

2017 Immuno-Oncology Medicines in Development

Adoptive Cell Therapies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
ACTR087 + rituximab (antibody-coupled T-cell receptor immunotherapy + rituximab)	Unum Therapeutics Cambridge, MA	B-cell lymphoma	Phase I www.unumrx.com
AFP TCR (T-cell receptor cell therapy)	Adaptimmune Philadelphia, PA	liver	Phase I www.adaptimmune.com
anti-BCMA CAR-T cell therapy	Juno Therapeutics Seattle, WA Memorial Sloan Kettering New York, NY	multiple myeloma	Phase I www.junotherapeutics.com
anti-CD19 "armored" CAR-T cell therapy	Juno Therapeutics Seattle, WA Memorial Sloan Kettering New York, NY	recurrent/relapsed chronic lymphocytic leukemia (CLL)	Phase I www.junotherapeutics.com
anti-CD19 CAR-T cell therapy	Intrexon Germantown, MD ZIOPHARM Oncology Boston, MA	B-cell malignancies	Phase I www.dna.com www.ziopharm.com
anti-CD19 CAR-T cell therapy (second generation)	Kite Pharma Santa Monica, CA National Cancer Institute Bethesda, MD	hematological malignancies	Phase I www.kitepharma.com

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anti-CEA CAR-T therapy	Sorrento Therapeutics San Diego, CA TNK Therapeutics San Diego, CA	liver metastases	Phase I www.sorrentotherapeutics.com
anti-PSMA CAR-T cell therapy	TNK Therapeutics San Diego, CA Sorrento Therapeutics San Diego, CA	cancer	Phase I www.sorrentotherapeutics.com
ATA520 (WT1-specific T lymphocyte cell therapy)	Atara Biotherapeutics South San Francisco, CA	multiple myeloma, plasma cell leukemia	Phase I www.atarabio.com
AU101 (HER2-CD28 CAR-T cell therapy)	Aurora BioPharma Cambridge, MA	recurrent glioblastoma, sarcoma, osteosarcoma	Phase I/II www.aurora-biopharma.com
AU105 (HER2-CMV CAR-T cell therapy)	Aurora BioPharma Cambridge, MA	newly-diagnosed glioblastoma	Phase I/II www.aurora-biopharma.com

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axicabtagene ciloleucel (KTE-C19) (CAR-T therapy) ORPHAN DRUG	Kite Pharma Santa Monica, CA	aggressive non-Hodgkin lymphoma	application submitted www.kitepharma.com
		mantle cell lymphoma, diffuse large B-cell lymphoma (DLBCL), primary mediastinal B-cell lymphoma, transformed follicular lymphoma	Phase II/III www.kitepharma.com
		acute lymphoblastic leukemia (ALL), DLBCL (with a PD-L1 mAb)	Phase I www.kitepharma.com
baltaleucel-T (CMD-003) (T lymphocyte cell therapy) ORPHAN DRUG	Cell Medica Houston, TX	extranodal natural killer T-cell lymphoma (Fast Track), DLBCL, Hodgkin lymphoma, post-transplant lymphoproliferative disorder	Phase II www.celmedica.co.uk
bb2121 (anti-BCMA CAR-T cell therapy) ORPHAN DRUG	bluebird bio Cambridge, MA Celgene Summit, NJ	multiple myeloma	Phase I www.bluebirdbio.com www.celgene.com
BPX-501 (rivogenlecleucel) (T lymphocyte cell therapy)	Bellicum Pharmaceuticals Houston, TX	haploidentical hematopoietic stem cell transplantation (adjunct therapy)	Phase I/II www.bellicum.com
BPX-601 (GoCAR-T cell therapy)	Bellicum Pharmaceuticals Houston, TX	non-resectable pancreatic	Phase I www.bellicum.com

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BPX-701 (T-cell receptor based therapy)	Bellicum Pharmaceuticals Houston, TX	acute myeloid leukemia (AML), myelodysplastic syndromes	Phase I www.bellicum.com
BSK01™ (cell-based immunotherapy)	Kiromic Houston, TX	AML	Phase I/II www.kiromic.com
IMCgp100 (T-cell receptor therapy) ORPHAN DRUG	Immunocore Conshohocken, PA	ocular melanoma, cutaneous melanoma (combination therapy)	Phase II www.immunocore.com
JCAR014 (anti-CD19 CAR-T cell therapy)	Juno Therapeutics Seattle, WA	B-cell non-Hodgkin lymphoma (with durvalumab)	Phase I www.junotherapeutics.com
JCAR017 (anti-CD19 CAR-T cell therapy)	Celgene Summit, NJ Juno Therapeutics Seattle, WA	B-cell non-Hodgkin lymphoma (Breakthrough Therapy)	Phase I www.celgene.com www.junotherapeutics.com
JCAR018 (anti-CD22 CAR-T cell therapy)	Juno Therapeutics Seattle, WA	ALL (pediatric), non-Hodgkin lymphoma	Phase I www.junotherapeutics.com
JCAR020 (MUC16 CAR-T cell therapy)	Juno Therapeutics Seattle, WA	ovarian	Phase I www.junotherapeutics.com
JCAR023 (anti-CD171 CAR-T cell therapy)	Juno Therapeutics Seattle, WA	neuroblastoma (pediatric)	Phase I www.junotherapeutics.com

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JCAR024 (ROR1-directed CAR-T cell therapy)	Juno Therapeutics Seattle, WA	non-small cell lung cancer (NSCLC), triple-negative breast	Phase I www.junotherapeutics.com
JTCR016 (WT1-specific T lymphocyte therapy)	Juno Therapeutics Seattle, WA	AML, chronic myelogenous leukemia (CML)	Phase I/II www.junotherapeutics.com
JTX-2011 (inducible T-cell CO-stimulator activator)	Jounce Therapeutics Cambridge, MA	solid tumors	Phase II www.jouncetx.com
KITE-439 (HPV-16 E7 T-cell receptor therapy)	Kite Pharma Santa Monica, CA National Cancer Institute Bethesda, MD	cervical, head and neck, urogenital	Phase I www.kitepharma.com
KITE- 718 (MAGE A3/A6 T-cell therapy)	Kite Pharma Santa Monica, CA	solid tumors	Phase I www.kitepharma.com
LN-144 (tumor infiltrating lymphocyte therapy) ORPHAN DRUG	Lion Biotechnologies San Carlos, CA	malignant melanoma	Phase II www.lbio.com
LN-145 (tumor infiltrating lymphocyte therapy)	Lion Biotechnologies San Carlos, CA	cervical, head and neck	Phase II www.lbio.com

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MAGE-A10 TCR (T-cell receptor therapy)	Adaptimmune Philadelphia, PA	bladder, head and neck, melanoma, NSCLC	Phase I/II www.adaptimmune.com
MB-101 (anti-CD213a2 CAR-T cell therapy)	Mustang Bio New York, NY	glioblastoma	Phase I www.mustangbio.com
MB-102 (anti-CD123 CAR-T cell therapy)	Mustang Bio New York, NY	AML	Phase I www.mustangbio.com
NKR-2 (CAR-T cell therapy)	Celyad Boston, MA	hematological malignancies, solid tumors	Phase I/II www.celyad.com
NY-ESO-TCR (T-cell receptor therapy) ORPHAN DRUG	Adaptimmune Philadelphia, PA GlaxoSmithKline Philadelphia, PA	myxoid round cell liposarcoma, melanoma, multiple myeloma, NSCLC, ovarian, synovial sarcoma	Phase I/II www.adaptimmune.com
NY-ESO-1 T-cell receptor therapy	Kite Pharma Santa Monica, CA National Cancer Institute Bethesda, MD	solid tumors	Phase II www.kitepharma.com
PNK-007 (natural killer cell therapy)	Celgene Summit, NJ	AML, multiple myeloma	Phase I www.celgene.com

Adoptive Cell Therapies

Drug Name Organization Indication Development Phase

tisagenlecleucel-T (anti-CD19 CAR-T cell therapy)	Novartis Pharmaceuticals East Hanover, NJ	relapsed or refractory acute lymphoblastic leukemia (children and adolescents)	application submitted www.novartis.com
		DLBCL (Breakthrough Therapy)	Phase II www.novartis.com

TT12 (HPV-specific T-cell therapy)	Tessa Therapeutics Singapore	cervical, oropharyngeal	Phase I www.tessatherapeutics.com
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Bispecific Antibodies I Monoclonal Antibodies

Drug Name Organization Indication Development Phase

ABBV-428 (CD40 ligand stimulant)	AbbVie North Chicago, IL	solid tumors	Phase I www.abbvie.com
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AFM11 (bispecific antibody)	Affimed Therapeutics Heidelberg, Germany	B-cell non-Hodgkin lymphoma	Phase I www.affimed.com
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AFM13 (CD30 antigen modulator) ORPHAN DRUG	Affimed Therapeutics Heidelberg, Germany	Hodgkin lymphoma	Phase I www.affimed.com
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AMG 211 (MEDI-565) (anti-CEA/anti-CD3 bispecific antibody)	Amgen Thousand Oaks, CA MedImmune Gaithersburg, MD	solid tumors	Phase I www.amgen.com www.medimmune.com
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Bispecific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
AMG 330 (anti-CD33/anti-CD3 bispecific antibody)	Amgen Thousand Oaks, CA	AML	Phase I www.amgen.com
AMG 420 (anti-BCMA/anti-CD3 bispecific antibody)	Amgen Thousand Oaks, CA	multiple myeloma	Phase I www.amgen.com
BI-836880 (anti-VEGF/Ang2 inhibitor bispecific nanobody)	Boehringer Ingelheim Pharmaceuticals Ridgefield, CT	cancer	Phase I www.boehringer-ingelheim.com
Blincyto® blinatumomab ORPHAN DRUG	Amgen Thousand Oaks, CA	relapsed/refractory Philadelphia chromosome-positive (ph+) and minimal residual of ALL, ph+ refractory/relapsed B-cell precursor ALL	Phase II www.amgen.com
		DLBCL	Phase II www.amgen.com
duvortuxizumab (JNJ-64052781) (CD19/CD3 bispecific antibody)	Janssen Research & Development Raritan, NJ	B-cell malignancies	Phase I www.janssen.com
ERY974 (anti-glypican-3/CD3 bispecific antibody)	Chugai Pharma USA Berkeley Heights, NJ	solid tumors	Phase I www.chugai-pharma.com

Bispecific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
flotetuzumab (MGD06) (CD123/CD3 bispecific antibody) ORPHAN DRUG	MacroGenics Rockville, MD	AML, myelodysplastic syndromes	Phase I www.macrogenics.com
istiratumab (MM-141) (PI3K/AKT/mTOR inhibitor bispecific antibody)	Merrimack Pharmaceuticals Cambridge, MA	pancreatic	Phase II www.merrimack.com
JNJ-61186372 (EGFR/proto-oncogene protein c-Met bispecific antibody)	Janssen Research & Development Raritan, NJ	NSCLC	Phase I www.janssen.com
JNJ-63709178 (CD123/CD3 bispecific antibody)	Janssen Research & Development Raritan, NJ	AML	Phase I www.janssen.com
LY3164530 (EGFR/proto-oncogene protein c-Met bispecific antibody)	Eli Lilly Indianapolis, IN	cancer	Phase I www.lilly.com
MGD007 (gpA33/CD3 bispecific antibody)	MacroGenics Rockville, MD	metastatic colorectal	Phase I www.macrogenics.com
MGD009 (CD3/B7H3 bispecific antibody)	MacroGenics Rockville, MD	solid tumors	Phase I www.macrogenics.com

Bispecific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
MOR209/ES414 (PSMA/CD3 bispecific antibody)	Aptevo Therapeutics Seattle, WA MorphoSys Planegg, Germany	prostate	Phase I www.morphosys.com
navicixizumab (anti-DLL4/VEGF bispecific antibody)	OncoMed Pharmaceuticals Redwood City, CA	colorectal, ovarian	Phase I www.oncomed.com
OXS-1550 (bispecific scFv recombinant fusion protein-drug conjugate)	Oxis Biotech Tampa, FL	non-Hodgkin lymphoma	Phase II www.oxis.com
PF-06671008 (anti-CD3/P-cadherin bispecific antibody)	Pfizer New York, NY	solid tumors	Phase I www.pfizer.com
REGN1979 (CD20/CD3 bispecific antibody)	Regeneron Pharmaceuticals Tarrytown, NY	cancer	Phase I www.regeneron.com
RG7386 (fibroblast-activating protein/TRAIL receptor 2 agonist bispecific antibody)	Genentech South San Francisco, CA	solid tumors	Phase I www.gene.com
RG7802 (carcinoembryonic/CD3 antigen inhibitor)	Genentech South San Francisco, CA	solid tumors	Phase I www.gene.com

Bispecific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
RG7828 (CD20/CD3 bispecific antibody)	Genentech South San Francisco, CA	hematological malignancies	Phase I www.gene.com
TF 2-targeted bispecific antibody (TF2 and 68 Ga-IMP-288)	Immunomedics Morris Plains, NJ IBC Pharmaceuticals Morris Plains, NJ	HER2-negative CEA-expressing breast	Phase I/II www.immunomedics.com
vanucizumab (RG7221) (angiopoietin-2 inhibitor/ VEGF-A inhibitor)	Genentech South San Francisco, CA	metastatic colorectal	Phase II www.gene.com
XmAb13676 (CD20/CD3 bispecific antibody)	Xencor Monrovia, CA	non-Hodgkin lymphoma	Phase I www.xencor.com
XmAb14045 (CD3 antigen modulator/IL-3 receptor alpha subunit modulator)	Xencor Monrovia, CA	AML	Phase I www.xencor.com
ZW25 (two different epitopes of HER2 protein) ORPHAN DRUG	Zymeworks Vancouver, Canada	ovarian	Phase I www.zymeworks.com

Checkpoint Modulators I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
AGEN 1884 (CTLA-4 antagonist)	Agenus Lexington, MA	solid tumors	Phase I www.agenusbio.com
AGEN 2034 (PD-1 protein inhibitor)	Agenus Lexington, MA	solid tumors	Phase I/II www.agenusbio.com
anti-GITR antibody (glucocorticoid-induced tumor necrosis factor receptor)	Bristol-Myers Squibb Princeton, MA	cancer	Phase I www.bms.com
anti-LAG3 (BMS-986016) (CD223 antigen inhibitor)	Bristol-Myers Squibb Princeton, NJ	gastric, NSCLC, renal cell	Phase II www.bms.com
Bavencio® avelumab (anti-PD-L1 mAb) ORPHAN DRUG	EMD Serono Rockland, MA Pfizer New York, NY	gastric (1L, 3L, 1L maintenance), head and neck, NSCLC (1L, 2L), ovarian (1L), platinum-resistant/refractory ovarian, renal cell (1L), urothelial (1L, 1L maintenance)	Phase III www.emdserono.com www.pfizer.com
		triple negative breast, head and neck, melanoma, NSCLC (with PF-05082566 for all)	Phase I www.emdserono.com www.pfizer.com
		hematological malignancies, solid tumors	Phase I www.emdserono.com www.pfizer.com

Checkpoint Modulators I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
BGB-A317 (PD-1 inhibitor)	BeiGene Cambridge, MA	solid tumors	Phase I www.beigene.com
BI-754091 (anti-PD-1 mAb)	Boehringer-Ingelheim Pharmaceuticals Ridgefield, CT	solid tumors	Phase I www.boehringer-ingelheim.com
BMS-986178 (anti-OX40 mAb)	Bristol-Myers Squibb Princeton, NJ	solid tumors (combination therapy)	Phase I/II www.bms.com
BMS-986192 (anti-PD-L1 mAb)	Bristol-Myers Squibb Princeton, NJ	NSCLC	in clinical trials www.bms.com
CBT-501 (genolimzumab) (PD-1 protein modulator)	CBT Pharmaceuticals Santa Clara, CA	solid tumors	Phase I www.cbtpharma.com
CX-072 (PD-L1 inhibitor)	CytomX Therapeutics South San Francisco, CA	lymphoma, solid tumors	Phase I/II www.cytomx.com
FAZ053 (PD-L1 protein inhibitor)	Novartis Pharmaceuticals East Hanover, NJ	solid tumors	Phase I www.novartis.com
GSK3174998 (anti-OX40 mAb)	GlaxoSmithKline Philadelphia, PA	hematological malignancies, solid tumors	Phase I www.gsk.com
GWN323 (anti-GITR mAb)	Novartis Pharmaceuticals East Hanover, NJ	lymphoma, solid tumors	Phase I www.novartis.com

Checkpoint Modulators I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
Imfinzi™ durvalumab (anti-PD-L1 antibody)	AstraZeneca Wilmington, DE	advanced bladder (2L), bladder (1L with tremelimumab), head and neck, NSCLC (1L & 3L with tremelimumab), NSCLC stage III (monotherapy), small cell lung cancer (SCLC) (1L with tremelimumab), squamous cell head and neck (1L & 2L with tremelimumab)	Phase III www.medimmune.com
		solid tumors (monotherapy), squamous cell head and neck (with AZD5069), solid tumors (with MEDI0680), hepatocellular (with tremelimumab), gastric (with tremelimumab)	Phase II www.medimmune.com
		DLBCL (monotherapy and combination), melanoma (combination therapy), NSCLC (with gefitinib), solid tumors (in several combinations)	Phase I www.medimmune.com
	AstraZeneca Wilmington, DE Celgene Summit, NJ	acute myeloid leukemia, myelodysplastic syndromes	Phase II www.celgene.com www.medimmune.com
		chronic lymphocytic leukemia, multiple myeloma, non-Hodgkin lymphoma	Phase I www.celgene.com www.medimmune.com
IMP701 (anti-LAG3 mAb)	Novartis Pharmaceuticals East Hanover, NJ	cancer	Phase I www.novartis.com

Checkpoint Modulators I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
INCAGN1876 (GITR receptor agonist)	Agenus Lexington, MA Incyte Wilmington, DE	solid tumors	Phase I/II www.agenusbio.com www.incyte.com
INCAGN1949 (OX40 receptor agonist)	Agenus Lexington, MA Incyte Wilmington, DE	solid tumors	Phase I/II www.agenusbio.com www.incyte.com
INCSHR1210 (PD-1 protein inhibitor)	Incyte Wilmington, DE	solid tumors	Phase I/I www.incyte.com
JNJ-63723283 (PD-1 inhibitor)	Janssen Research & Development Raritan, NJ	solid tumors	Phase I/II www.janssen.com
Keytruda® pembrolizumab (anti-PD-1 mAb)	Merck Kenilworth, NJ	previously treated microsatellite instability-high, relapsed or refractory classical Hodgkin lymphoma, cisplatin-ineligible bladder (1L), metastatic bladder (2L), non-squamous NSCLC (1L, combination therapy)	application submitted www.merck.com
		breast, colorectal, esophageal, gastric, hepatocellular, multiple myeloma, renal	Phase III www.merck.com
		primary mediastinal large B-cell lymphoma, nasopharyngeal, ovarian prostate	Phase II www.merck.com

Checkpoint Modulators I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
KN035 (anti-PD-L1 antibody)	3D Medicine Suzhou, China Alphamab Suzhou, China	solid tumors	Phase I www.alphamab.com
LAG525 (anti-LAG3 mAb)	Novartis Pharmaceuticals East Hanover, NJ	solid tumors	Phase I/II www.novartis.com
lirilumab (anti-KIR receptor antagonist)	Bristol-Myers Squibb Princeton, NJ Innate Pharma Marseille, France	acute myeloid leukemia, chronic lymphocytic leukemia, myelodysplastic syndromes (combination therapy)	Phase II www.bms.com
		solid tumors	Phase I/II www.bms.com
LY3300054 (PD-L1 mAb)	Eli Lilly Indianapolis, IN	solid tumors	Phase I www.lilly.com
M7824 (anti-PD-L1/TGFbeta trap)	EMD Serono Rockland, MA	solid tumors	Phase I www.emdserono.com
MBG453 (anti-TIM3 antibody)	Novartis Pharmaceuticals East Hanover, NJ	solid tumors	Phase I/II www.novartis.com
MEDI0562 (OX40 receptor agonist)	MedImmune Gaithersburg, MD	solid tumors	Phase I www.medimmune.com

Checkpoint Modulators I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
MEDI0680 (PD-1 protein inhibitor)	MedImmune Gaithersburg, MD	solid tumors	Phase I www.medimmune.com
MEDI1873 (GITR agonist fusion protein)	MedImmune Gaithersburg, MD	solid tumors	Phase I www.medimmune.com
MGA 012 (PD-1 inhibitor)	MacroGenics Rockville, MD	solid tumors	Phase I www.macrogenics.com
MK-4166 (GITR protein stimulant)	Merck Kenilworth, NJ	solid tumors	Phase I www.merck.com
Opdivo® nivolumab ORPHAN DRUG	Bristol-Myers Squibb Princeton, NJ	mismatch repair deficient or microsatellite instability-positive colorectal	application submitted www.bms.com
		esophageal, gastro-esophageal junction, gastric, glioblastoma, hepatocellular, multiple myeloma, NSCLC (1L), renal cell (1L), SCLC	Phase III www.bms.com
		central nervous system , DLBCL, follicular lymphoma, hematological malignancies, testicular	Phase II www.bms.com
		continued on next page	

Checkpoint Modulators I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
Opdivo® nivolumab ORPHAN DRUG	Bristol-Myers Squibb Princeton, NJ	bladder (combination therapy), colorectal (combination therapy), solid tumors (in several combinations)	Phase I/II www.bms.com
		CML (combination therapy), solid tumors (with mogamulizumab), solid tumors (with BMS-986207)	Phase I www.bms.com
Opdivo® / Yervoy® nivolumab/ipilimumab	Bristol-Myers Squibb Princeton, NJ	head and neck, malignant plural mesothelioma, NSCLC, renal cell (1L), SCLC	Phase III www.bms.com
PDR001 (anti-PD-1 antibody)	Novartis Pharmaceuticals East Hanover, NJ	malignant melanoma	Phase III www.novartis.com
		nasopharyngeal, neuroendocrine tumors	Phase II www.novartis.com
		solid tumors, lymphoma	Phase I www.novartis.com
PF-04518600 (OX40 receptor agonist)	Pfizer New York, NY	cancer (with avelumab)	Phase I www.pfizer.com
PF-06801591 (anti-PD-1 antibody)	Pfizer New York, NY	cancer	Phase I www.pfizer.com

Checkpoint Modulators I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
REGN2810 (SAR439684) (PD-1 inhibitor)	Regeneron Pharmaceuticals Tarrytown, NY Sanofi US Bridgewater, NJ	advanced cutaneous squamous cell	Phase II www.regeneron.com www.sanofi.com
		cancer	Phase I www.regeneron.com www.sanofi.com
REGN3767 (LAG3 antibody)	Regeneron Pharmaceuticals Tarrytown, NY	cancer	Phase I www.regeneron.com
RG7888 (anti-OX40 antibody)	Genentech South San Francisco, CA	solid tumors, urothelial	Phase II www.gene.com
		solid tumors (with atezolizumab)	Phase I www.gene.com
Tecentriq® atezolizumab	Genentech South San Francisco, CA	metastatic NSCLC	Phase II www.gene.com
		melanoma (with vemurafenib), solid tumors (monotherapy), solid tumors (with bevacizumab)	Phase I www.gene.com
tremelimumab + MEDI0562 (anti-CTLA-4 + OX40 receptor agonist)	MedImmune Gaithersburg, MD	solid tumors	Phase I www.medimmune.com

Checkpoint Modulators I Monoclonal Antibodies

Drug Name Organization Indication Development Phase

TRX518 (anti-GITR antibody)	Leap Therapeutics Cambridge, MA	solid tumors	Phase I www.leaptx.com
TSR-022 (anti-TIM-3 mAb)	TESARO Waltham, MA	solid tumors	Phase I www.tesaro.com
TSR-042 (anti-PD-1 mAb)	TESARO Waltham, MA	solid tumors	Phase I www.tesarobio.com
Yervoy® ipilimumab	Bristol-Myers Squibb Princeton, NJ	squamous NSCLC	Phase III www.bms.com

Cytokines

Drug Name Organization Indication Development Phase

Actimmune® interferon gamma 1-b	Horizon Pharma Lake Forest, IL	breast	Phase I/II www.horizonpharma.com
		solid tumors	Phase I www.horizonpharma.com
ALKS 4230 (recombinant fusion protein and immunotherapeutic based on IL-2)	Alkermes Waltham, MA	solid tumors	Phase I www.alkermes.com

Cytokines

Drug Name

Organization

Indication

Development Phase

ALT-801
(tumor antigen-specific T-cell receptor
linked to IL-2)

Altor BioScience
Miramar, FL

advanced bladder

Phase II
www.altorbioscience.com

non-muscle invasive bladder,
metastatic melanoma

Phase I
www.altorbioscience.com

ALT-803
(IL-15 superagonist protein complex)

Altor BioScience
Miramar, FL

non-muscle invasive bladder

Phase II
www.altorbioscience.com

hematological malignancies, indolent
non-Hodgkin lymphoma, multiple
myeloma, NSCLC, pancreatic,
solid tumors

Phase I
www.altorbioscience.com

AM0010
(PEGylated IL-10)
ORPHAN DRUG

ARMO Biosciences
Redwood City, CA

pancreatic ductal adenocarcinoma

Phase III
www.armobio.com

NSCLC, renal cell, solid tumors

Phase I
www.armobio.com

APN301
(mAb hu14.18 linked with IL-2)

Apeiron Biologics
Vienna, Austria

neuroblastoma

Phase II
www.apeiron-biologics.com

CDX-301/CDX-1401
(hematopoietic cytokine [Flt3L]/
NY-ESO-1 antibody fusion protein)

Celldex
Hampton, NJ
Cancer Immunotherapy Trials Ntwk.
Bethesda, MD

solid tumors

Phase II
www.celldex.com

Cytokines

Drug Name

Organization

Indication

Development Phase

cergutuzumab amunaleukin (RG7813)
(immunocytokine comprising a
variant of IL-2 targeting CEA)

Genentech
South San Francisco, CA

solid tumors

Phase I
www.gene.com

solid tumors (with atezolizumab)

Phase I
www.gene.com

CYT-6091
(nanotherapy comprised of cAu
particles, tumor necrosis factor,
PEG-Thiol)

CytImmune Sciences
Rockville, MD

solid tumors

Phase I
www.cytimmune.com

DI-Leu16-IL2
(immunocytokine fusion protein)

Alopexx Oncology
Concord, MA

non-Hodgkin lymphoma

Phase II
www.alopexx.com

GEN-1
(IL-12 gene therapy-nanoparticle)
ORPHAN DRUG

Celsion
Lawrenceville, NJ

ovarian

Phase II
www.celsion.com

heterodimeric IL-15
(interleukin stimulant)

Admune Therapeutics
Danvers, MA

solid tumors

Phase I
www.admune.com

HL143
(subcutaneous interferon alpha-2b)

HanAll Biopharma
Rockville, MD

hepatocellular

Phase II
www.hanallbiopharma.com

IGN002
(anti-CD20 antibody/interferon-alpha)

ImmunGene
Thousand Oaks, CA

non-Hodgkin lymphoma

Phase I
www.immugene.com

Cytokines

Drug Name

Organization

Indication

Development Phase

ImmunoPulse® IL-12 interleukin-12 gene therapy	OncoSec Medical San Diego, CA	triple negative breast, metastatic melanoma (Fast Track)	Phase II www.oncosec.com
IRX-2 (immunostimulant with multiple cytokines)	IRX Therapeutics New York, NY	head and neck (Fast Track)	Phase II www.irxtherapeutics.com
		breast cancer	Phase I www.irxtherapeutics.com
M9241 (NHS-IL12) (interleukin-12 stimulant)	EMD Serono Rockland, MA	solid tumors	Phase I www.emdserono.com
MDNA55 (IL-4 empowered cytokine) ORPHAN DRUG	Medicenna Therapeutics Toronto, Canada	recurrent glioblastoma (Fast Track)	Phase II www.medicenna.com
		brain metastases, newly-diagnosed glioblastoma	Phase I www.medicenna.com
NGR-hTNF (recombinant fusion protein) ORPHAN DRUG	MolMed Milan, Italy	malignant pleural mesothelioma	Phase III www.molmed.com

Cytokines

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
NKTR 214 (IL-2 receptor beta subunit agonist)	Nektar Therapeutics San Francisco, CA	bladder, colorectal, malignant melanoma, NSCLC, renal cell (combination therapy)	Phase I/II www.nektar.com
		solid tumors	Phase I www.nektar.com
NM-IL-12 (recombinant IL-12)	Neumedicines Pasadena, CA	cutaneous T-cell lymphoma	Phase II www.neumedicines.com
RG7461 (IL-2 variant fused with anti-fibroblast activation protein antibody)	Genentech South San Francisco, CA	solid tumors	Phase I www.gene.com
rSIFN-co (interferon)	Sichuan Huiyang Life Science and Technology Chengdu City, China	solid tumors	Phase I

Oncolytic Virus Therapies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
Ad-VirRx 007 (engineered oncolytic adenovirus)	Multivir Houston, TX	solid tumors	Phase I www.multivir.com
CG0070 (oncolytic immunotherapy)	Cold Genesys Santa Ana, CA	non-muscle invasive bladder	Phase II www.coldgenesys.com

Oncolytic Virus Therapies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
coxsackievirus (CVA21) ORPHAN DRUG	Viralytics Sydney, Australia	bladder, lung, melanoma, prostate	Phase I/II www.viralytics.com
DNX-2401 (oncolytic immunotherapy) ORPHAN DRUG	DNatrix Houston, TX	glioblastoma (Fast Track) (combination therapy)	Phase II www.dnatrix.com
enadenotucirev (Ad11/Ad3 chimeric group B adenovirus)	PsiOxus Therapeutics Abingdon, United Kingdom Bristol-Myers Squibb Princeton, NJ	solid tumors (with nivolumab)	Phase I www.psioxus.com www.bms.com
GL-ONC1 (genetically-modified oncolytic virus)	Genelux San Diego, CA	peritoneal carcinomatosis	Phase I/II www.genelux.com
		solid tumors	Phase I www.genelux.com
HF10 (attenuated mutant of HSV1)	Takara Bio USA Mountain View, CA	malignant melanoma	Phase II www.takara-bio.com
Imlygic® talimogene laherparepvec	Amgen Thousand Oaks, CA	mid- to late-stage malignant melanoma (combination therapy)	Phase III www.amgen.com
		head and neck, liver	Phase I www.amgen.com

Oncolytic Virus Therapies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
LOAd703 (immuno-stimulatory oncolytic adenovirus) ORPHAN DRUG	Lokon Pharma Uppsala, Sweden	pancreatic	Phase I/II www.lokonpharma.com
ONCOS-102 (genetically-modified human serotype 5/3 adenovirus)	Targovax Oslo, Sweden	advanced or unresectable melanoma progressing after PD-1 blockade	Phase I www.targovax.com
pexastimogene devacirepvec (JX-594) (engineered strain of oncolytic vaccinia poxvirus) ORPHAN DRUG	SillaJen Biotherapeutics Seoul, South Korea Transgene Strasbourg, France	hepatocellular	Phase III www.sillajen.com
Reolysin® pelareorep ORPHAN DRUG	Oncolytics Biotech Calgary, Canada	NSCLC	Phase II www.oncolyticsbiotech.com
		colorectal, glioma, multiple myeloma, pancreatic	Phase I www.oncolyticsbiotech.com
telomelysin (telomerase-selective oncolytic virus)	Oncolys Biopharma Tokyo, Japan	melanoma	Phase II www.oncolys.com
VSV-IFNβ-NIS (recombinant vesicular stomatitis virus)	Vyriad Rochester, MN	advanced solid tumors	Phase I www.vyriad.com

Vaccines

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
adagloxad simolenin (cancer immunotherapy)	OBI Pharma Taipei, Taiwan	metastatic breast	Phase II/III www.obipharma.com
ADXS-HER2 (cancer immunotherapy)	Advaxis Princeton, NJ	metastatic HER2-expressing solid tumors	Phase I www.advaxis.com
ADXS-PSA (cancer immunotherapy)	Advaxis Princeton, NJ	metastatic castration-resistant prostate (monotherapy)	Phase I/II www.advaxis.com
	Advaxis Princeton, NJ Merck Kenilworth, NJ	metastatic prostate (in combination with pembrolizumab)	Phase I/II www.advaxis.com
AE37 (li-key hybrid cancer vaccine)	Antigen Express Wellesley, MA	newly-diagnosed breast	Phase II www.antigenexpress.com
		metastatic prostate (monotherapy)	Phase I www.antigenexpress.com
AE37/GP2 peptide vaccine (li-key hybrid cancer vaccine)	Antigen Express Wellesley, MA	breast	Phase I www.antigenexpress.com
AlloStim® T-cell therapy-device combination	Immunovative Therapies Jerusalem, Israel	metastatic colorectal	Phase II www.immunovative.com

Vaccines

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
AST-VAC1 (dendritic cell vaccine)	Asterias Biotherapeutics Fremont, CA	AML	Phase II www.asteriasbiotherapeutics.com
AutoSynVax™ autologous synthetic vaccine	Agenus Lexington, MA	cancer (prevention)	Phase I www.agenusbio.com
AVX 701 (alphavirus VEE cancer vaccine)	AlphaVax Durham, NC	CEA-expressing colorectal	Phase I/II www.alphavax.com
AVX 901 (alphavirus VEE cancer vaccine)	AlphaVax Durham, NC	HER2-expressing breast	Phase I www.alphavax.com
axalimogene filolisbac (AXAL) (cancer immunotherapy) ORPHAN DRUG	Advaxis Princeton, NJ	high-risk locally advanced cervical (Fast Track)	Phase III www.advaxis.com
		metastatic cervical, metastatic head and neck, metastatic anal	Phase II www.advaxis.com
BB-MPI-03 (RNA-derived cancer vaccine)	Benovus Bio Atlanta, GA	AML, multiple myeloma, myelodysplastic syndromes	Phase I www.benovousbio.com
BI 1361849 (RNA cancer vaccine)	Boehringer Ingelheim Pharmaceuticals Ridgefield, CT	NSCLC	Phase II www.boehringer-ingelheim.com
BriaVax™ SV-BR-1 GM cancer vaccine	BriaCell Therapeutics Berkeley, CA	breast cancer	Phase I/II www.briacell.com

Vaccines

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
CMB305 (prime-boost immunotherapy) ORPHAN DRUG	Immune Design Seattle, WA	soft tissue sarcoma	Phase II www.immunedesign.com
CMP-001 (virus-like particle cancer vaccine)	Checkmate Pharmaceuticals Cambridge, MA	malignant melanoma (with pembrolizumab)	Phase I www.checkmatepharma.com
colorectal cancer vaccine (therapeutic cancer vaccine)	Targeted Diagnostics & Therapeutics Exton, PA Viral Gene Philadelphia, PA	colorectal	Phase I www.viralgeneinc.com
CRS-207 (<i>Listeria monocytogenes</i> cancer vaccine) ORPHAN DRUG	Aduro Biotech Berkeley, CA Incyte Wilmington, DE	ovarian (combination therapy)	Phase I/II www.aduro.com
	Aduro Biotech Berkeley, CA	gastric (combination therapy), mesothelioma (combination therapy)	Phase I www.aduro.com
CV301 (CEA/MUC-1 targeted immunotherapy)	Bavarian Nordic Washington, DC	NSCLC (with nivolumab)	Phase II www.bavarian-nordic.com
DCVax®-Direct personalized immune therapy	Northwest Biotherapeutics Bethesda, MD	solid tumors	Phase I/II www.nwbio.com

Vaccines

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
DCVax®-L personalized immune therapy ORPHAN DRUG	Northwest Biotherapeutics Bethesda, MD	newly-diagnosed glioblastoma	Phase III www.nwbio.com
		metastatic ovarian	Phase I completed www.nwbio.com
DCVax®-Prostate personalized immune therapy	Northwest Biotherapeutics Bethesda, MD	prostate	Phase II completed www.nwbio.com
DPV-001 (tumor-derived, autophagosome-enriched cancer vaccine)	UbiVac Portland, OR	definitely-treated stage III NSCLC	Phase II www.ubivac.com
		advanced prostate	Phase I www.ubivac.com
DPX E7 (peptide cancer vaccine)	Immunovaccine Halifax, Canada	HPV-related anal, cervical, head and neck	Phase I/II www.imvaccine.com
DPX Survivac (peptide cancer vaccine) ORPHAN DRUG	Immunovaccine Halifax, Canada	ovarian (combination therapy)	Phase I www.imvaccine.com
DSP-7888 (peptide cancer vaccine)	Sunovion Pharmaceuticals Marlborough, MA	hematologic malignancies, solid tumors	Phase I www.sunovion.com

Vaccines

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
Elenagen™ p62 anti-cancer DNA Vaccine	CureLab Oncology Canton, MA	solid tumors	Phase I/II www.curelaboncology.com
EP-101 (type-1 T helper cell stimulant)	EpiThany Seattle, WA	breast	Phase I www.epithany.com
EP-201 (type-1 T helper cell stimulant)	EpiThany Seattle, WA	ovarian	Phase I www.epithany.com
EP-301 (type-1 T helper cell stimulant)	EpiThany Seattle, WA	breast	Phase I www.epithany.com
ERC1671 (allogeneic/autologous cell vaccine) ORPHAN DRUG	Epitopoietic Research Pasadena, CA	glioblastoma	Phase II www.erc-immunotherapy.com
ETBX-011 (Ad5 CEA cancer vaccine)	Etubics Seattle, WA	solid tumors	Phase I/II www.etubics.com
ETBX-021 (Ad5 HER2/neu cancer vaccine)	Etubics Seattle, WA NantBioScience Culver City, CA	breast	Phase I www.etubics.com
GALE-301 (folate binding protein E39-targeted peptide vaccine) ORPHAN DRUG	Galena Biopharma San Ramon, CA	endometrial, ovarian cancer	Phase II www.galenabiopharma.com

Vaccines

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
GALE-301 + GALE-302 (immunogenic peptide vaccine combination) ORPHAN DRUG	Galena Biopharma San Ramon, CA	breast, ovarian	Phase I/II www.galenabiopharma.com
galinpepimut-S (WT1 cancer vaccine) ORPHAN DRUG	Sellas Life Sciences New York, NY	AML (Fast Track), mesothelioma (Fast Track), multiple myeloma	Phase II www.sellaslifesciences.com
		CML, ovarian (with nivolumab)	Phase I/II www.sellaslifesciences.com
GI-6207 (CEA inhibitor cancer vaccine)	Celgene Summit, NJ GlobeImmune Louisville, CO	medullary thyroid cancer	Phase II www.celgene.com www.globeimmune.com
GI-6301 (brachyury peptide cancer vaccine)	Celgene Summit, NJ GlobeImmune Louisville, CO	chordoma	Phase II www.globeimmune.com
		advanced cancer	Phase I www.globeimmune.com
GL 0817 (peptide immunomodulator)	Gliknik Baltimore, MD	head and neck, squamous cell	Phase II www.gliknik.com
GRN 1201 (peptide cancer vaccine)	GreenPeptide Kurume, Japan	melanoma	Phase I www.green-peptide.com

Vaccines

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
ICT-107 (dendritic cell vaccine) ORPHAN DRUG	ImmunoCellular Therapeutics Calabasas, CA	newly-diagnosed glioblastoma	Phase III www.imuc.com
ICT-121 (dendritic cell vaccine)	ImmunoCellular Therapeutics Calabasas, CA	recurrent glioblastoma	Phase I www.imuc.com
IMT1012 (multi-peptide antigen cancer vaccine)	Immunotope Doylestown, PA	breast, ovarian	Phase I www.immunotope.com
INO-1400 (hTERT DNA cancer vaccine)	Inovio Pharmaceuticals Plymouth Meeting, PA	breast, lung, pancreatic	Phase I www.inovio.com
INO-3106 (E6, E7 DNA cancer vaccine)	Inovio Pharmaceuticals Plymouth Meeting, PA	aerodigestive	Phase I www.inovio.com
INO-3112 (E6, E7 DNA cancer vaccine)	Inovio Pharmaceuticals Plymouth Meeting, PA MedImmune Gaithersburg, MD	cervical, head and neck	Phase I/II www.inovio.com www.medimmune.com
INO-5150 (PSA, PSMA DNA cancer vaccine)	Inovio Pharmaceuticals Plymouth Meeting, PA	prostate	Phase I www.inovio.com
INT230-6 (cisplatin based intratumoral cancer vaccine)	Intensity Therapeutics Westport, CT	cancer	Phase I/II www.intensitytherapeutics.com

Vaccines

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
JNJ-64041757 (ADU-214) (<i>Listeria monocytogenes</i> immunotherapy)	Aduro Biotech Berkeley, CA Janssen Research & Development Raritan, NJ	lung	Phase I www.aduro.com www.janssen.com
JNJ-64041809 (ADU-741) (<i>Listeria monocytogenes</i> immunotherapy)	Aduro Biotech Berkeley, CA Janssen Research & Development Raritan, NJ	prostate	Phase I www.aduro.com www.janssen.com
LAMP-Vax + pp65 DC therapy (DNA immunotherapeutic vaccine)	Immunomic Therapeutics Rockville, MD	newly-diagnosed glioblastoma	Phase I/II www.immunomix.com
LV305 (RNA cancer vaccine) ORPHAN DRUG	Immune Design Seattle, WA	breast, malignant melanoma, NSCLC, ovarian, sarcoma	Phase I www.immunedesign.com
MUC-1 CD40L dendritic cell vaccine	MicroVAX Manassas, VA	solid tumors	Phase I
MVA-BN brachyury vaccine (cancer immunotherapy)	Bavarian Nordic Washington, DC	cancer	Phase I www.bavarian-nordic.com
MVA p53 vaccine (modified vaccinia virus ankara vaccine expressing p53)	Tara Immuno-Oncology New York, NY	solid tumors	Phase I

Vaccines

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
M-VAX (autologous tumor cell vaccine) ORPHAN DRUG	AVAX Technologies Philadelphia, PA	melanoma	Phase II www.avax-tech.com
MVI-118 (AR plasmid DNA vaccine)	Madison Vaccines Madison, WI	metastatic prostate	Phase I www.madisonvaccinesinc.com
MVI-816 (plasmid DNA vaccine)	Madison Vaccines Madison, WI	biochemically recurrent prostate	Phase II www.madisonvaccinesinc.com
		metastatic castration-resistant prostate (combination therapy)	Phase I www.madisonvaccinesinc.com
NEO-PV-01 (personalized neoantigen vaccine)	Bristol-Myers Squibb Princeton, NJ Neon Therapeutics Cambridge, MA	bladder, melanoma, NSCLC (with nivolumab)	Phase I www.neontherapeutics.com
NeuVax® nelipepimut S (peptide cancer vaccine)	Galena Biopharma San Ramon, CA	triple negative HER2-positive breast (combination therapy), HER2-positive ductal carcinoma in situ of breast (combination therapy)	Phase II www.galenabiopharma.com
		gastric	Phase I www.galenabiopharma.com
Oncoquest™-CLL chronic lymphocytic leukemia vaccine	XEME Biopharma Lombard, IL	chronic lymphocytic leukemia	Phase I www.xemebiopharma.com

Vaccines

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
Oncoquest-L® personalized cancer vaccine	XEME Biopharma Lombard, IL	non-Hodgkin lymphoma	Phase I completed www.xemebiopharma.com
OncoVAX® colorectal cancer vaccine	Vaccinogen Baltimore, MD	colorectal (Fast Track)	Phase III www.vaccinogeninc.com
OSE-2101 (neo-epitopes cancer vaccine)	OSE Immunotherapeutics Nantes, France	NSCLC	Phase III www.ose-immuno.com
O-VAX (autologous tumor cell-based vaccine)	AVAX Technologies Philadelphia, PA	ovarian	Phase I/II www.avax-tech.com
ovapuldencel-T	AiVita Biomedical Irvine, CA	ovarian	Phase II www.aivitabiomedical.com
PAN-301-1 (nanoparticle-based cancer vaccine)	Panacea Pharmaceuticals Gaithersburg, MD	prostate	Phase I www.panaceapharma.com
PDS0101 (cancer immunotherapy)	PDS Biotechnology North Brunswick, NJ	HPV-related cancer	Phase I www.pdsbiotech.com
PEPIDH1M (dendritic cell cancer vaccine)	Annias Immunotherapeutics Chapel Hill, NC	glioblastoma	Phase I/II www.anniasimmuno.com
PF-06753512 (cancer immunotherapy)	Pfizer New York, NY	prostate	Phase I www.pfizer.com

Vaccines

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
polyclonal antibody stimulator (fusion peptide) ORPHAN DRUG	Cancer Advances Durham, NC	gastric, pancreatic <hr/> colorectal	Phase III www.canceradvancesinc.com <hr/> Phase II www.canceradvancesinc.com
Prophage™ heat shock protein vaccine ORPHAN DRUG	Agenus Lexington, MA	newly-diagnosed glioblastoma	Phase II www.agenusbio.com
Proscavax PSA/IL-2/GM-CSF vaccine	OncBioMune Pharmaceuticals Baton Rouge, LA	prostate cancer	Phase I www.oncbiomune.com
PROSTVAC rilimogene galvacirepvec- rilimogene glafolivec	Bavarian Nordic Morrisville, NC Bristol-Myers Squibb Princeton, NJ	metastatic castration-resistant prostate cancer (monotherapy) (Fast Track)	Phase III www.bavarian-nordic.com www.bms.com
PSMA VRP (viral vector vaccine)	AlphaVax Durham, NC	prostate	Phase I www.alphavax.com
PT 107 (allogeneic B7.1/HLA-A1 transfected tumor cell vaccine)	Pique Therapeutics Durham, NC	NSCLC	Phase II www.piquetherapeutics.com
PVX-410 (peptide cancer vaccine)	OncoPep North Andover, MA	smoldering multiple myeloma	Phase I www.oncopep.com

Vaccines

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
REIC gene therapy	Momotaro-Gene Okayama, Japan	localized prostate	Phase I www.mt-gene.com
RG6180 (personalized mRNA cancer vaccine)	Genentech South San Francisco, CA	cancer	Phase I www.gene.com
rocapuldencel-T (dendritic cell vaccine)	Argos Therapeutics Durham, NC	renal cell carcinoma (Fast Track)	Phase III www.argostherapeutics.com
seviprotimut-L (polyvalent antigen vaccine)	Polynoma San Diego, CA	melanoma	Phase III www.polynoma.com
SL-701 (alpha-type 1 dendritic cell-based vaccine) ORPHAN DRUG	Stemline Therapeutics New York, NY	glioblastoma (adults)	Phase II www.stemline.com
stapuldencel-T (autologous dendritic cell vaccine)	SOTIO Prague, Czech Republic	prostate	Phase III www.sotio.com
SurVaxM peptide mimic vaccine	MimiVax Rochester, NY	glioblastoma	Phase II www.mimivax.com
		multiple myeloma	Phase I www.mimivax.com

Vaccines

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
tergenpumatucl-L + indoximod + chemotherapy (tumor cell vaccine)	NewLink Genetics Ames, IA	NSCLC (combination therapy)	Phase I/II www.newlinkgenetics.com
TG4010 (MVA-MUC1-IL2 cancer vaccine)	Transgene Paris, France Bristol-Myers Squibb Princeton, NJ	NSCLC (with nivolumab)	Phase II www.transgene.fr
TLPLDC (tumor lysate particle loaded dendritic cell vaccine)	Cancer Insight San Antonio, TX Elios Therapeutics Austin, TX	melanoma	Phase II/III www.cancerinsight.com
		ovarian	Phase I/II www.cancerinsight.com
TPIV 110 (peptide antigen cancer vaccine)	TapImmune Jacksonville, FL	HER2/neu-positive breast	Phase I www.tapimmune.com
TPIV 200 (peptide antigen cancer vaccine) ORPHAN DRUG	TapImmune Jacksonville, FL	platinum-sensitive ovarian (Fast Track), platinum-resistant ovarian (combination therapy), triple negative breast	Phase II www.tapimmune.com
TV-Kidney-1 (personalized cancer cell vaccine and killer T-cell therapy)	TVAX Biomedical Olathe, KS	renal cell	Phase II www.tvaxbiomedical.com

Vaccines

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
TV-Brain-1 (personalized cancer cell vaccine and killer T-cell therapy)	TVAX Biomedical Olathe, KS	glioblastoma	Phase II www.tvaxbiomedical.com
vesigenurtucel-L (HS-410) (cytotoxic T-lymphocyte stimulant vaccine)	Heat Biologics Durham, NC	non-muscle invasive bladder (Fast Track)	Phase II www.heatbiologics.com
VGX-3100 (therapeutic DNA vaccine)	Inovio Pharmaceuticals Plymouth Meeting, PA	cervical intraepithelial neoplasia (high grade HPV-caused pre-cancers)	Phase II www.inovio.com
viagenpumatucl-L (HS-110) (allogeneic vaccine)	Heat Biologics Durham, NC	NSCLC	Phase II www.heatbio.com
Vigil™ genetically-modified autologous tumor cell vaccine	Gradalis Dallas, TX	advanced ovarian	Phase II www.gradalisinc.com
		advanced breast, Ewing's sarcoma, advanced NSCLC, advanced melanoma	Phase I www.gradalisinc.com
WT2725 (peptide cancer vaccine)	Sunovion Pharmaceuticals Marlborough, MA	hematological malignancies, solid tumors	Phase I www.sunovion.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
131-I-MIP-1095 (PSMA-targeting ADC)	Progenics Pharmaceuticals New York, NY	metastatic castration-resistant prostate	Phase I www.progenics.com
177 Lu PSMA-617 targeted radioligand therapy	RadioMedix Houston, TX Excel Diagnostics and Nuclear Oncology Houston, TX University of California-Los Angeles Los Angeles, CA	metastatic castration-resistant prostate cancer	Phase II www.radiomedix.com
8H9 I-124 mAb ORPHAN DRUG	Y-mAbs Therapeutics New York, NY	diffuse intrinsic pontine glioma	Phase I/II www.ymabs.com
8H9 I-131 mAb ORPHAN DRUG	Y-mAbs Therapeutics New York, NY	leptomeningeal tumor from neuroblastoma	Phase II www.ymabs.com
		desmoplastic small round cell tumor	Phase I/II www.ymabs.com
ABBV-181	AbbVie North Chicago, IL	solid tumors	Phase I www.abbvie.com
ABBV-399 (c-met inhibitor)	AbbVie North Chicago, IL	solid tumors	Phase I www.abbvie.com
ABBV-838 (CD319 antigen inhibitor)	AbbVie North Chicago, IL	multiple myeloma	Phase I www.abbvie.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
ABP 215 (bevacizumab biosimilar)	Allergan Parsippany, NJ Amgen Thousand Oaks, CA	NSCLC	application submitted www.allergan.com www.amgen.com
ABP 798 (rituximab biosimilar)	Allergan Parsippany, NJ Amgen Thousand Oaks, CA	non-Hodgkin lymphoma, CLL	Phase III www.allergan.com www.amgen.com
ABP 980 (trastuzumab biosimilar)	Allergan Parsippany, NJ Amgen Thousand Oaks, CA	HER2-positive breast, HER2-positive gastric	Phase III www.allergan.com www.amgen.com
ABT-414 (depatuxizumab mafodotin) ORPHAN DRUG	AbbVie North Chicago, IL	glioblastoma	Phase II www.abbvie.com
		pediatric brain tumors	Phase I www.abbvie.com
Actimab-A (CD33 antigen inhibitor) ORPHAN DRUG	Actinium Pharmaceuticals New York, NY	newly-diagnosed AML in patients over 60 years of age	Phase II www.actiniumpharma.com
Actimab-M (CD33 antigen inhibitor)	Actinium Pharmaceuticals New York, NY	relapsed/refractory multiple myeloma	Phase I www.actiniumpharma.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
Adcetris® brentuximab vedotin ORPHAN DRUG	Seattle Genetics Bothell, WA	cutaneous T-cell lymphoma, Hodgkin lymphoma (1L), CD30-expressing mature T-cell lymphoma (1L)	Phase III www.seattlegenetics.com
		CD30-expressing DLBCL, Hodgkin lymphoma in patients 60 and older, Hodgkin lymphoma (2L), relapsed non-Hodgkin lymphoma	Phase II www.seattlegenetics.com
ADCT-301 (antibody-drug conjugate)	ADC Therapeutics Murray Hill, NJ	AML, lymphoma	Phase I www.adctherapeutics.com
ADCT-402 (antibody-drug conjugate)	ADC Therapeutics Murray Hill, NJ	ALL, B-cell non-Hodgkin lymphoma	Phase I www.adctherapeutics.com
ADCT-502 (antibody-drug conjugate)	ADC Therapeutics Murray Hill, NJ	HER2-expressing solid tumors	Phase I www.adctherapeutics.com
AGS-16C3F (antibody-drug conjugate targeting ENPP3)	Agensys Santa Monica, CA	renal cell	Phase II www.agensys.com
AGS-62P1 (antibody-drug conjugate)	Agensys Santa Monica, CA	AML	Phase I www.agensys.com
AGS-67E (antibody-drug conjugate)	Agensys Santa Monica, CA	AML, lymphoid malignancies	Phase I www.agensys.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
amatuximab (MORAb-009) (IgG1 mAb) ORPHAN DRUG	Eisai Woodcliff Lake, NJ Morphotek Exton, PA	mesothelioma	Phase II www.eisai.com
AMG 224 (antibody-drug conjugate)	Amgen Thousand Oaks, CA	multiple myeloma	Phase I www.amgen.com
AMG 820 (c-fms inhibitor)	Amgen Thousand Oaks, CA	solid tumors	Phase I www.amgen.com
andecaliximab (GS-5745) (MMP9 mAb inhibitor)	Gilead Sciences Foster City, CA	gastric	Phase III www.gilead.com
		solid tumors	Phase I www.gilead.com
anetumab ravtansine (mesothelin-targeted ADC) ORPHAN DRUG	Bayer HealthCare Pharmaceuticals Whippany, NJ	mesothelioma	Phase II www.pharma.bayer.com
		solid tumors	Phase I www.pharma.bayer.com
angiopoietin 2 mAb	Eli Lilly Indianapolis, IN	cancer	Phase I www.lilly.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies | Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
anti-CD73 mAb	Bristol-Myers Squibb Princeton, NJ	cancer	Phase I www.bms.com
anti-MUC1 AR20.5 (chemo-enhanced immunotherapy)	OncoQuest Edmonton, Canada	pancreatic	Phase I/II www.oncoquestinc.com
APX005M (CD40 agonist)	Apexigen San Carlos, CA	malignant melanoma, solid tumors	Phase I/II www.apexigen.com
ARX788 (antibody-drug conjugate)	Ambrx La Jolla, CA	HER2-overexpressing breast	Phase I www.ambrx.com
Arzerra® ofatumumab	Novartis Pharmaceuticals East Hanover, NJ	follicular lymphoma	Phase III www.novartis.com
ASG-15ME (antibody-drug conjugate)	Astellas Northbrook, IL Seattle Genetics Bothell, WA	metastatic urothelial	Phase I www.astellas.com www.seattlegenetics.com
AV-203 (ERBB-3 receptor antagonist)	AVEO Oncology Cambridge, MA	solid tumors	Phase I www.aveooncology.com
Avastin® bevacizumab ORPHAN DRUG	Genentech South San Francisco, CA	newly-diagnosed glioblastoma, relapsed platinum-sensitive ovarian	application submitted www.gene.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
AVID100 (epidermal growth factor modulator)	Formation Biologics Austin, TX	solid tumors	Phase I/II www.formatiobiologics.com
B-701 (type-3-FGF receptor antagonist)	BioClin Therapeutics San Ramon, CA	metastatic bladder (2L)	Phase II www.bioclintherapeutics.com
		urothelial (with atezolizumab)	Phase I www.bioclintherapeutics.com
bavituximab (chimeric mAb)	Peregrine Pharmaceuticals Tustin, CA	previously-treated NSCLC (combination therapy)	Phase III www.peregrineinc.com
		hepatocellular (combination therapy), head and neck (combination therapy), squamous cell	Phase II www.peregrineinc.com
		glioblastoma, rectal	Phase I www.peregrineinc.com
BAY-1129980 (C4.4a antibody-drug conjugate)	Bayer HealthCare Pharmaceuticals Whippany, NJ	solid tumors	Phase I www.pharma.bayer.com
bevacizumab biosimilar	Biocon Bangalore, India Mylan Canonsburg, PA	cancer	Phase I www.biocon.com www.mylan.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
bevacizumab biosimilar	Oncobiologics Cranbury, NJ	colorectal, lung	Phase I www.oncobiologics.com
BHQ880 (DKK1 protein inhibitor)	Novartis Pharmaceuticals East Hanover, NJ	smoldering multiple myeloma	Phase II www.novartis.com
BI-695500 (rituximab biosimilar)	Boehringer Ingelheim Pharmaceuticals Ridgefield, CT	follicular lymphoma	Phase III www.boehringer-ingelheim.com
BI-695502 (bevacizumab biosimilar)	Boehringer Ingelheim Pharmaceuticals Ridgefield, CT	brain metastases	Phase II www.boehringer-ingelheim.com
BI-836826	Boehringer Ingelheim Pharmaceuticals Ridgefield, CT Xencor Monrovia, CA	cancer	Phase I www.boehringer-ingelheim.com www.xencor.com
BI-836858 (CD33 antigen inhibitor) ORPHAN DRUG	Boehringer Ingelheim Pharmaceuticals Ridgefield, CT Xencor Monrovia, CA	AML, myelodysplastic syndromes	Phase I/II www.boehringer-ingelheim.com www.xencor.com
BMS-986012 (anti-fucosyl GM1)	Bristol-Myers Squibb Princeton, NJ	SCLC	Phase II www.bms.com
BMS-986148 (mesothelin ADC)	Bristol-Myers Squibb Princeton, NJ	solid tumors	Phase I www.bms.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
BMS-986207 (anti-TIGIT)	Bristol-Myers Squibb Princeton, NJ	solid tumors	Phase I/II www.bms.com
BMS-986218	Bristol-Myers Squibb Princeton, NJ	solid tumors	Phase I/II www.bms.com
brontictuzumab (anti-notch-1 mAb)	OncoMed Pharmaceuticals Redwood City, CA	colorectal	Phase I www.oncomed.com
cabiralizumab (CSF/M-CSF receptor antagonist)	Bristol-Myers Squibb Princeton, NJ Five Prime Therapeutics South San Francisco, CA	solid tumors	Phase I www.bms.com www.fiveprime.com
CC-90002 (CD47 antigen inhibitor)	Celgene Summit, NJ	AML, myelodysplastic syndromes, solid tumors	Phase I www.celgene.com
CDX-014 (antibody-drug conjugate)	Celldex Therapeutics Hampton, NJ	renal cell	Phase I/II www.celldex.com
CDX-0158 (antibody-drug conjugate)	Celldex Therapeutics Hampton, NJ	gastrointestinal stromal tumors, KIT-positive tumors	Phase I www.celldex.com
CDX-3379 (ERBB-3 receptor antagonist)	Celldex Therapeutics Hampton, NJ	solid tumors	Phase I www.celldex.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
cirmtuzumab (receptor protein-tyrosine kinase antagonist)	Oncternal Therapeutics San Diego, CA	CLL	Phase I www.oncternal.com
CJM112 (IL-17 inhibitor)	Novartis Pharmaceuticals East Hanover, NJ	solid tumors	Phase I www.novartis.com
codrituzumab (RG7686) (glypican 3 inhibitor)	Genentech South San Francisco, CA	metastatic liver	Phase II www.gene.com
coltuximab ravtansine (CD19 antigen inhibitor)	ImmunoGen Waltham, MA	non-Hodgkin lymphoma	Phase II www.immunogen.com
Cotara® derlotuximan biotin (mAb conjugated to 131-iodine) ORPHAN DRUG	Peregrine Pharmaceuticals Tustin, CA	glioblastoma	Phase II www.peregrineinc.com
CT-P6 (trastuzumab biosimilar)	Celltrion Incheon, South Korea Teva Pharmaceuticals North wales, PA	breast	Phase I completed www.tevausa.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
Cyramza® ramucirumab ORPHAN DRUG	Eli Lilly Indianapolis, IN	bladder, gastric, hepatocellular, NSCLC	Phase III www.lilly.com
		advanced or metastatic biliary	Phase II www.lilly.com
		NSCLC (combination therapy)	Phase I www.lilly.com
Darzalex® daratumumab ORPHAN DRUG	Janssen Research & Development Raritan, NJ	multiple myeloma (1L combination therapy)	Phase III www.janssen.com
		DLBCL, follicular lymphoma, mantle-cell lymphoma	Phase II www.janssen.com
denintuzumab mafodotin (anti-CD19 protein)	Seattle Genetics Bothell, WA	DLBCL	Phase II www.seattlegenetics.com
depatuxizumab (EGFR receptor antagonist)	AbbVie North Chicago, IL	solid tumors	Phase I www.abbvie.com
dinutuximab (anti-GD2 mAb)	United Therapeutics Silver Spring, MD	SCLC	Phase II/III www.unither.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
DKN-01 (anti-DKK1 antibody)	Leap Therapeutics Cambridge, MA	cholangiocarcinoma, esophageal	Phase I/II www.leaptx.com
		NSCLC	Phase I www.leaptx.com
DS-8201 (anti-HER2 antibody-drug conjugate)	Daiichi Sankyo Parsippany, NJ	breast (Fast Track), gastric	Phase I www.dsi.com
DS-8273 (anti-DR5 antibody)	Daiichi Sankyo Parsippany, NJ	colorectal	Phase I www.daiichisankyo.com
dusigitumab (MEDI-573) (insulin-like growth factor inhibitor)	MedImmune Gaithersburg, MD	metastatic breast cancer	Phase II www.medimmune.com
emactuzumab (RG7155) (M-CSF receptor antagonist)	Genentech South San Francisco, CA	solid tumors (combination therapy)	Phase I www.gene.com
emibetuzumab (proto oncogene protein c-Met inhibitor)	Eli Lilly Indianapolis, IN	cancer	Phase II www.lilly.com
Empliciti® elotuzumab ORPHAN DRUG	Bristol-Myers Squibb Princeton, NJ	multiple myeloma (1L)	Phase III www.bms.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
enfortumab vedotin (ADC targeting nectin-4)	Agensys Santa Monica, CA Seattle Genetics Bothell, WA	urogenital	Phase II www.agensys.com www.seattlegenetics.com
enoblituzumab (CD276 protein inhibitor)	MacroGenics Rockville, MD	solid tumors	Phase I www.macrogenics.com
ensituximab (neoplasm antigen inhibitor) ORPHAN DRUG	Precision Biologics Great Neck, NY	colorectal, pancreatic	Phase II www.precision-biologics.com
epratuzumab (anti-CD22 mAb) ORPHAN DRUG	Immunomedics Morris Plains, NJ	ALL (pediatric)	Phase III www.immunomedics.com
farletuzumab (MORAb-003) (folate receptor 1 antagonist) ORPHAN DRUG	Eisai Woodcliff Lake, NJ Morphotek Exton, PA	platinum-sensitive ovarian, NSCLC	Phase II www.eisai.com
FF21101 (radio-labelled anti-cadherin-3 mAb)	Fujifilm Pharmaceuticals U.S.A. Cambridge, MA	solid tumors	Phase I www.fujifilmusa.com
FG-3019 (pamrevlumab)	FibroGen San Francisco, CA	pancreatic	Phase II www.fibrogen.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies | Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
ficlatuzumab	AVEO Oncology Cambridge, MA Biodesix Boulder, CO	AML, head and neck	Phase I www.aveooncology.com
FPA144 (FGFR2b receptor antagonist) ORPHAN DRUG	Five Prime Therapeutics South San Francisco, ca	bladder, gastric	Phase I www.fiveprime.com
ganitumab ORPHAN DRUG	NantCell Culver City, CA	Ewing's sarcoma	in clinical trials www.nantworks.com
Gazyva® oblinutuzumab	Genentech South San Francisco, CA	hematological malignancies (multiple combination regimens)	Phase I www.gene.com
glembatumumab vedotin	Celldex Hampton, NJ	triple negative breast (Fast Track), metastatic melanoma	Phase II www.celldex.com
glypican3-ADC	Bristol-Myers Squibb Princeton, NJ	cancer	Phase I www.bms.com
GP2013 (rituximab biosimilar)	Sandoz Princeton, NJ	CLL, DLBCL, follicular lymphoma	Phase III www.sandoz.com
GSK2857916 (beta cell maturation antigen ADC)	GlaxoSmithKline Philadelphia, PA	multiple myeloma	Phase I www.gsk.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
GSK3359609 (induced T-cell costimulatory agonist antibody)	GlaxoSmithKline Philadelphia, PA	solid tumors	Phase I www.gsk.com
HKT288 (cadherin-6 antibody-drug conjugate)	Novartis Pharmaceuticals East Hanover, NJ	solid tumors	Phase I www.novartis.com
Hu3F8 mAb (GD2 ganglioside inhibitor) ORPHAN DRUG	Y-mAbs Therapeutics New York, NY	refractory/relapsed neuroblastoma	Phase II www.ymabs.com
		osteosarcoma (pediatric)	Phase I/II www.ymabs.com
Hu5F9-G4 (CD47 antigen inhibitor)	Forty Seven Menlo Park, CA	colorectal cancer, solid tumors (combination therapy), relapsed/refractory B-cell non-Hodgkin lymphoma	Phase I/II www.fortyseveninc.com
		AML, solid tumors	Phase I www.fortyseveninc.com
HuL2G7 (anti-HGF monoclonal antibody)	Galaxy Biotech Sunnyvale, CA	solid tumors	Phase I completed www.galaxybiotech.com
HuMax-IL8 (IL-8 inhibitor)	Bristol-Myers Squibb Princeton, NJ	solid tumors	Phase I www.bms.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
ICON-1 (immunoconjugate proteins to tissue proteins)	Iconic Therapeutics South San Francisco, CA	uveal melanoma	Phase I www.iconictherapeutics.com
ifabotuzumab (EphA3 receptor antagonist)	KaloBios Pharmaceuticals Brisbane, CA	AML, myelodysplastic syndromes	Phase II www.kalobios.com
IGN523 (CD98 antigen inhibitor)	Igenica Burlingame, CA	AML	Phase I www.igencia.com
IMGN529 (antibody-drug conjugate)	ImmunoGen Waltham, MA	non-Hodgkin lymphoma	Phase II www.immunogen.com
IMGN779 (CD33-targeting DNA-alkylating ADC)	ImmunoGen Waltham, MA	AML	Phase I www.immunogen.com
IMMU-114 (anti-HLA-DR antigen)	Immunomedics Morris Plains, NJ	hematological malignancies	Phase I www.immunomedics.com
indatuximab ravtansine ORPHAN DRUG	Biotest Dreieich, Germany	multiple myeloma	Phase II www.biotest.com
inotuzumab ozogamicin ORPHAN DRUG	Pfizer New York, NY	ALL (Breakthrough Therapy)	application submitted www.pfizer.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
Iomab-B CD45 antigen inhibitor ORPHAN DRUG	Actinium Pharmaceuticals New York, NY	bone marrow transplant in patients with AML (age 55 and over)	Phase III www.actiniumpharma.com
IPH4102 (cytotoxic mAb)	Innate Pharma Marseille, France	cutaneous T-cell lymphoma	Phase I www.innatepharma.com
isatuximab (anti-CD38 naked mAb) ORPHAN DRUG	Sanofi US Bridgewater, NJ	relapsed/refractory multiple myeloma	Phase III www.sanofi.com
JNJ-56022473 (IL-3-receptor-alpha-subunit antagonist)	Janssen Research & Development Raritan, NJ	acute myeloid leukemia	Phase II www.janssen.com
JNJ-61610588 (VISTA inhibitor)	Janssen Research & Development Raritan, NJ	solid tumors	Phase I www.janssen.com
JNJ-64457107 (CD40 antigen stimulant)	Janssen Research & Development Raritan, NJ	solid tumors	Phase I www.janssen.com
Kadcyla® trastuzumab emtansine	Genentech South San Francisco, CA	early HER2-positive breast (with pertuzumab), HER2-positive breast (3L), HER2-positive breast (adjuvant)	Phase III www.gene.com
		HER2-positive metastatic breast (2L) (with atezolizumab)	Phase II www.gene.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
labetuzumab govitecan (anti-CEACAM5-SN-38)	Immunomedics Morris Plains, NJ	colorectal	Phase II www.immunomedics.com
Lartruvo™ olaratumab	Eli Lilly Indianapolis, IN	cancer (pediatric)	Phase I www.lilly.com
L-DOS47 (immunoconjugate)	Helix Biopharma Toronto, Canada	NSCLC	Phase I www.helixbiopharma.com
lenzilumab (GM-CSF antagonist)	KaloBios Pharmaceuticals Brisbane, CA	chronic myelomonocytic leukemia	Phase I/II www.kalobios.com
lilotomab satetraxetan (lutetium-17 conjugates to a mAb) ORPHAN DRUG	Nordic Nanovector Oslo, Norway	DLBCL	Phase I www.nordicnanovector.com
LY3022855 (CSF-1R mAb)	Eli Lilly Indianapolis, IN	cancer	Phase I www.lilly.com
LY3076226 (FGFR3 antibody-drug conjugate)	Eli Lilly Indianapolis, IN	cancer	Phase I www.lilly.com
margetuximab (anti-HER2 antibody)	MacroGenics Rockville, MD	breast	Phase III www.macrogenics.com
		gastric	Phase II www.macrogenics.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
MCS110 (IgG1 kappa mAb)	Novartis Pharmaceuticals East Hanover, NJ	triple negative breast (combination therapy)	Phase I www.novartis.com
MEDI3726 (ADCT-401) (PSMA antibody-drug conjugate)	ADC Therapeutics Murray Hill, NJ MedImmune Gaithersburg, MD	prostate	Phase I www.adctherapeutics.com www.medimmune.com
MEDI4276 (HER2 antibody-drug conjugate)	MedImmune Gaithersburg, MD	solid tumors	Phase I www.medimmune.com
MEDI9447 (anti-CD37 mAb)	MedImmune Gaithersburg, MD	solid tumors	Phase I www.medimmune.com
mirvetuximab soravtansine (antibody-drug conjugate) ORPHAN DRUG	ImmunoGen Waltham, MA	platinum-resistant ovarian	Phase III www.immunogen.com
MM-151 (EGFR antagonist)	Merrimack Pharmaceuticals Cambridge, MA	solid tumors	Phase I www.merrimack.com
mogamulizumab (CCR4 receptor antagonist) ORPHAN DRUG	Kyowa Kirin Bedminster, NJ	cutaneous T-cell lymphoma	Phase III www.kyowa-kirin.com
		adult T-cell leukemia / lymphoma, solid tumors	Phase I/II www.kyowa-kirin.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
monalizumab (NK cell lectin-like receptor subfamily C antagonist)	Innate Pharma Marseille, France	CLL, head and neck (combination therapy)	Phase I/II www.innatepharma.com
	Innate Pharma Marseille, France MedImmune Gaithersburg, MD	solid tumors (with durvalumab)	Phase I www.innatepharma.com www.medimmune.com
MOR208 (CD19 antigen inhibitor) ORPHAN DRUG	MorphoSys Planegg, Germany	chronic lymphocytic leukemia, diffuse large B-cell lymphoma (Fast Track)	Phase II www.morphosys.com
MORAb-066 (IgG mAb)	Eisai Woodcliff Lake, NJ Morphotek Exton, PA	solid tumors	Phase I www.eisai.com www.morphotek.com
moxetumomab pasudotox (CD22/recombinant immunotoxin) ORPHAN DRUG	MedImmune Gaithersburg, MD	hairy cell leukemia	Phase III www.medimmune.com
MT-3724 (modified toxins fused to single-chain antibody variable fragments)	Molecular Templates San Diego, CA	B-cell malignancies	Phase I www.moleculartemplates.com
MVT-1075 (radioimmunotherapy)	MabVax Therapeutics San Diego, CA	pancreatic	Phase I www.mabvax.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
MVT-5873 (GD2 ganglioside modulator)	MabVax Therapeutics San Diego, CA	colorectal, pancreatic	Phase I www.mabvax.com
Mylotarg® gemtuzumab ozogamicin	Pfizer New York, NY	acute myeloid leukemia (1L)	application submitted www.pfizer.com
necitumumab (EGFR inhibitor)	Eli Lilly Indianapolis, IN	NSCLC (combination therapy)	Phase I www.lilly.com
NIS793 (anti-TGF-beta mAb)	Novartis Pharmaceuticals East Hanover, NJ	solid tumors	Phase I/II www.novartis.com
OMP-313M32 (anti-TIGHT antibody)	OncoMed Pharmaceuticals Redwood City, CA	solid tumors	Phase I www.oncomed.com
ontuxizumab (MORAb-004) (CD248 antigen inhibitor)	Eisai Woodcliff Lake, NJ Morphotek Exton, PA	melanoma	Phase II www.eisai.com
oportuzumab monatox (mAb conjugated to cytotoxic agent) ORPHAN DRUG	Eleven Biotherapeutics Cambridge, MA	bladder	Phase III www.elevenbio.com
		head and neck (Fast Track)	Phase II www.elevenbio.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
oregovomab (anti-idiotypic mAb) ORPHAN DRUG	OncoQuest Edmonton, Canada	ovarian	Phase II www.oncoquestinc.com
otlertuzumab (CD37 protein inhibitor) ORPHAN DRUG	Aptevo Therapeutics Seattle, WA	CLL	Phase II www.aptevotherapeutics.com
PCA062 (antibody-drug conjugate)	Novartis Pharmaceuticals East Hanover, NJ	p-CAD positive solid tumors	Phase I www.novartis.com
Perjeta® pertuzumab	Genentech South San Francisco, CA	early HER2-positive breast, early breast (adjuvant), advanced HER2-positive gastric	Phase III www.gene.com
PF-05082566 (4-1BB agonist antibody)	Pfizer New York, NY	solid tumors	Phase I www.pfizer.com
		solid tumors (combination therapy)	Phase I www.pfizer.com
PF-05280014 (trastuzumab biosimilar)	Pfizer New York, NY	metastatic breast cancer	Phase III www.pfizer.com
PF-05280586 (rituximab biosimilar)	Pfizer New York, NY	follicular lymphoma	Phase III www.pfizer.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
PF-06439535 (bevacizumab biosimilar)	Pfizer New York, NY	NSCLC	Phase III www.pfizer.com
PF-06647020 (PTK7 protein inhibitor)	Pfizer New York, NY Stemcentrx South San Francisco, CA	solid tumors	Phase I www.pfizer.com
PF-06647263 (ephrin A4 antibody-drug conjugate)	Pfizer New York, NY	solid tumors	Phase I www.pfizer.com
PF-06688992 (GD3 antibody-drug conjugate)	Pfizer New York, NY	multiple myeloma	Phase I www.pfizer.com
PF-06747143 (CXCR4 receptor antagonist)	Pfizer New York, NY	AML	Phase I www.pfizer.com
pidilizumab (MDV9300)	Medivation New York, NY	DLBCL	Phase II www.medivation.com
polatuzumab vedotin (anti-CD79b antibody)	Genentech South San Francisco, CA	hematological malignancies	Phase II www.gene.com
pritumumab (natural human IgG1κ antibody) ORPHAN DRUG	Nascent Biotech Vero Beach, FL	glioma	Phase II www.nascentbiotech.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
Resimmune® anti-CD3 immunotoxin	Angimmune Rockville, MD	cutaneous T-cell lymphoma, malignant melanoma	Phase I/II www.angimmune.com
RG6058 (anti-TIGIT mAb)	Genentech South San Francisco, CA	solid tumors	Phase I www.gene.com
RG7876 (CD40 antigen stimulant)	Genentech South San Francisco, CA	solid tumors (with atezolizumab), solid tumors (with vanucizumab)	Phase I www.gene.com
RG7882 (anti-MUC16 antibody-drug conjugate)	Genentech South San Francisco, CA	ovarian, pancreatic	Phase I www.gene.com
RG7986 (antibody-drug conjugate)	Genentech South San Francisco, CA	non-Hodgkin lymphoma	Phase I www.gene.com
Rituxan® rituximab	Genentech South San Francisco, CA	CLL (subcutaneous formulation)	application submitted www.gene.com
		relapsed/refractory CLL (with venetoclax)	Phase III www.gene.com
		relapsed/refractory follicular lymphoma (with venetoclax)	Phase II www.gene.com
RM-1929 (antibody-drug conjugate)	Aspyrian Therapeutics San Diego, CA	head and neck	Phase I www.aspyriantherapeutics.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
rosmantuzumab (RSPO3 protein inhibitor)	OncoMed Pharmaceuticals Redwood City, CA	colorectal	Phase I www.oncomed.com
Rova-T (rovalpituzumab tesirine) ORPHAN DRUG	AbbVie North Chicago, IL Stemcentrx South San Francisco, CA	SCLC	Phase II www.abbvie.com
		neuroendocrine tumors	Phase I www.abbvie.com
sacituzumab govitecan (IMMU-132) (antibody-drug conjugate)	Immunomedics Morris Plains, NJ	metastatic triple negative breast (Fast Track & Breakthrough Therapy), solid tumors	Phase II www.immunomedics.com
samalizumab (CD200 antigen inhibitor)	Alexion Pharmaceuticals New Haven, CT	AML	Phase II www.alexion.com
		solid tumors	Phase I www.alexion.com
SAR408701 (maytansin-loaded anti-CEACAM5 mAb)	Sanofi US Bridgewater, NJ	solid tumors	Phase I www.sanofi.com
SAR428926 (mattansin-loaded anti-Lamp1 mAb)	Sanofi US Bridgewater, NJ	solid tumors	Phase I www.sanofi.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
SAR566658 (maytansin-loaded anti-CA6 mAb)	Sanofi US Bridgewater, NJ	solid tumors	Phase I www.sanofi.com
SC-002 (antibody-drug conjugate)	AbbVie North Chicago, IL Stemcentrx South San Francisco, CA	solid tumors	Phase I www.abbvie.com
SC-003 (antibody-drug conjugate)	AbbVie North Chicago, IL Stemcentrx South San Francisco, CA	solid tumors	Phase I www.abbvie.com
SC-006 (antibody-drug conjugate)	AbbVie North Chicago, IL Stemcentrx South San Francisco, CA	solid tumors	Phase I www.abbvie.com
SEA-CD40 (antibody-drug conjugate)	Seattle Genetics Bothell, WA	metastatic or unresectable solid tumors, hematologic malignancies	Phase I www.seattlegenetics.com
seribantumab (ERBB-3 receptor antagonist)	Merrimack Pharmaceuticals Cambridge, MA	colorectal, head and neck, NSCLC (combination therapy) (Fast Track)	Phase II www.merrimack.com
SGN-2FF (antibody-drug conjugate)	Seattle Genetics Bothell, WA	solid tumors	Phase I www.seattlegenetics.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

Drug Name Organization Indication Development Phase

SGN-CD19B (antibody-drug conjugate)	Seattle Genetics Bothell, WA	non-Hodgkin lymphoma	Phase I www.seattlegenetics.com
SGN-CD123A (antibody-drug conjugate)	Seattle Genetics Bothell, WA	AML	Phase I www.seattlegenetics.com
SGN-CD352A (antibody-drug conjugate)	Seattle Genetics Bothell, WA	multiple myeloma	Phase I www.seattlegenetics.com
SGN-LIV1A (antibody-drug conjugate)	Seattle Genetics Bothell, WA	metastatic breast	Phase I www.seattlegenetics.com
SNDX-6352 (anti-CSF-1R)	Syndax Pharmaceuticals Waltham, MA	solid tumors	Phase I www.syndax.com
STI-001 (cetuximab biobetter)	Sorrento Therapeutics San Diego, CA	colorectal	Phase III www.sorrentotherapeutics.com
Sylvant® siltuximab (interleukin-6 inhibitor)	Janssen Research & Development Raritan, NJ	smoldering multiple myeloma	Phase II www.janssen.com
Sym004 (futuximab/modotuximab)	Symphogen Somerville, NJ	colorectal, glioblastoma	Phase II www.symphogen.com
		squamous NSCLC (combination therapy) colorectal (combination therapy)	Phase I www.symphogen.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

<u>Drug Name</u>	<u>Organization</u>	<u>Indication</u>	<u>Development Phase</u>
Sym013 (EGFR/ERBB-2/ERBB-3 receptor antagonist)	Symphogen Somerville, NJ	cancer	Phase I/II www.symphogen.com
Sym015 (epidermal growth factor receptor antagonist)	Symphogen Somerville, NJ	solid tumors	Phase I/II www.symphogen.com
SYN004 (EGFR inhibitor)	Synermore Biologics Taipei, Taiwan	solid tumors	Phase I www.synermore.com
TAK-202 (plozalizumab) (CCR2 receptor antagonist)	Takeda Oncology Cambridge, MA	solid tumors, melanoma (with checkpoint inhibitor)	Phase I www.takeda.com
tarextumab (anti-notch-2/3 Mab) ORPHAN DRUG	OncoMed Pharmaceuticals Redwood City, CA	pancreatic, SCLC	Phase II www.oncomed.com
TB-403 (placenta growth factor inhibitor)	BioInvent International Lund, Sweden Oncurios Leuven, Belgium Neuroblastoma and Medulloblastoma Translational Research Consortium Grand Rapids, MI	relapsed/refractory medulloblastoma	Phase II www.bioinvent.se www.oncurious.com
tisotumab vedotin (HuMax-TF antibody-drug conjugate)	Genmab Princeton, NJ	solid tumors	Phase I/II www.genmab.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies | Monoclonal Antibodies

Drug Name Organization Indication Development Phase

trastuzumab biosimilar (ERBB-2 receptor antagonist)	Biocon Bangalore, India Mylan Canonsburg, PA	metastatic HER2-positive breast	application submitted www.biocon.com www.mylan.com
TRC105 (ENG protein inhibitor) ORPHAN DRUG	TRACON Pharmaceuticals San Diego, CA	hemangiosarcoma	Phase III www.traconpharma.com
		hepatocellular, renal cell (Fast Track), gestational trophoblastic neoplasia	Phase II www.traconpharma.com
		breast, lung	Phase I www.traconpharma.com
ublituximab (TG-1101) (CD20 antigen inhibitor) ORPHAN DRUG	TG Therapeutics New York, NY	high-risk CLL (combination therapy), DLBCL (combination therapy)	Phase III www.tgtherapeutics.com
ulocuplumab (CXCR4 receptor antagonist)	Bristol-Myers Squibb Princeton, NJ	AML	Phase I www.bms.com
urelumab (CD137 antigen agonist)	Bristol-Myers Squibb Princeton, NJ	advanced solid tumors, advanced B-cell non-Hodgkin lymphoma	Phase II www.bms.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies I Monoclonal Antibodies

Drug Name Organization Indication Development Phase

vadastuximab talirine (CD33 antigen inhibitor/cytoadhesin receptor antagonist/DNA cross linking agent) ORPHAN DRUG	Seattle Genetics Bothell, WA	AML (elderly)	Phase III www.seattlegenetics.com
		myelodysplastic syndromes	Phase II www.seattlegenetics.com
		AML (1L)	Phase I www.seattlegenetics.com
varlilumab (CD27 antigen inhibitor)	Celldex Therapeutics Hampton, NJ	glioblastoma, colorectal, head and neck	Phase II www.celldex.com
veltuzumab (CD20 antigen inhibitor)	Immunomedics Morris Plains, NJ	non-Hodgkin lymphoma	Phase II www.immunomedics.com
VX15 (CD10 antigen inhibitor)	Vaccinex Rochester, NY	NSCLC	Phase I www.vaccinex.com
xentuzumab (BI-836845) (somatomedin inhibitor)	Boehringer Ingelheim Pharmaceuticals Ridgefield, CT	prostate	Phase I/II www.boehringer-ingelheim.com
Xgeva® denosumab	Amgen Thousand Oaks, CA	delay or prevention of bone metastases in patients with adjuvant breast	Phase III www.amgen.com

Antibody-Drug Conjugates & Tumor Antigen Specific Antibodies | Monoclonal Antibodies

Drug Name Organization Indication Development Phase

Xilonix™ anti-IL-1-alpha mAb	XBiotech Austin, TX	colorectal cancer (Fast Track)	Phase III www.xbiotech.com
		NSCLC	Phase II www.xbiotech.com
XMT-1522 (anti-HER2 antibody)	Mersana Therapeutics Cambridge, MA	breast	Phase I www.mersana.com

The content of this report has been obtained through public, government and industry sources, and the Springer "Adis Insight" database based on the latest information. **Report current as of May 26, 2017.** The medicines in this listing include medicines being developed by U.S.-based companies conducting trials in the United States and abroad, PhRMA-member companies conducting trials in the United States and abroad, and foreign companies conducting clinical trials in the United States. Some products may not be in active clinical trials. The information may not be comprehensive. For more, specific information about a particular product, contact the individual company directly or go to www.clinicaltrials.gov. The entire series of *Medicines in Development* is available on PhRMA's website, www.phrma.org.

Definitions

Application Submitted—An application for marketing has been submitted by the company to the U.S. Food and Drug Administration (FDA).

Breakthrough Therapy—Upon request by a sponsor, the FDA can grant this designation to expedite the development and review of a drug or biologic intended, alone or in combination with one or more other drugs, to treat a serious or life threatening disease or condition and preliminary clinical evidence indicates that it may demonstrate substantial improvement over existing therapies on one or more clinically-significant endpoints, such as substantial treatment effects observed early in clinical development. If a drug or biologic is designated as a Breakthrough Therapy, the FDA will expedite the development and review. With this designation, all Fast Track features convey to the medicine.

Fast Track—Upon request by a sponsor, the FDA can grant this designation to facilitate the development and expedite the review of a drug or biologic to treat a serious condition and fill an unmet medical need. When considering a biopharmaceutical company's request for Fast Track designation for an investigational drug or biologic, the FDA evaluates whether it will affect factors such as survival, day-to-day functioning, or the likelihood that the disease, if left untreated, will progress from a less severe condition to a more serious one, and whether a condition can be adequately addressed by available therapy. With Fast Track designation, early and frequent communication between the FDA and the biopharmaceutical company is encouraged throughout the entire drug development and review process to help to quickly resolve any questions or issues that arise, potentially leading to an earlier approval and access by patients.

Orphan Designation—Upon request by a sponsor, the FDA can grant special status (“orphan status”) to a drug or biologic to treat a rare disease or condition. In order to receive an orphan designation, a qualifying drug or biologic must be intended for the treatment, diagnosis, or prevention of a rare disease or condition that affects usually fewer than 200,000 people in the United States.

Phase I—Researchers test the investigational drug or biologic in a small group of people, usually between 20 and 100 healthy adult volunteers, to evaluate its initial safety and tolerability profile, determine a safe dosage range, and identify potential side effects.

Phase II—The investigational drug or biologic is given to volunteer patients, usually between 100 and 500, to determine whether it is effective, identify an optimal dose, and to further evaluate its short-term safety.

Phase III—The investigational drug or biologic is given to a larger, more diverse patient population, often involving between 1,000 and 5,000 patients (but sometimes many more), to generate statistically significant evidence to confirm its safety and effectiveness. Phase III studies are the longest studies and usually take place in multiple sites around the world.