	Nichirei			○											Ready to use	Photo. 113
109	Glucose Transporter type 1	-	Abcam		○												1/250	Photo. 114
110	Glucose Transporter type 3	-	GeneTex		○												1/100	Photo. 115
111	Glutamate Decarboxylase 65&67	-	Millipore		○												1/50	
112	Glutamine Synthetase	GS-6	Millipore		○												1/200	Photo. 116
113	Glutathione S-transferase Placental type	-	MBL		○												1/2000	Photo. 117
						○											1/1000	
					○												1/200	
					○	○			○								1/1000	
					○												1/1000	
					○												1/1000	
					○												1/1000	
					○												Ready to use	
					○												Ready to use	
					○												1/2	
					○												Ready to use	

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

No.	Primary antibody																Photo. No.
	Antibody			Species reactivity												Dilution	
	Antigen	Clone	Supplier	All	Rat	Mou	Dog	GP	Hum	Mon	Rab	Cat	Pig	Cow	Chi	Other		
114	Glutathione S-transferase π	-	MBL		○	○											1/500	
						○											1/500	
115	Granzyme B	-	Spring Bioscience				○		○								1/100	
116	Green Fluorescent Protein	-	Novus Biologicals		○												1/7000	
117	Growth Hormone	222540	R&D systems		○												1/1000	Photo. 118
		-	AbD serotec		○	○											1/500	
			Millipore		○												1/250	Photo. 119
			Santa Cruz		○	○			○								1/200	
118	H+,K+-ATPase	-	Millipore		○												1/1000	Photo. 120
119	Heat Shock Protein 60	D6F1	Cell Signaling Technology		○	○	○		○				○	○			1/400	
120	Heme Oxygenase-1	GTS-3	Takara Bio		○												1/200	
121	Hepatocyte	OCH1E5	Dako				○										Ready to use	Photo. 121
122	Hexanoyl Lysine (HEL)	5F12	JaICA		○		○		○								1/100	
123	4-Hydroxy-2-nonenal	HNEJ2	JaICA				○										1/100	
							○										1/50	Photo. 122
		-	Millipore		○												1/1000	
124	Iba 1	1022-5	Abcam		○	○	○										1/200	
		-	Bioss		○												1/500	Photo. 125
			Wako		○					○							1/250	
					○	○											1/16000	
														○			1/200	
							○										1/500	
					○					○							1/500	
										○							1/1000	Photo. 124
					○												1/200	
			Wako		○	○											1/2000	
					○		○										1/2000	
							○										-	
							○							○			1/50	
					○		○										1/1000	
					○	○											1/200	
					○												1/1000	
					○												1/1000	
						○											1/500; 1/400	
125	IFN-γ	-	R&D systems				○										1/200	
126	IgG, Fc(γ)	-	Jackson ImmunoResearch Laboratories		○												1/500	Photo. 125
127	IgM, (μ)	-	Cappel		○												1/200	
			Jackson ImmunoResearch Laboratories		○												1/500	Photo. 126
128	IL-17	-	Abcam		○	○	○		○								1/200	
129	Inhibin α	R1	AbD serotec				○					○	○				1/25	Photo. 127
130	Insulin	K36aC10	Abcam							○							1/1000	Photo. 128
					○		○										1/1000	
			Sigma-Aldrich		○		○										1/5000	Photo. 129
					○		○										1/8000	
		-	Dako		○												1/30	
										○							Ready to use	Photo. 130
										○							Ready to use	
			Santa Cruz			○											1/100	Photo. 131
131	Intrinsic Factor	-	Fitzgerald		○												1/3000	Photo. 132
132	Ki-67	MIB-1	Dako				○										1/75~150	
						○											Ready to use	Photo. 133
									○	○							1/2	Photo. 134
										○							1/800	Photo. 135
							○							○			1/50	
				○													1/100	
							○										1/100	
					○												1/100	

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

No.	Primary antibody																Photo. No.
	Antibody			Species reactivity												Dilution	
	Antigen	Clone	Supplier	All	Rat	Mou	Dog	GP	Hum	Mon	Rab	Cat	Pig	Cow	Chi	Other		
132	Ki-67	MIB-5	Dako		○												1/50	
					○												1/20	
					○												1/20	
					○	×	○										1/25	
					○												1/100	
					○												1/20	
					○												1/50	
					○												1/50	
					○					×							1/25	
					○												1/15	
					○												1/15	
					○												1/50	
					○												1/25	Photo. 136
					○												1/50	
		SP6	Abcam		○	○											1/200	Photo. 137
			Nichirei		○												Ready to use	
					○		○										Ready to use	
		-	Abcam			○											1/200	Photo. 138
			Millipore			○											1/600	
			Novus Biologicals			○											1/1000	Photo. 139
					○	○											1/500	
133	KIM-1/Tim-1	-	R&D systems		○												1/100	
					○												1/200	
					○												1/5000	Photo. 140
					○												15 μg/mL	
134	Lactate Dehydrogenase	H160	Santa Cruz		○												1/200	
135	Laminin	-	Dako		○	○											1/2000	
			LSL		○		○										1/50	Photo. 141
			Sigma-Aldrich		○												1/100	
					○												1/30	Photo. 142
136	LAMP-1	-	Abcam		○	○	○		○			○				○	1/200	
			Sigma-Aldrich		○	○	○										1/100	
137	LAMP-2	M3/84	Santa Cruz			○											1/1000	Photo. 143
		-	Affinity Bioreagents		○												1/800	
			Invitrogen		○												1/1000	
					○	○	○										1/1000	
					○												1/200	
					○	○											1/100	Photo. 144
					○												1/1000	
			Lifespan Biosciences		○	○	○										1/250	
							○										1/1000	Photo. 145
138	LC3	-	MBL		○	○	○		○								1/4000	
139	Lipocalin-2/NGAL	-	R&D systems		○												1/300	Photo. 146
140	Luteinizing Hormone	-	Affinity Bioreagents		○	○			○								1/100	
			Biogenesis		○	○											1/500	
			Millipore		○												1/4000	
141	Luteinizing Hormone Receptor	-	Santa Cruz		○	○			○								1/800	
142	Lysozyme	-	Dako		○												1/400	Photo. 147
					○												1/500	
							○								○		1/1000~1/3000	
143	MAC-2	M3/38	Cedarlane			○											1/50	
						○											1/80000	Photo. 148
144	Macrophage	RM0029-11H3	Abcam			○											1/100	Photo. 149
145	Macrophage Scavenger Receptor A	SRA-E5	Trans Genic				○										5 μg/mL	
146	Macrophage/Dendritic Cells	RM-4	Trans Genic		○												1/25	Photo. 150
147	MCM7	47DC141/DCS-141	Abcam		○												1/100	
		EP1974Y	Abcam		○	○											1/2000	Photo. 151
148	Melan A	A103	Dako				○										-	
							○					○		○			Ready to use	
					○	○	○										1/50	
							○										1/50	
							○										1/200	Photo. 152
		M2-7C10	Nichirei				○										Ready to use	

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

No.	Primary antibody																Photo. No.
	Antibody			Species reactivity												Dilution	
	Antigen	Clone	Supplier	All	Rat	Mou	Dog	GP	Hum	Mon	Rab	Cat	Pig	Cow	Chi	Other	
149	Melanoma	HMB-45	Dako				○										1/50	
		PNL2	Abcam		○												1/25	Photo. 153
150	Mesothelin	-	IBL		○												1/200	Photo. 154
					○												1/2000	
					○	×											1/100	
					○												1/250	
151	Metallothionein	E9	Dako		○												1/50	Photo. 155
152	MHC class II (Human HLA-DR)	TAL.1B5	Dako				○										1/20~40	
							○										1/500	Photo. 156
							○										1/100	
							○										1/100	
153	MHC class II (RT1B)	OX-6	AbD serotec		○												1/500	Photo. 157
154	β2-microglobulin	-	Lifespan Biosciences		○												1/200	Photo. 158
155	Microtubule Associated Protein 2	AP18	Neomarkers		○	○	○										1/200	
156	Mitochondria	113-1	Millipore				○										1/400	
157	MLH1	EPR3894	Abcam		○												1/1600	Photo. 159
158	Myelin Basic Protein	26	Millipore		○		○										1/1000	Photo. 160
		-	Abcam		○												1/100	Photo. 161
			AbFrontier			○											1/300	Photo. 162
			Sigma-Aldrich		○	○											1/100	Photo. 163
159	Myelin CNPase	SMI-91	Millipore		○												1/200	
160	Myelin Proteolipid Protein	EPR12675(2)(B)	Abcam		○	○											1/2000	
		PLPC1	Millipore		○		○										1/500	Photo. 164
161	Myeloid/Histiocyte Antigen	MAC387	Abcam			○	○		○	○	○		○	○			1/1000 or more	
			Dako				○										1/200~400	
							○										1/400	
162	MyoD1	5.8A	Dako				○							○			1/50	Photo. 165
163	Myogenin	F5D	Abcam		○												1/800	Photo. 166
			Dako				○							○			1/200	Photo. 167
164	Nectin 4	-	R&D Systems				○										1/100	
165	Nephrin C	-	IBL		○												1/20	Photo. 168
166	Nestin	Rat-401	Millipore		○												1/100	
					○												1/100	
					○	○											1/500	Photo. 169
			Santa Cruz		○	○											1/100	
167	NeuN	A60	Millipore		○												1/100	
										○							1/400	Photo. 170
					○												1/1000	
168	Neurofilament	2F11	Dako				○										1/50~100	
							○										Ready to use	Photo. 171
					○												1/50	
							○										1/200	
						○											1/1000	
					○												1/100	
													○				1/400	
						○											1/100	Photo. 172
					○	○											1/100	
					○												1/200	
					○					○							1/50~400; 1/100(Fo)	
169	Neurofilament 200	NE14	Sigma-Aldrich		○												1/1000	
170	Neurofilament L	-	Millipore							○							1/400	
171	Neuron-Specific Enolase	BBS/NC/VI-H14	Dako				○										Ready to use	
							○										Ready to use	
		-	Nichirei		○												Ready to use	
					○												1/10	
172	NG2	-	Millipore		○	○	○										1/50	
173	3-Nitrotyrosine	39B6	Abcam	○													1/50	
174	OCT3/4	C-10	Santa Cruz		○												1/800	

Table 10. Immunological Properties of Primary Antibodies and IHC Staining Conditions

No.	Primary antibody															Photo. No.
	Antibody			Species reactivity												Dilution	
	Antigen	Clone	Supplier	All	Rat	Mou	Dog	GP	Hum	Mon	Rab	Cat	Pig	Cow	Chi	Other		
175	Olig2	-	IBL		○	○	○										1/100	
					○												1/100	
					○												1/1000	
					○												1/100	Photo. 173
					○												1/500	
					○												1/1000	
			Novus Biologicals			○											1/1000	Photo. 174
176	Osteocalcin	OCG3	Abcam		○												1/100	Photo. 175
					○	○											1/100	
			Takara Bio		○												1/200	Photo. 176
177	Osterix	-	Abcam		○												1/200	Photo. 177
						○											1/200	
					○	○			○								1/200	
					○	○											1/200	
178	p62/SQSTM1	-	MBL		○	○			○								1/2000	
179	Paraoxonase 2 (PON2)	-	Abcam		○	○	○		○					○		○	1/1000	
180	Parathyroid Hormone	-	Yanaihara		○												1/50	
181	Pax5	EPR3730(2)	Abcam			○											1/300	Photo. 178
		-	Abcam				○										1/50	Photo. 179
182	Pax6	-	BioLegend		○												1/2500	
183	PCNA	PC10	Dako		○	○											1/1000	
					○												1/200~400	
					○												1/200; 1/400	
					○	○	○										1/2000	
				○													1/500	
					○												1/500	
					○	○	○										1/1000	
					○					○							1/20000 ~30000	
					○	○											1/100~200	
				○													1/100; 1/50	
					○	○											1/200	
							○										1/200~400	
							○								○		1/50~1/100	
					○		○										1/500	
				○													1/500	
					○												1/3000	
					○												1/6000	
							○										1/100	
										○							1/500	
					○						○						1/800	Photo. 180
						○											1/100	
					○												1/1000	
					○												1/800	
					○	○											1/1000	
					○												1/200	
					○												1/6000	
					○												1/800	
						○											0.2 μg/mL	
			Nichirei			○											Ready to use	Photo. 181
184	PDX1	-	Trans Genic		○												1/100	Photo. 182
185	Perilipin 1	-	Progen		○												1/1000	Photo. 183
186	PGP-9.5	13C4 / I3C4	Abcam		○	○	○	○	○				○				1/100	
		-	Dako		○												1/100	Photo. 184
							○										1/200	
187	Phospho-histone H3	-	Cell Signaling Technology		○												1/100	Photo. 185
					○	○											1/300	
188	Phospho-histone H3 (Ser10)	-	Millipore			○			○	○							1/200	Photo. 186
189	Phospho-Met (Tyr1349)	130H2	Cell Signaling Technology						○								1/25	
190	Phospho-p44/42 MAPK (Erk1/2) (Thr202/Tyr204)	D13.14.4E	Cell Signaling Technology			○			○								0.5 μg/mL	

Table 11. Immunological Properties of Primary Antibodies and IHC Staining Conditions

No.	Primary antibody																Photo. No.
	Antibody			Species reactivity												Dilution	
	Antigen	Clone	Supplier	All	Rat	Mou	Dog	GP	Hum	Mon	Rab	Cat	Pig	Cow	Chi	Other	
191	PLAP	8A9	Dako		○												1/100	
182	PNAd Carbohydrate	MECA-79	BD Biosciences							○							1/1000	
193	PNMT	1D2	Abcam		○												1/200	Photo. 187
194	Podoplanin	-	AngioBio		○												1/200	
					○												1/200	
					○	×											1/100	Photo. 188
					○												1/100	
195	PPARα	-	Santa Cruz		○	○			○								1/250	
196	PPARγ	C26H12	Cell Signaling Technology			○											1/400	Photo. 189
		-	Santa Cruz		○	○			○								1/250	
197	PPARγ2	-	Thermo Fisher Scientific			○											1/500	Photo. 190
198	Progesterone Receptor	16	Leica		○				○								1/400	
		Y85	Abcam		○												1/100	
		-	Dako		○				○								1/100	
199	Prohibitin	II-14-10	Fitzgerald		○												1/50	
		B-8	Santa Cruz		○	○	○		○				○				1/50	
		-	Abcam								○						1/500	
			Proteintech		○	○	○		○								1/50	
			Santa Cruz		○		○		○			○					1/100	
200	Prolactin	-	Millipore		○												1/1000	Photo. 191
201	Prosurfactant Protein C	-	Abcam			○											1/1000	Photo. 192
202	Pulmonary Surfactant-associated Protein C	-	Santa Cruz		○	○											1/100~300	
203	Pulmonary Surfactant-associated Protein D	-	Bioss			○											1/20	Photo. 193
204	RASSF1	-	Abcam		○												1/200	Photo. 194
205	Rat Mast Cell Protease 2	-	Moredun scientific		○												1/100	Photo. 195
206	Rat MFH	A3	Trans Genic		○												1/50	Photo. 196
207	Renin	-	Swant		○												1/500	
208	Retinal Pigment Epithelium-specific 65 kDa Protein	-	Abcam		○												1/500	Photo. 197
209	Retinoic Acid Receptor β	-	Abcam		○												1/50	Photo. 198
210	Rhodopsin	RET-P1	Millipore		○												1/2000	Photo. 199
211	S100	B32.1	Abcam		○					○							1/100~1000	Photo. 200
		-	Dako		○												1/2	
							○										Ready to use	
							○						○	○			Ready to use	
					○		○										Ready to use	Photo. 201
					○	○											Ready to use	
			Nichirei		○												Ready to use	Photo. 202
							○					○		○			Ready to use	
212	S100a	-	Dako		○	○											1/2000	Photo. 203
213	Sall4	EE-30	Santa Cruz		○												1/800	Photo. 204
		-	Abcam		○		△										1/10	Photo. 205
214	Sarcoplasmic/Endoplasmic Reticulum Calcium ATPase 2	IID8	Abcam		○												1/50000	
		-	Abcam		○												1/1000	Photo. 206
215	Schwann Cell/Peripheral Myelin	Schwann/ 2E	Cosmo Bio		○												1/500	
					○												1/1000	Photo. 207
					○												1/10000	
216	Slow Skeletal Myosin Heavy Chain	NOQ7.5.4D	Abcam		○												1/5000	Photo. 208
217	Somatostatin	-	Abcam				○										1/2000	
					○												1/2000	
218	Steroidogenic Factor 1	N1665	Perseus Proteomics Inc		○												1/1000	Photo. 209
219	Stromal Cell-derived Factor 1/CXCL12	79018.111	R&D System s			○											1/40	Photo. 210
220	Synaptophysin	27G12	Leica		○	○											Rat, 1/500; Mou, 1/50	Photo. 211
		DAK-Synap	Dako				○										1/50	
221	Talin	8d4	Sigma-Aldrich		○	○			○						○	○	1/250	
222	Tamm-Horsfall Urinary Glycoprotien	-	Santa Cruz		○	○											1/200	Photo. 212
					○												1/200	
223	Tartrate-resistant Acid Phosphatase	-	Santa Cruz		○	○	○		○	○							1/50	
			Takara Bio		○												1/1000~	
										○							1/1000	Photo. 213

Table 12. Immunological Properties of Primary Antibodies and IHC Staining Conditions

No.	Primary antibody																	Photo. No.
	Antibody			Species reactivity													Dilution	
	Antigen	Clone	Supplier	All	Rat	Mou	Dog	GP	Hum	Mon	Rab	Cat	Pig	Cow	Chi	Other		
224	T-bet/TBX21	-	Lifespan Biosciences				○		○				○	○			1/100	
225	TER-119/Erythroid Cells	Ter119	BioLegend		○												1/5000	
226	TGFβ Receptor II	-	Santa Cruz			○											2 μg/mL	
227	TGFβ1	-	Santa Cruz		○												1/100	Photo. 214
228	Thyroglobulin	-	Dako				○										Ready to use	
229	Thyroid Stimulating Hormone	-	Biogenesis		○	○											1/2000	
					○												1/1000	Photo. 215
			Millipore		○												1/4000	
					○												1/1000	Photo. 216
					○												1/5000	
230	Thyroid Stimulating Hormone β	-	Santa Cruz		○	○			○								1/100	
231	Thyroid Transcription Factor 1	8G7G3/1	Progen		○	○											1/100	Photo. 217
					○												1/20	
			Dako				○										1/50	Photo. 218
							○										1/50~200	
		EP1584Y	Abcam			○											1/100	Photo. 219
		SPT24	Leica		○		○										1/200	Photo. 220
232	Tissue Inhibitor of Metalloproteinase-3	-	Proteintech		○												1/200	Photo. 221
233	TJP1/ZO-1	-	Invitrogen		○												1/50	
234	Trichohyalin	AE15	Abcam								○						1/200	Photo. 222
235	Troponin I, Cardiac	2D5	Affinity Bioreagents							○							1/50	Photo. 223
236	Tubulin, β III	TU-20	Abcam		○												1/200	
237	Tyrosine Hydroxylase	LNC1	Millipore			○											1/2000	
		-	Enzo Life Sciences		○	○											1/1000	Photo. 224
238	Tyrosine Tubulin	TUB-1A2	Sigma-Aldrich	○					○								1/800	
					○	○											1/1000	Photo. 225
239	Ubiquitin	-	Dako			○											1/1000	Photo. 226
240	Uncoupling Protein 1	-	Abcam		○	○											1/500	Photo. 227
241	Uroplakin III	AU1	Progen		○												Ready to use	
					○												Ready to use	Photo. 228
242	Vascular Endothelial Growth Factor A	VG1	Abnova		○												1/800	
243	Vasoactive Intestinal Peptide	-	Millipore		○												1/500~1000	
244	Vimentin	D21H3	Cell Signaling Technology		○	○											1/500	
		V9	Dako		○												Ready to use	
										○							Ready to use	
									○	○							1/300	Photo. 229
					○	×											Ready to use (1/1~2)	
							○										Ready to use	
					○												Ready to use	
							○						○	○			Ready to use	
							○										Ready to use	
					○	○											Ready to use	
			Nichirei						○								Ready to use	
		Vim 3B4	Dako		○	○											Ready to use	Photo. 230
					○												1/200	
		-	Synaptic Systems		○												1/200	
245	Vinculin	SPM227	Abcam		○	○			○						○		1/25	
		V284	Millipore		○	○				○	○						1/100	
		-	Abcam		○	○			○								1/200	
246	Von Willebrand Factor	F8/86	Dako		○												1/200	
							○										1/25~50	
										○							1/400	
		-	Abcam		○	○	○										1/800	Photo. 231
			Thermo Fisher Scientific			○	○							○			1/100	Photo. 232
247	Wilms' Tumor 1	6F-H2	Dako		○		○										1/200	Photo. 233
		-	Santa Cruz		○												1/500	
					○												1/5000	Photo.234
					○												1/4000	
248	X-ray Repair Cross-complementing 1	-	Santa Cruz		○												1/600	Photo. 235

Animal species	All, All species; Rat, Rat; Mou, Mouse; Dog, Dog; GP, Guinea pig; Hum, Human; Mon, Monkey; Rab, Rabbit; Cat, Cat; Pig, Pig; Cow, Cow; Chi, Chicken; Other, Other.
Reactivity	○, good; △,conditional; ×, inappropriate

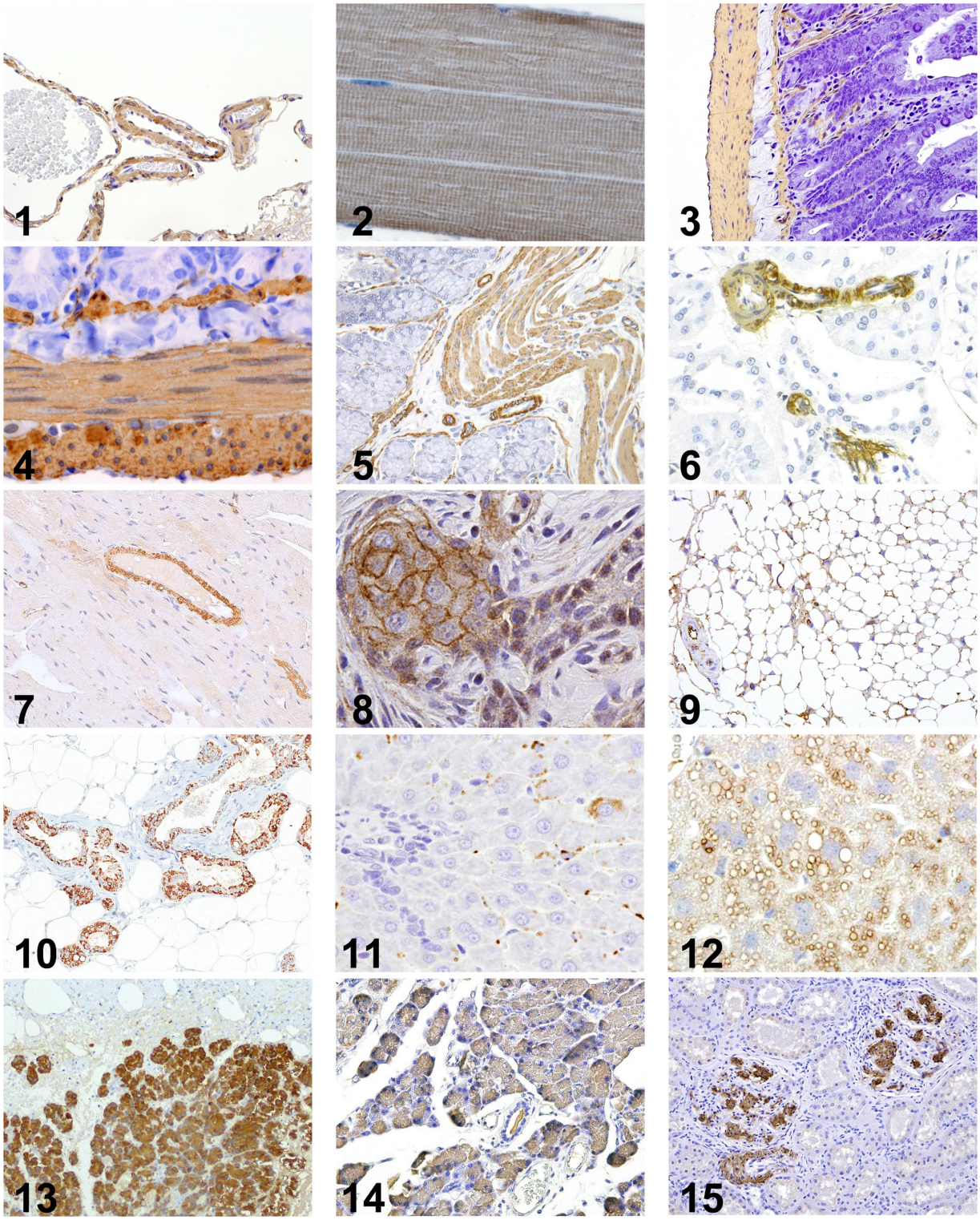

Fig. 1. Actin/ AC40/ Sigma/ A4700, Brain (Arachnoid)/ Minipig. **Fig. 2.** Actin, sarcomeric/ Alpha-Sr-1/ Dako/ M0874, Muscle/ Rat. **Fig. 3.** Actin, α-smooth muscle/ 1A4 / Dako/ IR611, Small intestine/ Rat. **Fig. 4.** Actin, α-smooth muscle/ 1A4/ Dako/ M0851, Jejunum/ Rat. **Fig. 5.** Actin, α-smooth muscle/ 1A4/ Nichirei/ 412021, Colon/ Rat. **Fig. 6.** Actin, α-smooth muscle/ ASM-1/ Progen/ 61001, Kidney/ Rat. **Fig. 7.** Actin, α-smooth muscle/ E184/ Abcam/ ab32575, Heart/ Rat. **Fig. 8.** Active-β-catenin/ 8E7/ Millipore/ 05-665, Stomach/ Rat. **Fig. 9.** Adiponectin/ - / BioVision/ 5902-50, Adipose tissue/Mouse. **Fig. 10.** Adipophilin/ AP125/ Acris Antibodies GmbH/ BM5051, Mammary gland/ Rat. **Fig. 11.** Adipophilin/ AP125/ American Research Products/ 03-651102, Liver/ Rat. **Fig. 12.** Adipophilin/ - / Progen/ GP40, Liver/ Mouse. **Fig. 13.** Amylase/ - / Santa Cruz/ sc-12821, Pancreas/ Rat. **Fig. 14.** Amylase 2A/ - / Proteintech/ 15845-1-AP, Pancreas/ Rat. **Fig. 15.** Amyloid A/ KM268/ Kyowa Medex/ HM01, Kidney/ Cow.

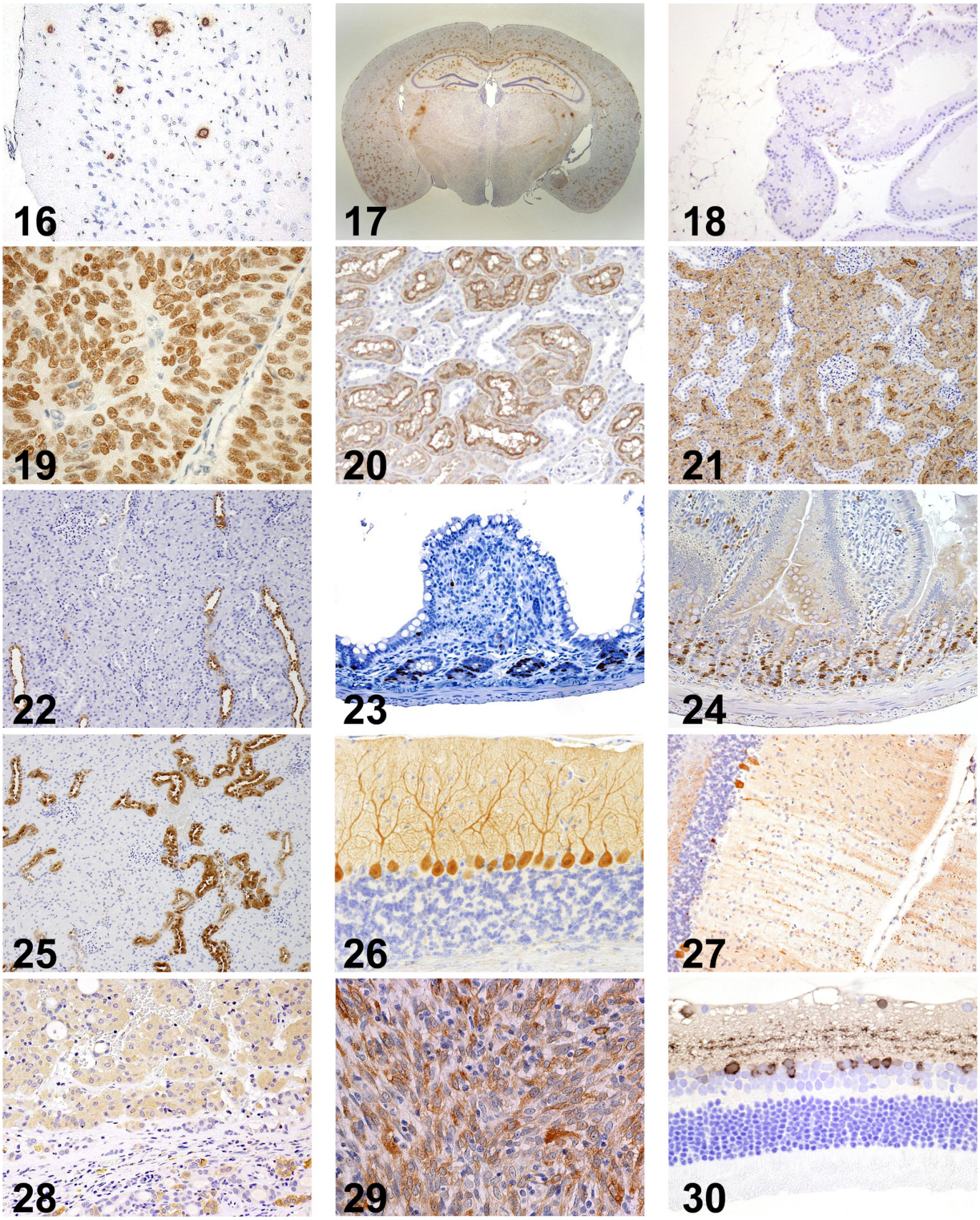

Fig. 16. β-Amyloid/ 6F/ 3D/ Dako/ M0872, Cerebrum/ Mouse. **Fig. 17.** β-Amyloid/ 82E1/ IBL/ 10326, Brain/ Mouse. **Fig. 18.** Androgen Receptor/ G122-25/ BD Biosciences/ 554224, Genital gland/ Rabbit. **Fig. 19.** Androgen Receptor/ - / Santa Cruz/ sc-816, Prostatic carcinoma/ Rat. **Fig. 20.** Aquaporin 1/ 1/22/ Abcam/ ab9566, Kidney/ Monkey. **Fig. 21.** Aquaporin 1/ - / Millipore/ AB2219, Kidney/ Rat. **Fig. 22.** Aquaporin 2/ - / ProSci/ 50-225, Kidney/ Rat. **Fig. 23.** BrdU/ Bu20a/ AbD serotec/ MCA2483, Small intestine/ Rat. **Fig. 24.** BrdU/ Bu20a/ Dako/ M0744, Duodenum/ Rat. **Fig. 25.** Calbindin D28K/ CB-955/ Abcam/ ab25085, Kidney/ Rat. **Fig. 26.** Calbindin D28K/ CB-955/ Sigma-Aldrich/ C9848, Cerebellum/ Mouse. **Fig. 27.** Calbindin D28K/ CB-955/ Sigma-Aldrich/ C9848, Cerebellum/ Rat. **Fig. 28.** Calcitonin/ - / GeneTex/ GTX28553,Thyroid gland/ Rat. **Fig. 29.** Calponin/ hCP/ Sigma-Aldrich/ C2687, Complex carcinoma/ Dog. **Fig. 30.** Calretinin/ 6B8.2/ Millipore/ MAB1568, Eye/ Rat.

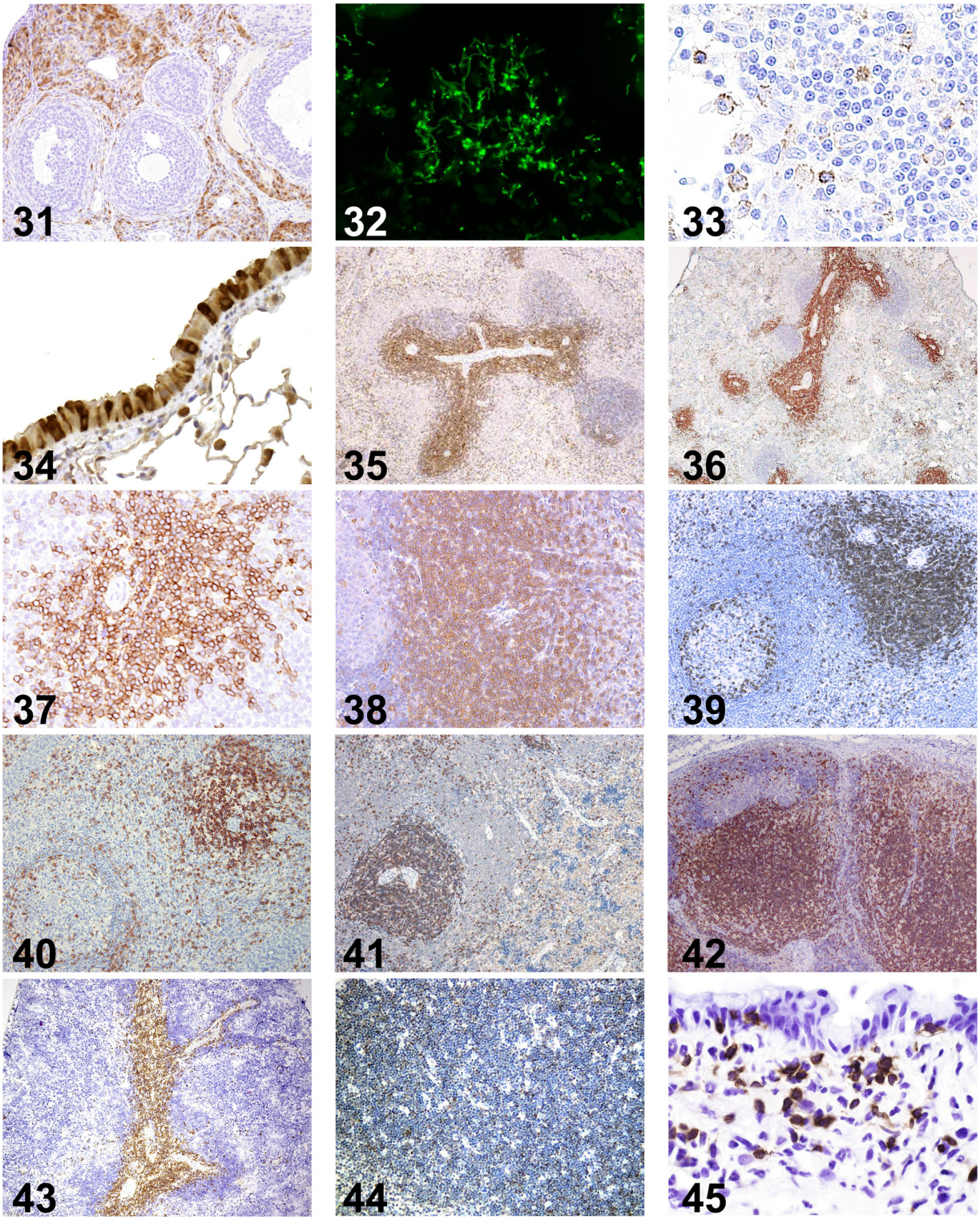

Fig. 31. Calretinin/ - / Acris Antibodies GmbH/ DP043-05, Ovary/ Rat. **Fig. 32.** Candida albicans/ - / Abnova/ PAB14205, Liver/ Rabbit. **Fig. 33.** Caspase-3/ - / Promega/ G748, Lymph node/ Rat. **Fig. 34.** CC10/ - / Santa Cruz/ sc-9772, Lung/ Mouse. **Fig. 35.** CD3/ 1F4/ AbD serotec/ MCA772, Spleen/ Rat. **Fig. 36.** CD3/ G4, 18/ BD Biosciences/ 550295, Spleen/ Rat. **Fig. 37.** CD3/ SP7/ Abcam/ ab16669, Lymph node/ Mouse. **Fig. 38.** CD3/ - / Abcam/ ab5690, Spleen/ Mouse. **Fig. 39.** CD3/ - / Dako/ IR503, Spleen / Monkey. **Fig. 40.** CD3/ - / Invitrogen/ 18-0102, Spleen/ Monkey. **Fig. 41.** CD3/ - / Santa Cruz/ sc-1127, Spleen/ Rat. **Fig. 42.** CD3/ - / Sigma-aldrich/ C7930, Lymph node/ Dog. **Fig. 43.** CD3e/ 145-2C11/ BD Biosciences/ 550275, Spleen/ Mouse. **Fig. 44.** CD3e/ SP7/ Nichirei/ 413591, Thymus/ Mouse. **Fig. 45.** CD4/ GK1.5/ Santa Cruz/ sc-13573, Lymph node/ Mouse.

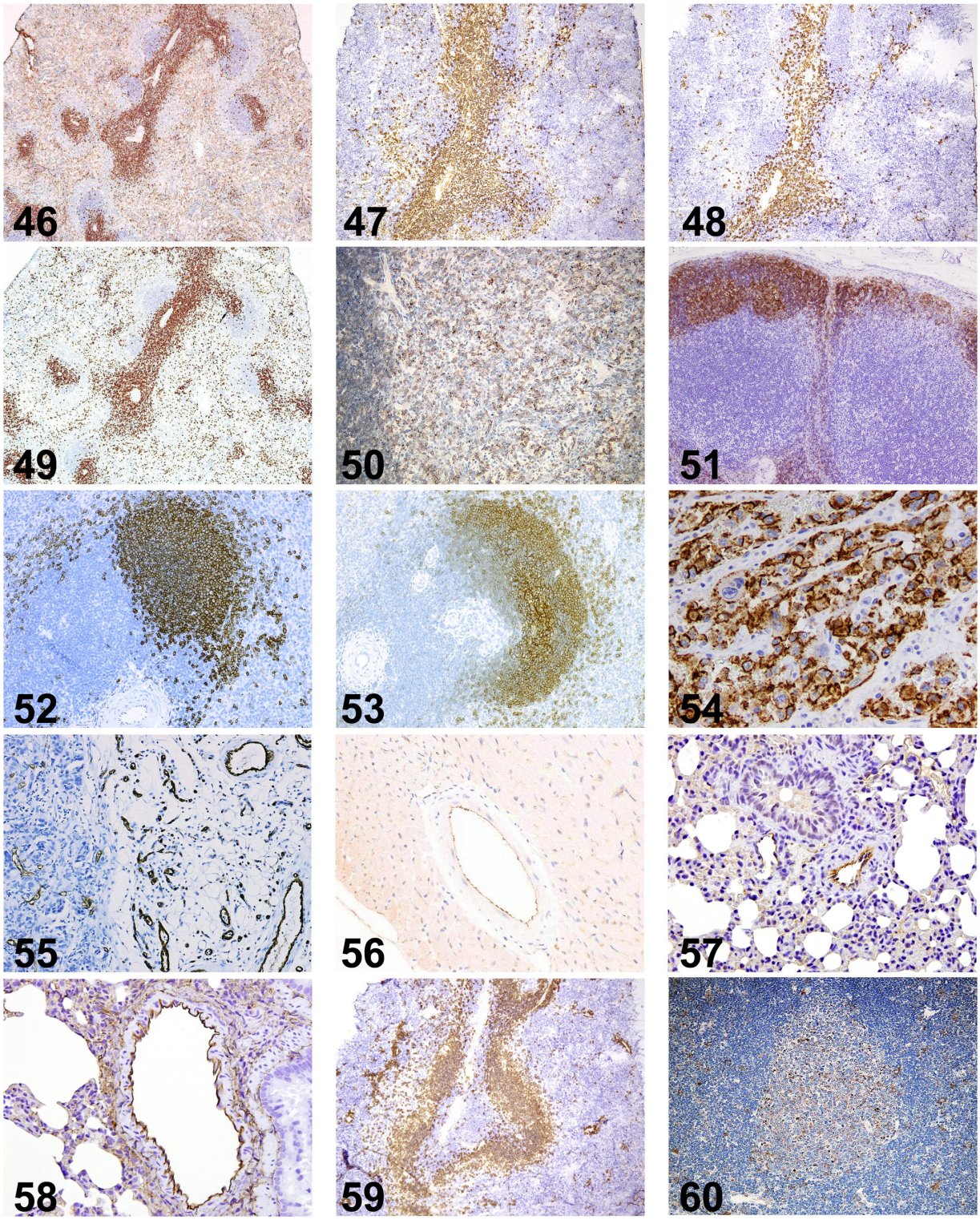

Fig. 46. CD4/ OX-38/ BD Biosciences/ 550297, Spleen/ Rat. **Fig. 47.** CD4/ RM4-5/ BD Biosciences/ 550280, Spleen/ Mouse. **Fig. 48.** CD8α/ 53-6.7/ BD Biosciences/ 550281, Spleen/ Mouse. **Fig. 49.** CD8α/ OX-8/ BD Biosciences/ 550298, Spleen/ Rat. **Fig. 50.** CD8α/ OX-8/ AbD serotec/ MCA48GA, Lymph node/ Rat. **Fig. 51.** CD20/ E17-P/ Acris Antibodies GmbH/ 24828-1-AP, Lymph node/ Dog. **Fig. 52.** CD20cy/ L26/ Dako/ IR604, Spleen/ Monkey. **Fig. 53.** CD21/ EP3093/ Abcam/ ab75985, Spleen/ Monkey. **Fig. 54.** CD31/ JC70A/ Dako/ N1596, Hemangiosarcoma/ Dog. **Fig. 55.** CD31/ SZ31/ dianova GmbH/ DIA 310, Human pancreatic cancer cell xenograft/ -. **Fig. 56.** CD31/ - / Abcam/ ab28364, Heart/ Mouse. **Fig. 57.** CD31/ - / Santa Cruz/ sc-1506, Lung/ Rat. **Fig. 58.** CD34/ - / R&D Systems/ AF4117, Lung/ Rat. **Fig. 59.** CD45R/ RA3-6B2/ BD Biosciences/ 550286, Spleen/ Mouse. **Fig. 60.** CD45RA/ OX33/ AbD serotec/ MCA340GA, Lymph node/ Rat.

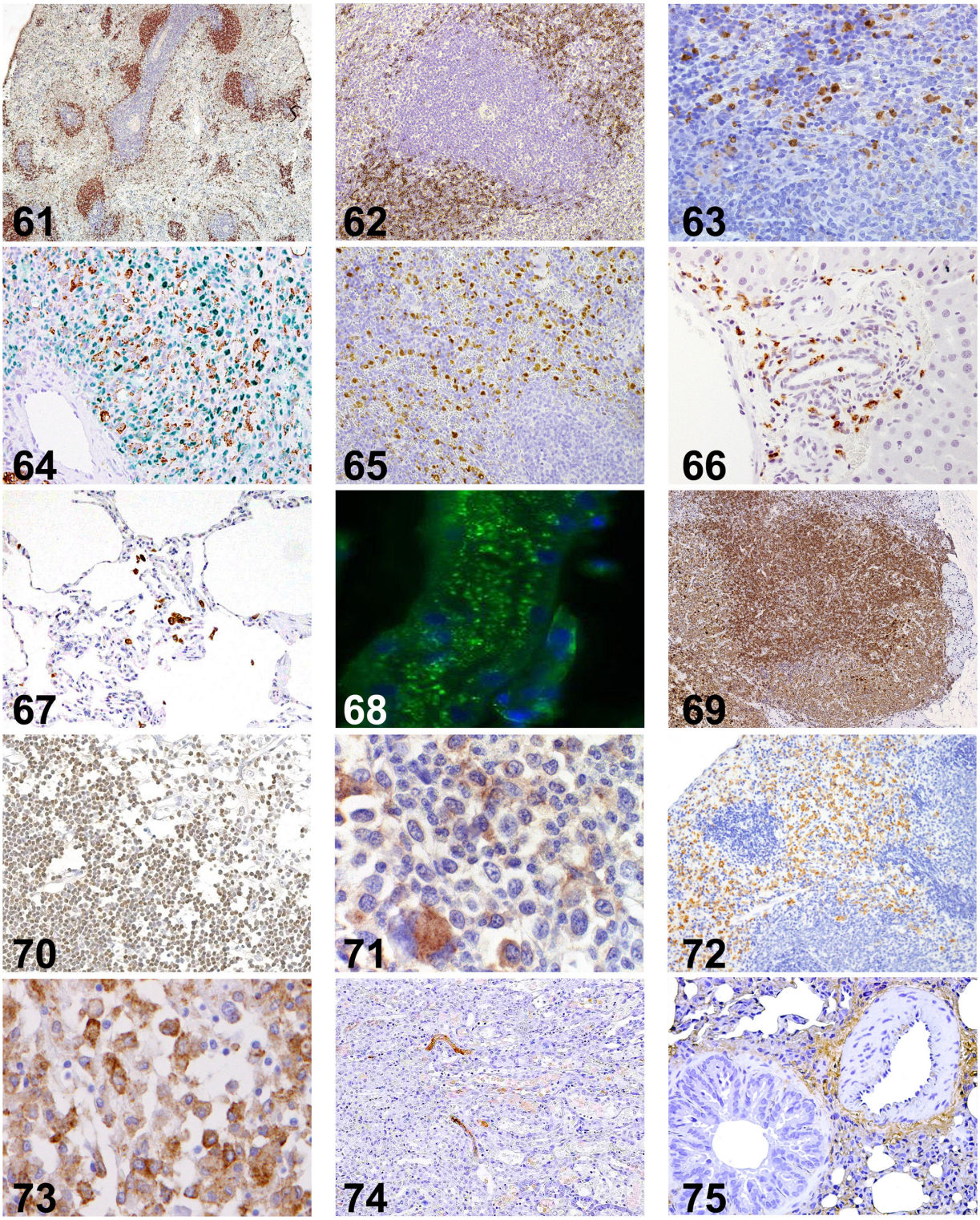

Fig. 61. CD45RA/ OX33/ BD Biosciences/ 554882, Spleen/ Rat. **Fig. 62.** CD45RA/ OX33/ Bio-Rad Laboratories/ MCA340G, Spleen/ Rat. **Fig. 63.** CD68/ ED1/ AbD serotec/ MCA341, Spleen/ Rat. **Fig. 64.** CD68/ ED1/ Acris Antibodies GmbH/ BM4000, Osteosarcoma (infiltrating macrophages)/ Rat. **Fig. 65.** CD68/ ED1/ BMA Biomedicals/ T-3003, Spleen/ Rat. **Fig. 66.** CD68/ ED1/ Millipore/ MAB1435, Liver/ Rat. **Fig. 67.** CD68/ KP1/ Dako/ M0814, Lung/ Monkey. **Fig. 68.** CD77/ 38.13/ Beckman Coulter/ IM0175, Kidney/ Mouse. **Fig. 69.** CD79α/ HM57/ Nichirei/ 413171, Lacrimal gland/ Cat. **Fig. 70.** CD90/ Thy 1/ OX-7/ Cedarlane Laboratories/ CL005AP/-2, Thymus/ Rat. **Fig. 71.** CD117/c-kit/ - / Dako/ A4502, Mastocytoma/ Dog. **Fig. 72.** CD163/ ED2/ Acris Antibodies GmbH/ BM4001, Spleen/ Rat. **Fig. 73.** CD204/ SRA-E5/ Trans Genic/ KT022, Histiocytic sarcoma/ Dog. **Fig. 74.** Clusterin/ - / R&D Systems/ AF2937, Kidney/ Rat. **Fig. 75.** Collagen type I/ - / BioLogo/ CO20141, Lung/ Rat.

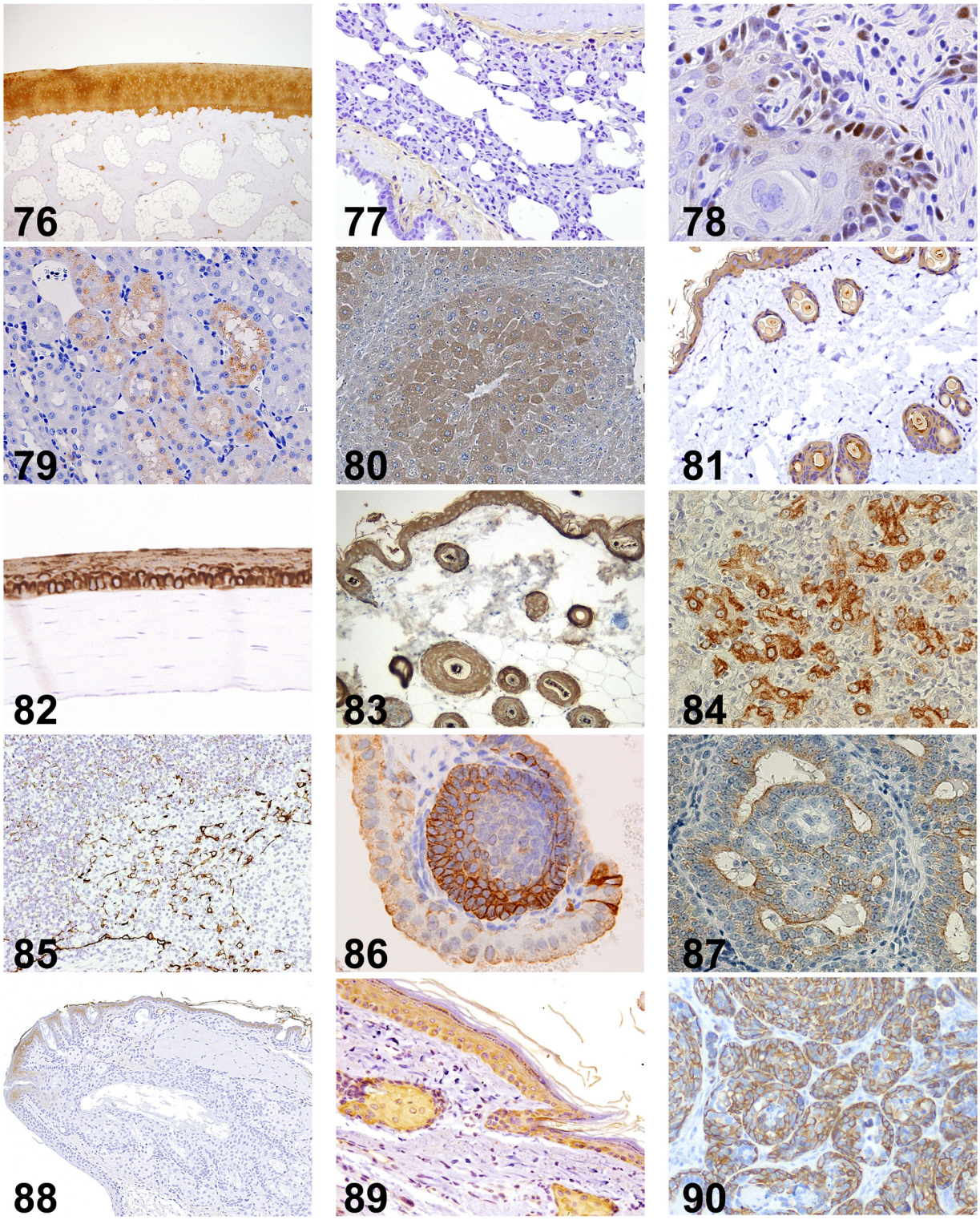

Fig. 76. Collagen type II/ II-4C11/ Daiichi Fine Chemical/ F-57, Joint/ Minipig. **Fig. 77.** Collagen type III/ - / BioLogo/ CO20341, Lung/ Rat. **Fig. 78.** Cyclin D1/ SP4/ Nichirei/ 413521, Stomach/ Rat. **Fig. 79.** Cystatin C/ EPR4413/ Abcam/ ab109508, Kidney/ Rat. **Fig. 80.** Cytochrome P450 3A1/ - / Millipore/ AB1253, Liver/ Mouse. **Fig. 81.** Cytokeratin/ AE1/ AE3/ Dako/ IR053, Skin/ Rat. **Fig. 82.** Cytokeratin/ AE1/ AE3/ Dako/ M3515, Eye/ Rat **Fig. 83.** Cytokeratin/ - / Nichirei/ 422061, Skin/ Mouse. **Fig. 84.** Cytokeratin Low Molecular Weight/ CAM 5.2/ BD Biosciences/ 349205, Complex carcinoma/ Dog. **Fig. 85.** Cytokeratin High Molecular Weight/ 34βE12/ Dako/ M0630, Thymus/ Rat. **Fig. 86.** Cytokeratin 5/ - / Abcam/ ab53121, Seminal vesicle/ Rabbit. **Fig. 87.** Cytokeratin 8/ Ks8.7/ Progen/ 65138, Mammary gland/ Rat. **Fig. 88.** Cytokeratin 10/ DE-K10/ Abcam/ ab9026, Eyelid/ Mouse. **Fig. 89.** Cytokeratin 14/ LL002/ Acris Antibodies GmbH/ SM1359P, Skin/ Rat. **Fig. 90.** Cytokeratin 14/ LL002/ BioGenex/ AM146-5M, Mammary gland/ Dog.

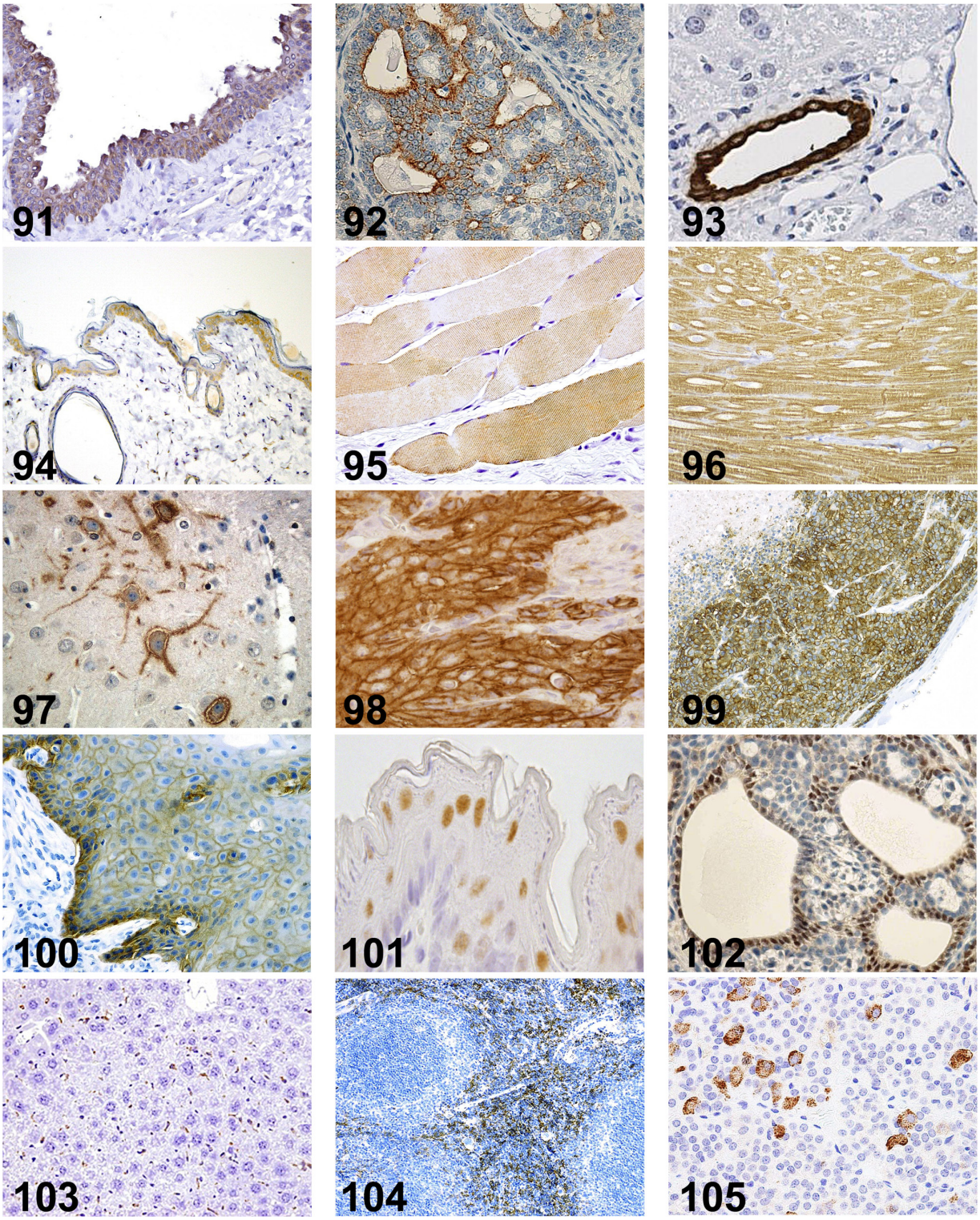

Fig. 91. Cytokeratin 14/ RCK107/ Millipore/ MAB3232, Skin/ Cow. **Fig. 92.** Cytokeratin 18/ C-04/ Santa Cruz/ sc-51582, Mammary gland/ Rat. **Fig. 93.** Cytokeratin 19/ EPNCIR127B/ Epitomics/ 3863-1, Liver/ Mouse. **Fig. 94.** Cytokeratin 19/ - / Abcam/ ab15463, Skin/ Rat. **Fig. 95.** Desmin/ D33/ Dako/ IR606, Muscle/ Rat. **Fig. 96.** Desmin/ - / Abcam/ ab15200, Heart/ Rat. **Fig. 97.** Doublecortin/ - / Santa Cruz/ sc-8066, Cerebrum/ Rat. **Fig. 98.** E-cadherin/ 36/ E-Cadherin/ BD Biosciences/ C20820, Stomach/ Rat. **Fig. 99.** E-cadherin/ NCH-38/ Dako/ M3612, Human gastric cancer cell xenograft/ -. **Fig. 100.** EGF Receptor/ D38B1/ Cell Signaling Technology/ 4267, Human squamous cancer cell xenograft/ -. **Fig. 101.** ERCC/ - / Santa Cruz/ sc-56386, Stomach/ Rat. **Fig. 102.** Estrogen Receptor α/ - / Santa Cruz/ sc-543, Mammary gland/ Rat. **Fig. 103.** F4/ 80/ Al-3/ Acris Antibodies GmbH/ BM4008, Liver/ Mouse. **Fig. 104.** F4/ 80/ BM8/ BMA Biomedicals/ T-2028, Spleen/ Mouse. **Fig. 105.** Follicle Stimulating Hormone/ - / AbD serotec/ 4561-6959, Pituitary gland/ Rat.

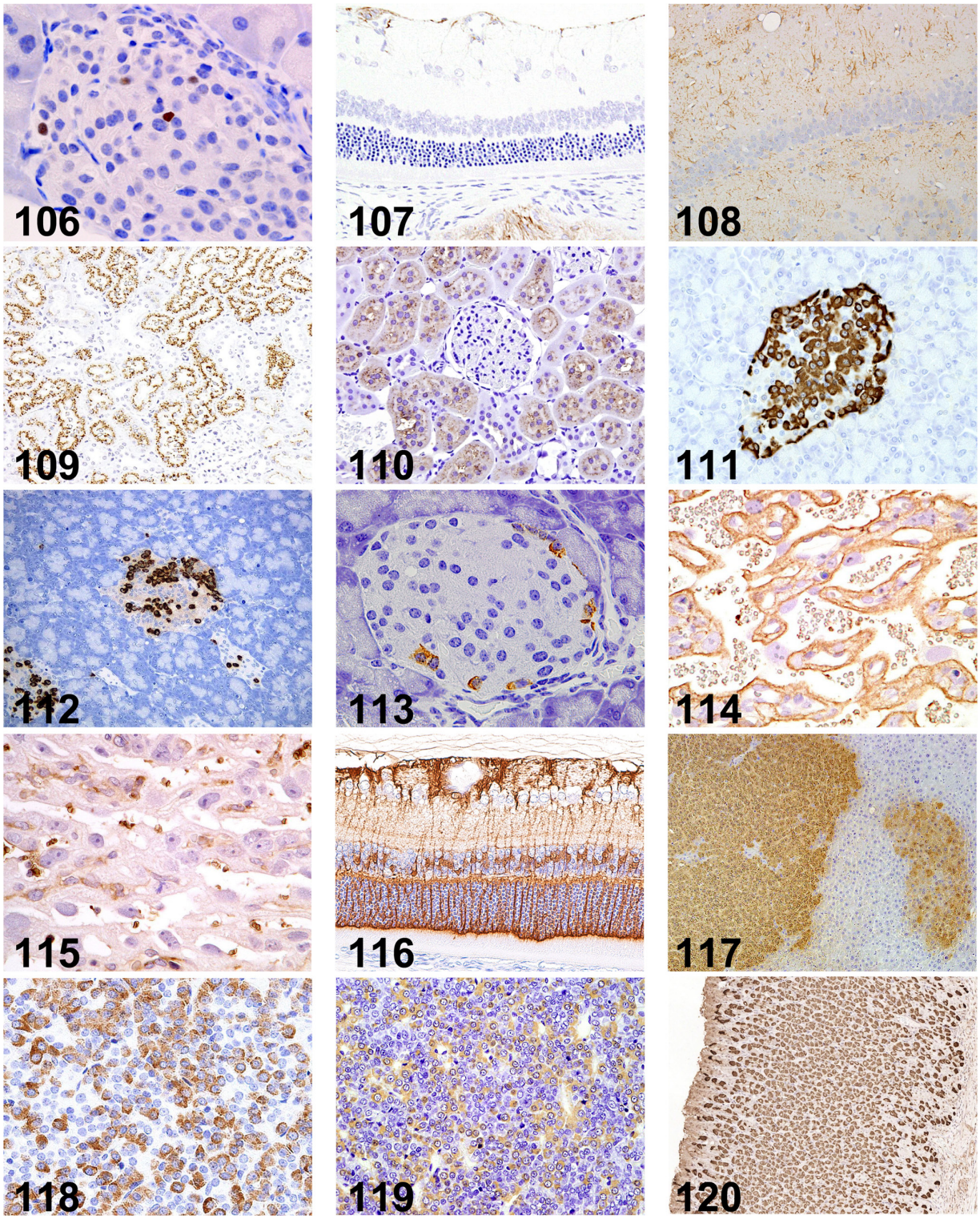

Fig. 106. GADD 153/ - / Santa Cruz/ sc-575, Pancreas/ Mouse. **Fig. 107.** Glial Fibrillary Acidic Protein/ 6F2/ Dako/ M0761, Eye/ Rat. **Fig. 108.** Glial Fibrillary Acidic Protein/ - / Dako/ IR524, Cerebrum/ Rat. **Fig. 109.** α2μ-globulin/ 129736/ R&D Systems/ BAM586, Kidney/ Rat. **Fig. 110.** α2μ-globulin/ - / R&D Systems/ AF586, Kidney/ Rat. **Fig. 111.** Glucagon/ K79bB10/ Abcam/ ab10988, Pancreas/ Monkey. **Fig. 112.** Glucagon/ K79bB10/ Sigma-Aldrich/ G2654, Pancreas/ Dog. **Fig. 113.** Glucagon/ - / Nichirei/ 422271, Pancreas/ Mouse. **Fig. 114.** Glucose Transporter type 1/ - / Abcam/ ab14683, Placenta/ Rat. **Fig. 115.** Glucose Transporter type 3/ - / GeneTex/ GTX15311 Placenta/ Rat. **Fig. 116.** Glutamine Synthetase/ GS-6/ Millipore/ MAB302, Eye/ Rat. **Fig. 117.** Glutathione S-transferase Placental type/ - / MBL/ 311, Liver/ Rat. **Fig. 118.** Growth Hormone/ - / R&D Systems/ MAB1566, Pituitary gland/ Rat. **Fig. 119.** Growth Hormone/ 222540/ Millipore/ AB940, Pituitary gland/ Rat. **Fig. 120.** H+-K+-ATPase/ - / Millipore/ 119102, Stomach/ Rat.

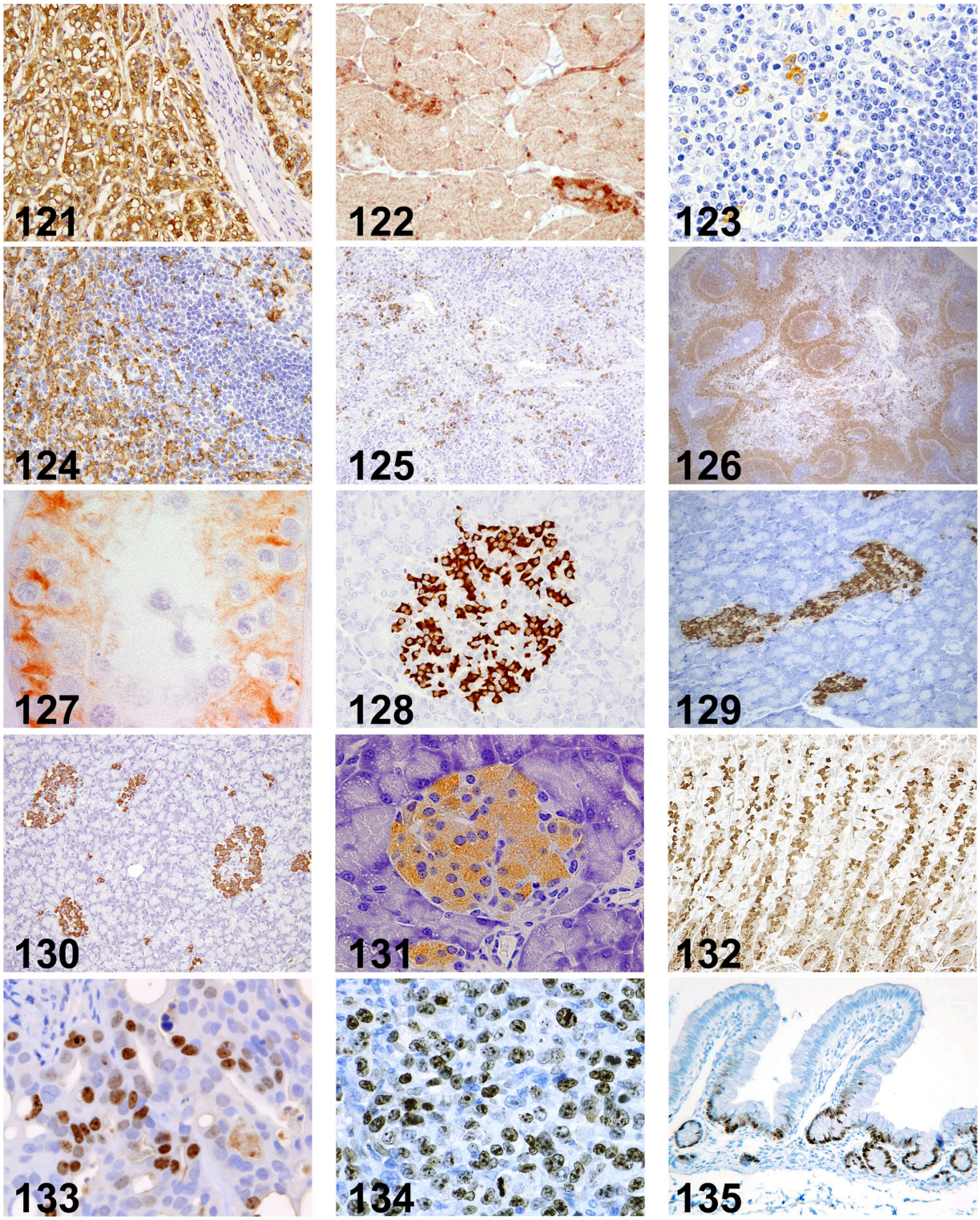

Fig. 121. Hepatocyte/ OCH1E5/ Dako/ M7158, Hepatocellular carcinoma/ Dog. **Fig. 122.** 4-Hydroxy-2-nonenal/ HNEJ2/ JalCA/ MHN-020P, Heart/ Dog. **Fig. 123.** Iba 1/ - / Bioss/ bs-1363R, Thymus/ Rat. **Fig. 124.** Iba 1/ - / Wako/ 019-19741, Spleen/ Monkey. **Fig. 125.** IgG, Fc(γ)/ - / Jackson ImmunoResearch Laboratories/ 112-005-008, Spleen/ Rat. **Fig. 126.** IgM, (μ)/ - / Jackson ImmunoResearch Laboratories/ 112-005-020, Spleen/ Rat. **Fig. 127.** Inhibin α/ R1/ AbD serotec/ MCA951S, Testis/ Dog. **Fig. 128.** Insulin/ K36aC10/ Abcam/ ab6995, Pancreas/ Monkey. **Fig. 129.** Insulin/ K36aC10/ Sigma-Aldrich/ I2018, Pancreas/ Dog. **Fig. 130.** Insulin/ - / Dako/ IR002, Pancreas/ Monkey. **Fig. 131.** Insulin/ - / Santa Cruz/ sc-9168, Pancreas/ Mouse. **Fig. 132.** Intrinsic Factor/ - / Fitzgerald/ 20-IR51, Stomach/ Rat. **Fig. 133.** Ki-67/ MIB-1/ Dako/ IR056, Human gastric carcinoma cell line/-. **Fig. 134.** Ki-67/ MIB-1/ Dako/ IR626, Human gastric cancer cell xenograft/-. **Fig. 135.** Ki-67/ MIB-1/ Dako/ M7240, Small intestine/ Monkey.

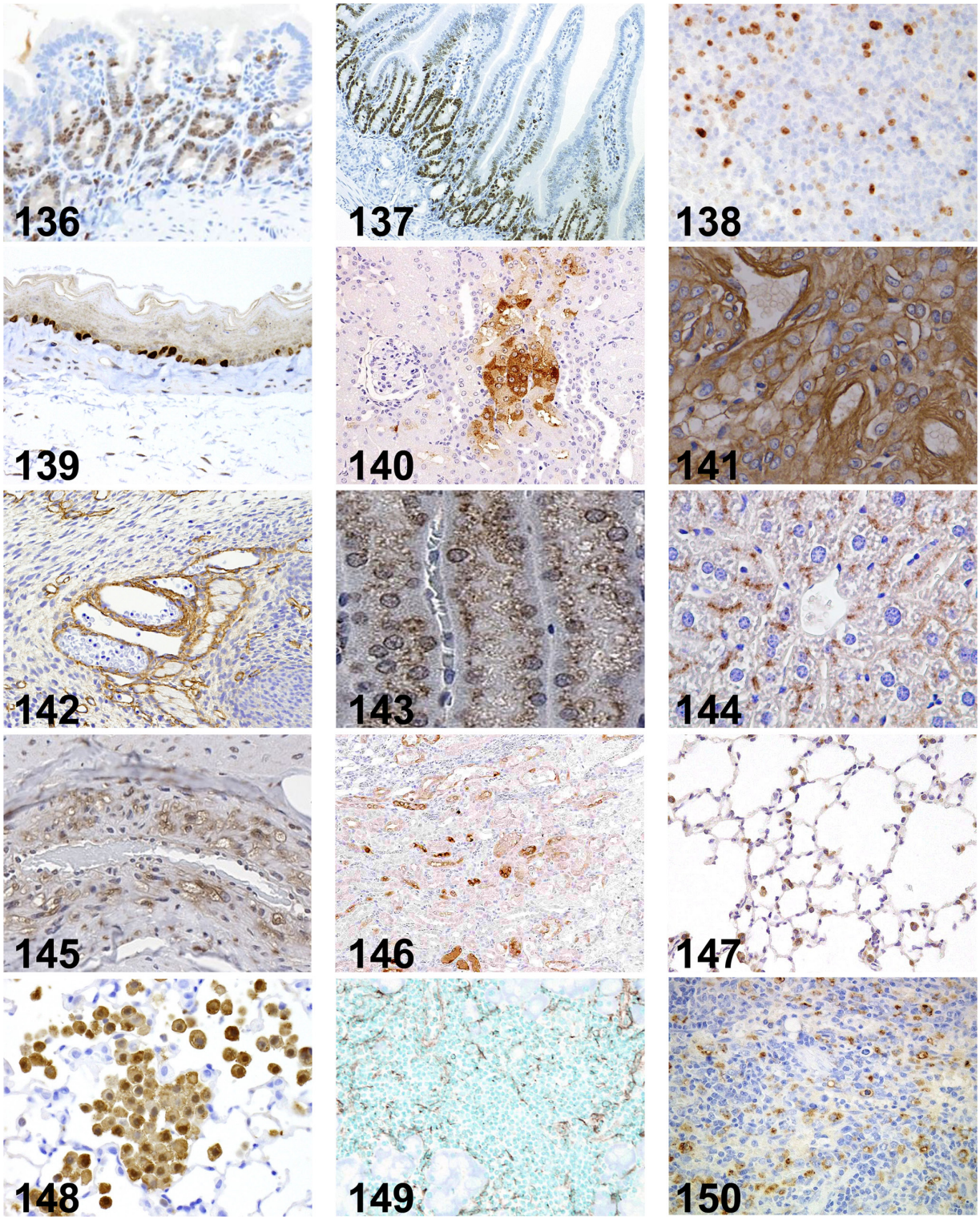

Fig. 136. Ki-67/ MIB-5/ Dako/ M7248, Duodenum/ Rat. **Fig. 137.** Ki-67/ SP6/ Abcam/ ab16667, Duodenum/ Mouse. **Fig. 138.** Ki-67/ - / Abcam/ ab15580, Spleen/ Mouse. **Fig. 139.** Ki-67/ - / Novus Biologicals/ NB110-89717, Esophagus/ Mouse. **Fig. 140.** KIM-1/ Tim-1/ - / R&D Systems/ AF3689, Kidney/ Rat. **Fig. 141.** Laminin/ - / LSL/ LB-1013, Stomach/ Rat. **Fig. 142.** Laminin/ - / Sigma-Aldrich/ L9393, Blood vessel/ Rat (fetus). **Fig. 143.** LAMP-2/ M3/ 84/ Santa Cruz/ sc-19991, Kidney/ Mouse. **Fig. 144.** LAMP-2/ - / Invitrogen/ 51-2200, Liver/ Mouse. **Fig. 145.** LAMP-2/ - / LifeSpan BioSciences/ LS-B3144, Aorta/ Dog. **Fig. 146.** Lipocalin-2/ NGAL/ - / R&D Systems/ AF1757, Kidney/ Rat. **Fig. 147.** Lysozyme/ - / Dako/ A0099, Lung/ Rat. **Fig. 148.** MAC-2/ M3/38/ Cedarlane/ CL8942AP, Macrophage/ Mouse. **Fig. 149.** Macrophage/ RM0029-11H3/ Abcam/ ab56297, Lacrimal gland/ Mouse. **Fig. 150.** Macrophage/ Dendritic Cells/ RM-4/ Trans Genic/ KT014, Kidney/ Rat.

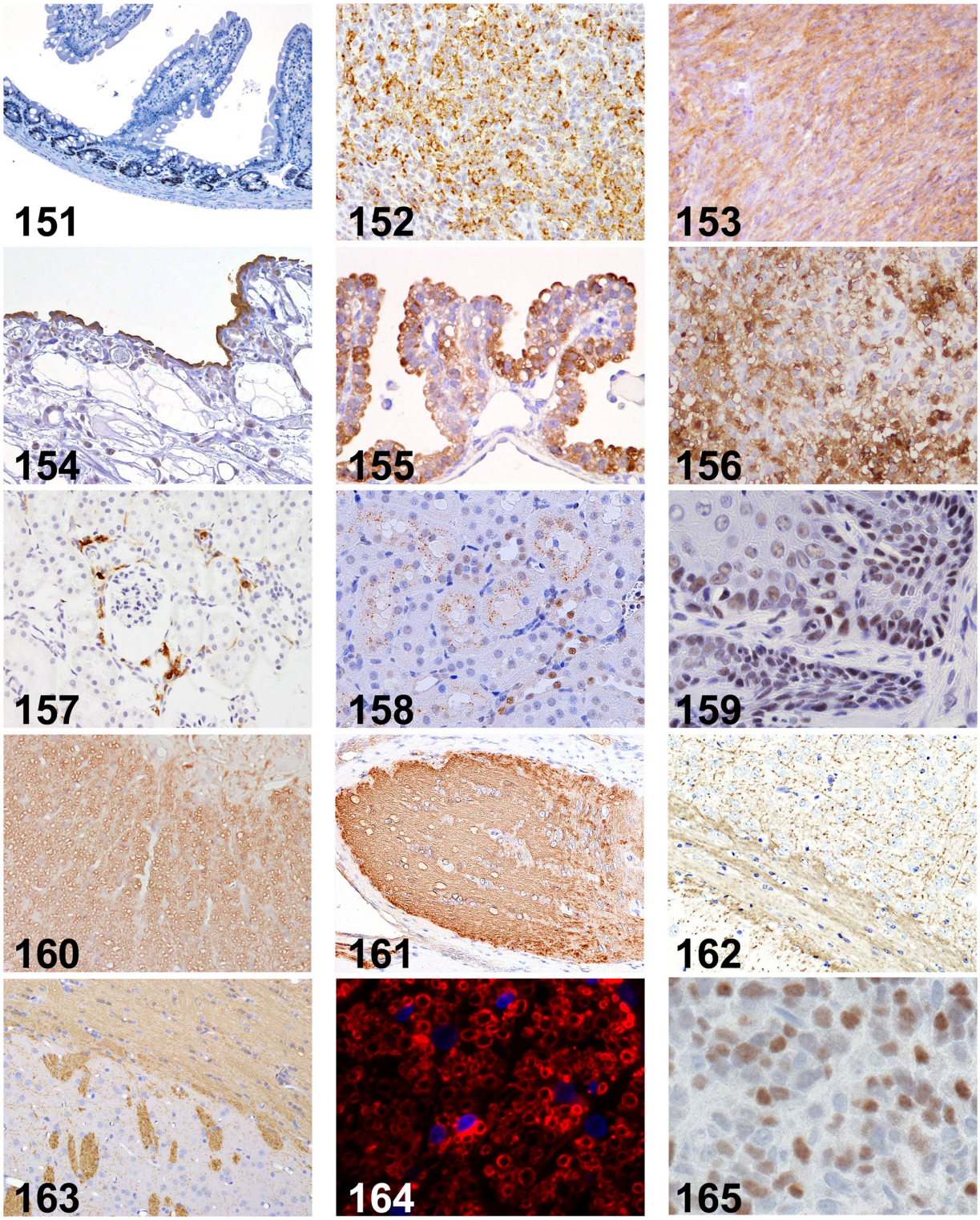

Fig. 151. MCM7/ 47DC141/ DCS-141/ Abcam/ ab52489, Small intestine/ Rat. **Fig. 152.** Melan A/ A103/ Dako/ M7196, Melanoma/ Dog. **Fig. 153.** Melanoma/ PNL2/ Abcam/ ab12502, Melanoma/ Rat. **Fig. 154.** Mesothelin/ - / IBL/ 28001, Adipose tissue/ Rat. **Fig. 155.** Metallothionein/ E9/ Dako/ M0639, Yolk sac/ Rat. **Fig. 156.** MHC class II (Human HLA-DR)/ TAL.1B5/ Dako/ M0746, Histiocytic sarcoma/ Dog. **Fig. 157.** MHC class II (RT1B)/ OX-6/ OX-6/ MCA46GA, Kidney/ Rat. **Fig. 158.** β2-microglobulin/ - / Lifespan Biosciences/ LS-B33, Kidney/ Rat. **Fig. 159.** MLH1/ EPR3894/ Abcam/ ab92312, Stomach/ Rat. **Fig. 160.** Myelin Basic Protein/ 26/ Millipore/ MAB384, Spinal cord/ Rat. **Fig. 161.** Myelin Basic Protein/ - / Abcam/ ab40390, Optic nerve/ Rat. **Fig. 162.** Myelin Basic Protein/ - / AbFrontier/ LF-PA50045, Brain/ Mouse. **Fig. 163.** Myelin Basic Protein/ - / Sigma-Aldrich/ M3821, Cerebrum/ Rat. **Fig. 164.** Myelin Proteolipid Protein/ PLPC1/ PLPC1/ Millipore, Spinal cord/ Rat. **Fig. 165.** MyoD1/ 5.8A/ Dako/ M3512, Rhabdomyosarcoma/ Dog .

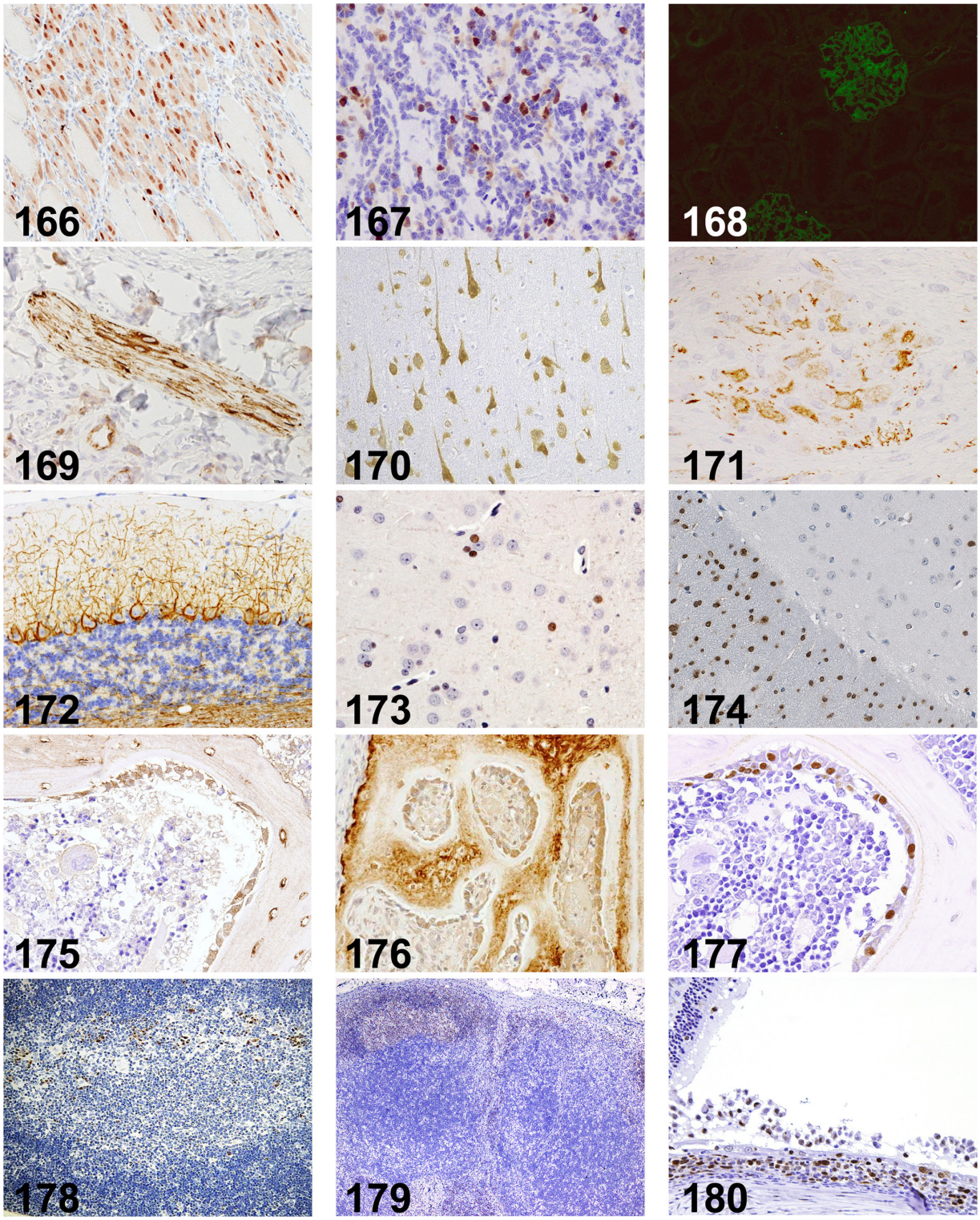

Fig. 166. Myogenin/ F5D/ Abcam/ ab1835, Myoblast/ Rat. **Fig. 167.** Myogenin/ F5D/ Dako/ M3559, Rhabdomyosarcoma/ Cow. **Fig. 168.** Nephrin C/ - / IBL/ 29070, Kidney/ Rat. **Fig. 169.** Nestin/ Rat-401/ Millipore/ MAB353, Skin/ Rat **Fig. 170.** NeuN/ A60/ Millipore/ MAB377, Cerebrum/ Monkey. **Fig. 171.** Neurofilament/ 2F11/ Dako/ IR607, Ganglioneuroma/ Dog. **Fig. 172.** Neurofilament/ 2F11/ Dako/ M0762, Cerebellum/ Mouse. **Fig. 173.** Olig2/ - / IBL/ 18953, Brain/ Rat. **Fig. 174.** Olig2/ - / Novus Biologicals/ NBP1-28667, Cerebrum/ Mouse. **Fig. 175.** Osteocalcin/ OCG3/ Abcam/ ab13420, Sternum/ Rat. **Fig. 176.** Osteocalcin/ OCG3/ Takara Bio/ M043, Parietal bone/ Rat. **Fig. 177.** Osterix/ - / Abcam/ ab22552, Sternum/ Rat. **Fig. 178.** Pax5/ EPR3730(2)/ Abcam/ ab109443, Thymus/ Mouse. **Fig. 179.** Pax5/ - / Abcam/ ab15164, Lymph node/ Dog. **Fig. 180.** PCNA/ PC10/ Dako/ M0879, Eye/ Rat.

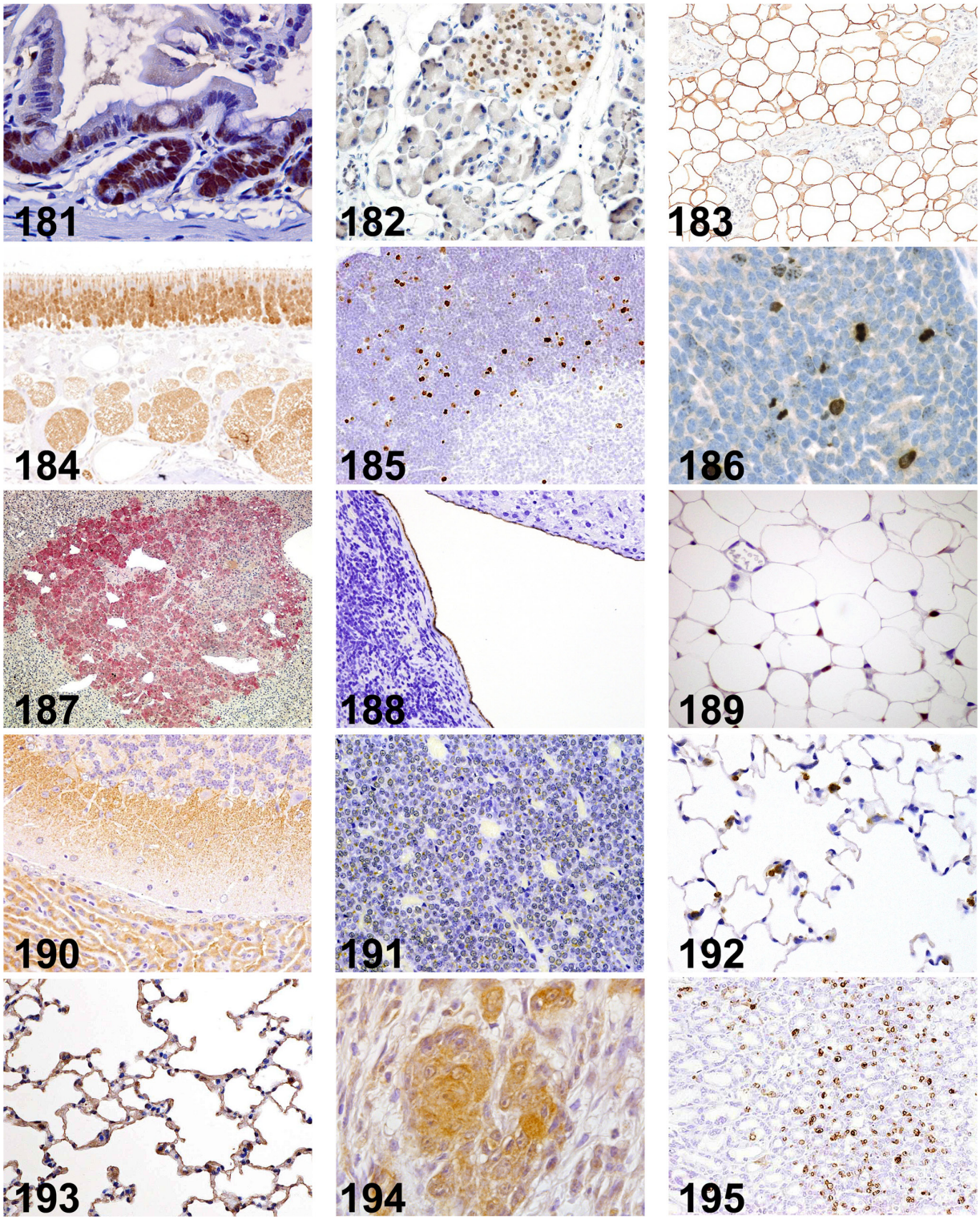

Fig. 181. PCNA/ PC10/ Nichirei/ 412801, Ileum/ Mouse. **Fig. 182.** PDX1/ - / Trans Genic/ KR059, Pancreas/ Rat. **Fig. 183.** Perilipin 1/ - / Progen/ GP29, Adipose tissue/ Rat. **Fig. 184.** PGP-9.5/ - / Dako/ Z5116, Olfactory/ Rat. **Fig. 185.** Phospho-histone H3/ - / Cell Signaling Technology/ 9701, Thymus/ Rat. **Fig. 186.** Phospho-histone H3 (Ser10)/ - / Millipore/ 06-570, Carcinoma/ Mouse. **Fig. 187.** PNMT/ 1D2/ Abcam/ ab119784, Adrenal gland/ Rat. **Fig. 188.** Podoplanin/ - / AngioBio/ 11035, Mesothelium / Rat. **Fig. 189.** PPARγ/ C26H12/ Cell Signaling Technology/ 2435S, Adipose tissue/ Mouse. **Fig. 190.** PPARγ2/ - / Thermo Fisher Scientific/ PA1-824, Brain/ Mouse. **Fig. 191.** Prolactin/ - / Millipore/ AB960, Pituitary gland/ Rat. **Fig. 192.** Prosurfactant Protein C/ - / Abcam/ ab90716, Lung/ Mouse. **Fig. 193.** Pulmonary Surfactant-associated Protein D/ - / Bioss/ bs-1583R, Lung/ Mouse. **Fig. 194.** RASSF1/ - / Abcam/ ab110900, Stomach/ Rat. **Fig. 195.** Rat Mast Cell Protease 2/ - / Moredun scientific/ MS-RM4, Glandular stomach/ Rat.

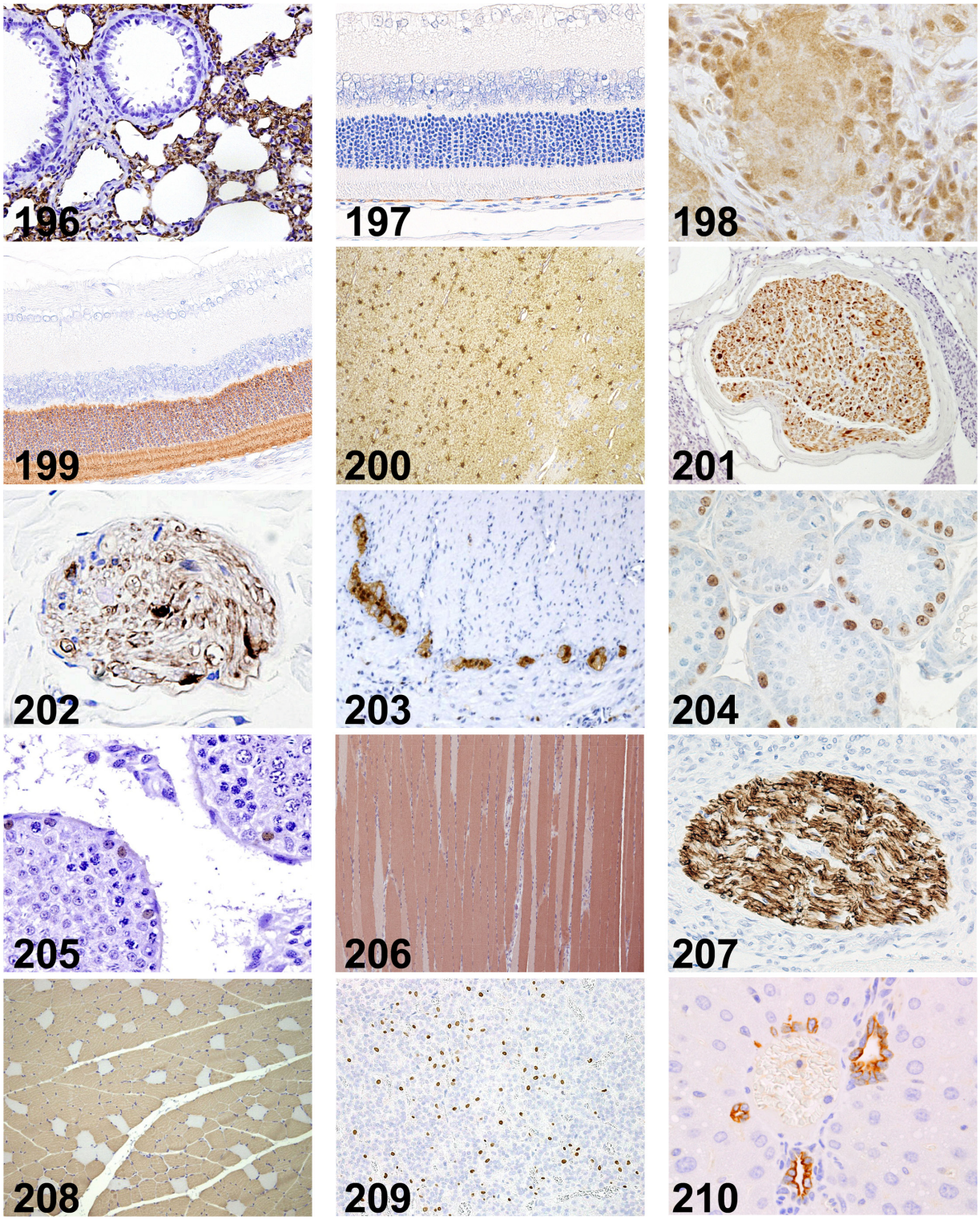

Fig. 196. Rat MFH/ A3/ Trans Genic/ KJ091, Lung/ Rat. **Fig. 197.** Retinal Pigment Epithelium-specific 65 kDa Protein/ - / Abcam/ ab77381, Eye/ Rat. **Fig. 198.** Retinoic Acid Receptor β/ - / Abcam/ ab53161, Stomach/ Rat. **Fig. 199.** Rhodopsin/ RET-P1/ Millipore/ MAB5316, Eye/ Rat. **Fig. 200.** S100/ B32.1/ Abcam/ ab7852, Cerebrum/ Monkey. **Fig. 201.** S100/ - / Dako/ IR504, Peripheral nerve/ Rat. **Fig. 202.** S100/ - / Nichirei/ 422091, Peripheral nerve/ Rat. **Fig. 203.** S100a/ - / Dako/ Z0628, Large intestine/ Rat. **Fig. 204.** Sall4/ EE-30/ Santa Cruz/ sc-101147, Testis/ Rat. **Fig. 205.** Sall4/ - / Abcam/ ab57577, Testis/ Rat. **Fig. 206.** Sarcoplasmic/ Endoplasmic Reticulum Calcium ATPase 2/ - / Abcam/ ab3625, Muscle/ Rat. **Fig. 207.** Schwann Cell/ Peripheral Myelin/ Schwann/ 2E/ Cosmo Bio/ GU01-M01AS-A, Peripheral nerve/ Rat. **Fig. 208.** Slow Skeletal Myosin Heavy Chain/ NOQ7.5.4D/ Abcam/ ab11083, Muscle/ Rat. **Fig. 209.** Steroidogenic Factor 1/ N1665/ Perseus Proteomics Inc./ PP-N1665-00, Pituitary gland/ Rat. **Fig. 210.** Stromal Cell-derived Factor 1/ CXCL12/ 79018.111/ R&D Systems/ MAB350, Liver/ Mouse.

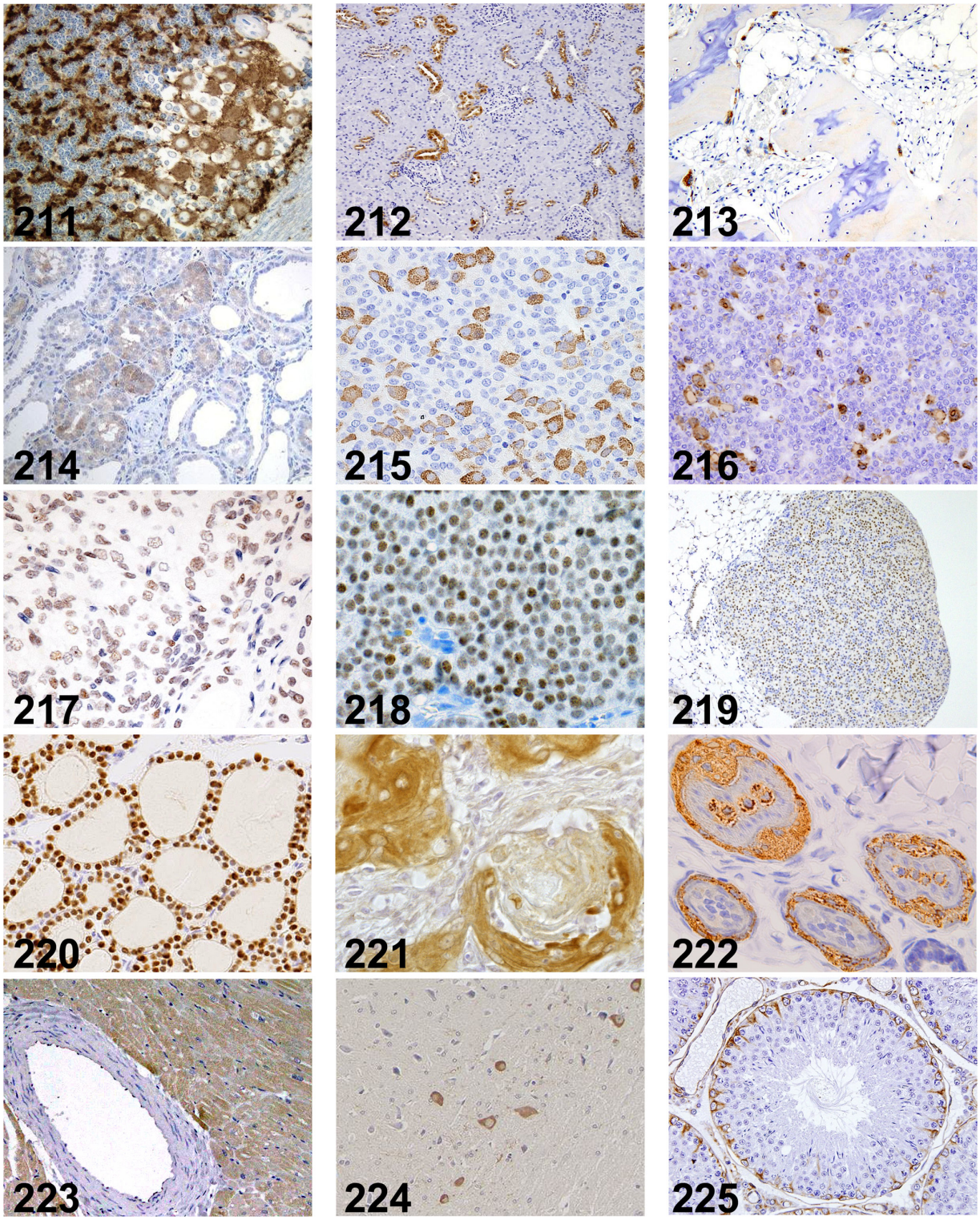

Fig. 211. Synaptophysin/ 27G12/ Leica/ NCL-L-SYNAP-299, Cerebellum/ Rat. **Fig. 212.** Tamm-Horsfall Urinary Glycoprotein/ - / Santa Cruz/ sc-20631, Kidney/ Rat. **Fig. 213.** Tartrate-resistant Acid Phosphatase/ - / Takara Bio/ M183, Femur/ Monkey. **Fig. 214.** TGFβ1/ - / Santa Cruz/ sc-146, Kidney/ Rat. **Fig. 215.** Thyroid Stimulating Hormone/ - / Biogenesis/ 8926-0004, Pituitary gland/ Rat. **Fig. 216.** Thyroid Stimulating Hormone/ - / Millipore/ AB976, Pituitary gland/ Rat. **Fig. 217.** Thyroid Transcription Factor 1/ 8G7G3/1/ Progen/ 16108, Thyroid/ Rat. **Fig. 218.** Thyroid Transcription Factor 1/ 8G7G3/1/ Dako/ M3575, Lung/ Dog. **Fig. 219.** Thyroid Transcription Factor 1/ EP1584Y/ Abcam/ ab76013, Lung/ Mouse. **Fig. 220.** Thyroid Transcription Factor 1/ SPT24/ Leica/ NCL-L-TTF-1, Thyroid gland/ Rat. **Fig. 221.** Tissue Inhibitor of Metalloproteinase-3/ - / Proteintech/ 10858-1-AP, Stomach/ Rat. **Fig. 222.** Trichohyalin/ AE15/ Abcam/ ab58755, Skin/ Rabbit. **Fig. 223.** Troponin I, Cardiac/ 2D5/ Affinity Bioreagents/ MA1-34958, Heart/ Monkey. **Fig. 224.** Tyrosine Hydroxylase/ - / Enzo Life Sciences/ BML-TZ1010, Midbrain/ Rat. **Fig. 225.** Tyrosine Tubulin/ TUB-1A2/ Sigma-Aldrich/ T9028, Testis/ Rat.

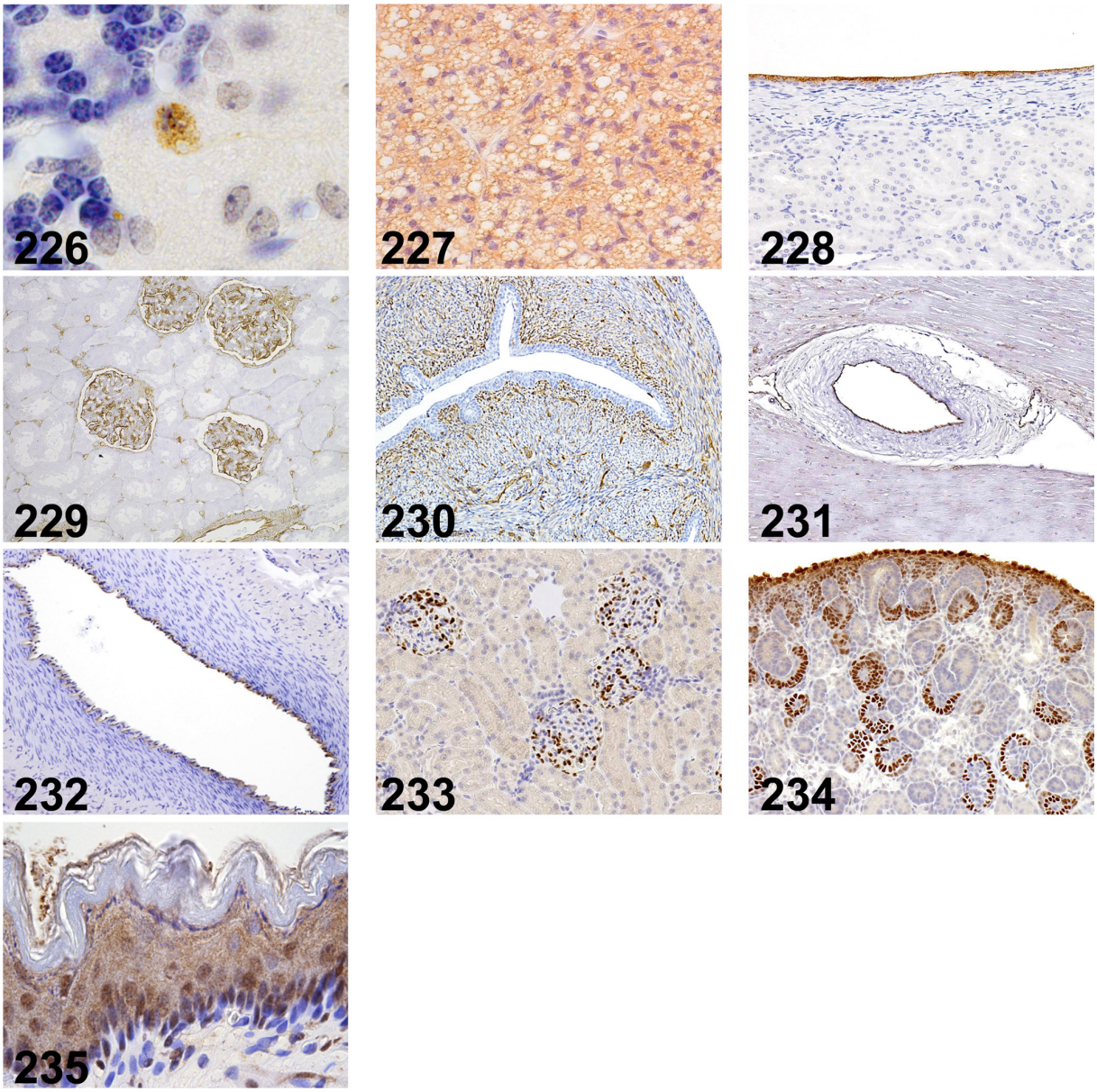

Fig. 226. Ubiquitin/ - / Dako/ Z0458, Cerebellum/ Mouse. **Fig. 227.** Uncoupling Protein 1/ - / Abcam/ ab10983, Brown adipose tissue/ Mouse. **Fig. 228.** Uroplakin III/ AU1/ Progen/ 651108, Kidney/ Rat. **Fig. 229.** Vimentin/ V9/ Dako/ IR630, Kidney/ Monkey. **Fig. 230.** Vimentin/ Vim 3B4/ Dako/ CBL202, Uterus/ Mouse. **Fig. 231.** Von Willebrand Factor/ - / Abcam/ ab6994, Heart/ Dog. **Fig. 232.** Von Willebrand Factor/ - / Thermo Fisher Scientific/ 18-0018, Uterus/ Dog. **Fig. 233.** Wilms' Tumor 1/ 6F-H2/ Dako/ M3561, Kidney/ Rat. **Fig. 234.** Wilms' Tumor 1/ - / Santa Cruz/ sc-192, Kidney/ Rat. **Fig. 235.** X-ray Repair Cross-complementing 1/ - / Santa Cruz/ sc-11429, Stomach/ Rat.