

**Table S1.** Description of commercially available therapeutic antibodies either approved or in late review stages and their molecular targets.

International Non-Proprietary Name	Indication First approved	Target	Heavy/light Chains/Specificity	First global approval (country, year) or in review	Conjugation/Pay load	Fc Modifications
Atezolizumab	bladder cancer	PD-L12	IgG1/k/Mono	US, 2016		Remove Fc effector functions
Durvalumab	bladder cancer	PD-L12	IgG1/k/Mono	US, 2017		Remove Fc effector functions
[fam-] trastuzumab deruxtecan-nxki	breast cancer	HER2	IgG1/k/Mono	US, 2019	ADC <sup>3</sup> : DXd <sup>5</sup>	
Ado-trastuzumab emtansine	breast cancer	HER2	IgG1/k/Mono	US, 2013	ADC <sup>3</sup> : DM1 <sup>6</sup>	
Margetuximab-cmkb	breast cancer	HER2	IgG1/k/Mono	US, 2020		Improved FcγRIIIa binding <sup>15</sup> Improved ADCC
Cipterbin <sup>a</sup>	breast cancer	HER2	IgG1/n.a. <sup>1</sup> /Mono	China, 2020		Enhanced ADCC/ADCP <sup>16</sup>
Pertuzumab	breast cancer	HER2	IgG1/k/Mono	US, 2012		
Trastuzumab	breast cancer	HER2	IgG1/k/Mono	US, 1998		
Trastuzumab duocarmazine	breast cancer	HER2	IgG1/k/Mono	in review	ADC <sup>3</sup> : Duocarmycin <sup>7</sup>	
Trastuzumab botidotin	breast cancer	HER2	IgG1/k/Mono	in review	ADC <sup>3</sup> : Duostatin-5 <sup>8</sup>	
Sacituzumab govitecan-hziy	breast cancer: TNBC	TROP-2	IgG1/k/Mono	US, 2020	ADC <sup>3</sup> : SN38 <sup>9</sup>	
Enlonstobart	cervical cancer	PD-12	IgG4/k/Mono	in review		
Cadonilimab	cervical cancer	PD-12, CTLA42	IgG1/k/Bi	China, 2022		Reduced Fc effector function
Socazolimab	cervical cancer	PD-L12	IgG1/l2/Mono	in review		
Tisotumab vedotin-tftv	cervical cancer	Tissue factor	IgG1/k/Mono	US, 2021	ADC <sup>3</sup> : MMAE <sup>10</sup>	
Omburtamab	CNS, neuroblastoma	B7-H3	mIgG1/k/Mono	in review	RIC <sup>4</sup> : Iodine-131	
Dinutuximab	CNS, neuroblastoma	GD2	IgG1/k/Mono	US, 2015		
Naxitamab-gqgk	CNS, neuroblastoma	GD2	IgG1/k/Mono	US, 2020		
Cetuximab	colon/colorectal cancer	EGFR	IgG1/k/Mono	Switzerland, 2003		
Panitumumab	colon/colorectal cancer	EGFR	IgG2/k/Mono	US, 2006		
Edrecolomab	colon/colorectal cancer	EpCAM	mIgG2a/k/Mono	Germany, 1995		
Bevacizumab	colon/colorectal cancer	VEGF-A	IgG1/k/Mono	US, 2004		
Dostarlimab	endometrial cancer	PD-12	IgG4/k/Mono	EU, 2021		Hinge stabilizing
Zolbetuximab	esophageal/gastric cancer	Claudin-18.2	IgG1/k/Mono	in review		
Disitamab vedotin	gastric cancer	HER2	IgG1/k/Mono	China, 2021	ADC <sup>3</sup> : MMAE <sup>10</sup>	
Ramucirumab	gastric cancer	VEGFR2	IgG1/k/Mono	US, 2014		

Cetuximab saratolacan	head & neck cancer	EGFR	IgG1/k/Mono	Japan, 2020	Photoimmunoth erapy IRDye® 700DX	
Nimotuzumab	head & neck cancer	EGFR	IgG1/k/Mono	Cuba, 2002		
Emapalumab-lzsg	hemophagocytic lymphohistiocytosis	IFN $\gamma$	IgG1/l/Mono	US, 2018		
Blinatumomab	leukemia: ALL	CD19, CD3	Tandem scFv/n.a./Bi	US, 2014		
Inotuzumab ozogamicin	leukemia: ALL	CD22	IgG4/k/Mono	US, 2017	ADC <sup>3</sup> : Calicheamicin <sup>11</sup>	Hinge stabilizing
Gemtuzumab ozogamicin	leukemia: AML	CD33	IgG4/k/Mono	US, 2000	ADC <sup>3</sup> : Calicheamicin <sup>11</sup>	Hinge stabilizing
Obinutuzumab	leukemia: CLL	CD20	IgG1/k/Mono	US, 2013	Improved Fc $\gamma$ RIIIa binding/Improved ADCC	
Ofatumumab	leukemia: CLL	CD20	IgG1/k/Mono	US, 2009		
Alemtuzumab	leukemia: CML	CD52	IgG1/k/Mono	US, 2001		
Moxetumomab pasudotox-tdfk	leukemia: HCL	CD22	dsFv fused with PE38 exotoxin//Mono	US, 2018	Immunoconjugat ePE38	
Tremelimumab	liver cancer	CTLA-42	IgG2/k/Mono	US, 2022		
Ivonescimab	lung cancer	PD-12, VEGF	IgG1/k/Bi	in review	Removed Fc effector functions	
Necitumumab	lung: non-small cell	EGFR	IgG1/k/Mono	US, 2015		
Racotumomab	lung: non-small cell	GM3	mIgG1/k/Mono	Cuba, 2013		
Sintilimab	lung: non-small cell	PD-12	IgG4/k/Mono	China, 2018	Hinge stabilizing	
Sugemalimab	lung: non-small cell	PD-L12	IgG4/l/Mono	China, 2021	Hinge stabilization	
Adebrelimab	lung: small cell	PD-L12	IgG4/k/Mono	China, 2023	Hinge stabilization; abrogated effector function	
Benmelstobart	lung: small cell	PD-L12	IgG1/k/Mono	in review	Removed Fc effector functions	
Loncastuximab tesirine	lymphoma: B cell	CD19	IgG1/k/Mono	US, 2021	ADC <sup>3</sup> : SG3199 <sup>12</sup>	
Tafasitamab-cxix	lymphoma: B cell	CD19	IgG1/2 hybrid/k/Mono	US, 2020	Improved Fc $\gamma$ RIIIa binding/Improved ADCC	
Zuberitamab	lymphoma: B cell	CD20	IgG1/k/Mono	China, 2023		
Epcoritamab	lymphoma: B cell	CD20, CD3	IgG1; Hetero H/l, k/Bi	US, 2023	Chain pairing, Reduced Fc effector function	
Odronextamab	lymphoma: B cell	CD20, CD3	IgG4 Hetero H, cL/k/Bi	in review	Fc-silencing and hinge-stabilization	
Glofitamab	lymphoma: B cell	CD20, CD3e	IgG1; CrossMab; Fab-Fc(G1) x Fab- Fab-Fc/l, k/Bi	Canada, 2023	Chain pairing, Reduced Fc effector function	
Polatuzumab vedotin-piiq	lymphoma: B cell	CD79b	IgG1/k/Mono	US, 2019	ADC <sup>3</sup> : MMAE <sup>10</sup>	
Mosunetuzumab	lymphoma: Follicular	CD20, CD3	IgG1; Hetero H, HL assembly/k/Bi	EU, 2022	Improved Fc $\gamma$ RIIIa binding/Improved ADCC	

Brentuximab vedotin	lymphoma: Hodgkin's	CD30	IgG1/k/Mono	US, 2011	ADC <sup>3</sup> : MMAE <sup>10</sup>	
Camrelizumab	lymphoma: Hodgkin's	PD-12	IgG4/k/Mono	China, 2019		Hinge stabilization
Zimberelimab	lymphoma: Hodgkin's	PD-12	IgG4/l/Mono	China, 2021		Hinge stabilization
Ibritumomab tiuxetan	lymphoma: non-Hodgkin's	CD20	mIgG1/k/Mono	US, 2002	RIC4: Yttrium-90	
Ripertamab	lymphoma: non-Hodgkin's	CD20	IgG1/k/Mono	China, 2022		
Rituximab	lymphoma: non-Hodgkin's	CD20	IgG1/k/Mono	US, 1997		
Tositumomab-I131	lymphoma: non-Hodgkin's	CD20	mIgG2a/l/Mono	US, 2003	RIC4: Iodine-131	
Catumaxomab	malignant ascites	EPCAM, CD3	mIgG2a/k and rIgG2b/λ Hybrid/k, l/Bi	EU, 2009		
Ipilimumab	melanoma	CTLA-42	IgG1/k/Mono	US, 2011		
Tebentafusp	melanoma	gp100, CD3	scFv fused with a TCR/n.a./Bi	US, 2022	Immunoconjugate	
Relatlimab	melanoma	LAG-3	IgG4/k/Mono	US, 2022		Hinge stabilizing
Pembrolizumab	melanoma	PD-12	IgG4/k/Mono	US, 2014		Hinge stabilizing
Prolgolimab	melanoma	PD-12	IgG1/V-l, C-k/Mono	Russia, 2020		Reduced Fc effector function
Nivolumab	melanoma/lung: non-small cell	PD-12	IgG4/k/Mono	US, 2014		Hinge stabilizing
Amivantamab	lung: non-small cell-EGFRmut	EGFR, cMET	IgG1/k/Bi	US, 2021		Improved FcγRIIIa binding & ADCC; Controlled Fab arm exchange for bispecific generation
Retifanlimab	merkel cell carcinoma	PD-12	IgG4/k/Mono	US, 2023		Hinge stabilizing
Avelumab	merkel cell carcinoma	PD-L12	IgG1/l/Mono	US, 2017		
Pucotenlimab	microsatellite instability-high solid tumors	PD-12	IgG4/k/Mono	China, 2022		Hinge stabilzation, half-life extension
Serplulimab	microsatellite instability-high solid tumors	PD-12	IgG4/k/Mono	China, 2022		Hinge stabilization
Envafohimab	microsatellite instability-high solid tumors	PD-L12	VHH-Fc (Fc IgG1)//Mono	China, 2021		Reduced Fc effector function (ADCC/ADCP)
Belantamab mafodotin-blmf	Multiple Myeloma	BCMA	IgG1/k/Mono	US, 2020	ADC <sup>3</sup> : MMAF <sup>13</sup>	Improved FcγRIIIa binding/Improved ADCC
Elranatamab	Multiple Myeloma	BCMA, CD3	IgG2/k/Bi	US, 2023		Strop Fab-arm exchange method
Teclistamab	Multiple Myeloma	BCMA, CD3	IgG4; Hetero H, HL exchanged/l/Bi	EU, 2022		Hinge-stabilizing (S228P) and Fc-silencing (F234A, L235A)
Daratumumab	Multiple Myeloma	CD38	IgG1/k/Mono	US, 2015		

Isatuximab-irfc	Multiple Myeloma	CD38	IgG1/k/Mono	US, 2020	
Talquetamab-tgvs	Multiple Myeloma	GPCR5D, CD3	IgG4/l, k/Bi	US, 2023	Hinge-stabilization (S228P), Reduced Fc effector function (F234A-L235A)
Elotuzumab	Multiple Myeloma	SLAMF7	IgG1/k/Mono	US, 2015	
Penpulimab	nasopharyngeal carcinoma	PD-12	IgG1/n.a./Mono	China, 2021	Reduced Fc effector functions
Toripalimab	nasopharyngeal carcinoma	PD-12	IgG4/k/Mono	China, 2018	Hinge stabilizing
Tagitanlimab	nasopharyngeal carcinoma	PD-L12	IgG1/k/Mono	in review	Reduced Fc effector function
Mirvetuximab soravtansine	ovarian cancer	FR $\alpha$	IgG1/k/Mono	US, 2022	ADC <sup>3</sup> ; DM4 <sup>14</sup>
Olaratumab	sarcoma	PDGFR $\alpha$	IgG1/k/Mono	US, 2016	
Mogamulizumab-kpkc	Sézary syndrome	CCR4	IgG1/k/Mono	Japan, 2012	Improved Fc $\gamma$ RIIIa binding/Improved ADCC
Cosibelimab	squamous cell carcinoma	PD-L12	IgG1/l/Mono	in review	
Cemiplimab-rwlc	squamous cell carcinoma: cutaneous	PD-12	IgG4/k/Mono	US, 2018	Hinge stabilizing
Tislelizumab	squamous cell carcinoma: esophageal	PD-12	IgG4/k/Mono	China, 2019	Hinge stabilizing; Abrogated Fc $\gamma$ Rs binding
Enfortumab vedotin-ejfv	urothelial	Nectin-4	IgG1/k/Mono	US, 2019	ADC <sup>3</sup> ; MMAE <sup>10</sup>

(a) No INN

(1) n.a. indicates that the data is not available

(2) antibodies targeting immune checkpoint molecules that can be used for the treatment of many tumor types, to switch the host's immune response to generate an anti-tumoral response

(3) ADC or antibody-drug conjugate

(4) RIC is a radioactive isotope conjugated antibody

(5) DXd is an inhibitor of topoisomerase I

(6) DM1 is an inhibitor of tubulin polymerization

(7) Duocarmycin is a DNA minor-groove-binding alkylating agent

(8) Duostatin-5 is a Tubulin inhibitor

(9) SN38 is a topoisomerase I inhibitor

(10) MMAE or Monomethyl Auristatin E is a tubulin polymerization inhibitor

(11) Calicheamicin is DNA-binding and induces double-chain breaks

(12) SG3199 is a cytotoxic DNA minor groove interstrand crosslinking pyrrolobenzodiazepine (PBD) dimer a potent cytotoxic agent for cells

(13) Monomethyl Auristatin F or MMAF is a tubulin polymerization inhibitor

(14) DM4 is an inhibitor of tubulin polymerization

(15) Improved Fc $\gamma$ RIIIa binding and decreased affinity for human inhibitory Fc $\gamma$ RIIB (CD32B)

(16) Mutations generated in the Ig not yet reported

**Table S2.** Number of Tumor & Normal samples (N) analyzed in Figures 2B & 3B.

Tissue	Normal	Tumor
<i>Adipose</i>	72	10
<i>Adrenal Gland</i>	501	58
<i>Bladder</i>	65	16
<i>Blood</i>	2623	4694
<i>Bone</i>	14	5
<i>Brain</i>	2569	5296
<i>Breast</i>	567	9867
<i>Cartilage</i>	2	51
<i>Cervix</i>	21	144
<i>Colon</i>	524	4887
<i>Endometrium</i>	73	74
<i>Esophagus</i>	105	328
<i>Eye</i>	1	156
<i>Gallbladder</i>	5	13
<i>Head and Neck</i>	20	217
<i>Heart</i>	41	222
<i>Joint</i>	55	135
<i>Kidney</i>	382	1534
<i>Larynx</i>	2	111
<i>Liver</i>	297	691
<i>Lung</i>	1007	3479
<i>Muscle</i>	684	5
<i>Oral</i>	15	371
<i>Ovary</i>	132	2121
<i>Pancreas</i>	119	365
<i>Pharynx</i>	6	40
<i>Placenta</i>	17	-
<i>Prostate</i>	142	620
<i>Skin</i>	319	1124
<i>Small Intestine</i>	33	12
<i>Soft Tissue</i>	9	149
<i>Stomach</i>	305	1330
<i>Teeth</i>	8	27
<i>Testis</i>	23	188
<i>Thyroid</i>	199	379
<i>Tongue</i>	20	46
<i>Urothelium</i>	9	90
<i>Uterus</i>	113	486
<i>Vagina</i>	5	3
<i>Vulva</i>	14	21