Better Health, Brighter Future

FY2018
PIPELINE SUPPLEMENTAL

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Pipeline

1. Clinical Development Activities

- The following table lists the pipeline assets that we are developing as of May 14, 2019. The assets in our pipeline are in various stages of development, and the contents of the pipeline may change as compounds currently under development drop out and new compounds are introduced. Whether the compounds listed below are ever successfully released as products depends on various factors, including the results of pre-clinical and clinical trials, market conditions for various drugs and regulatory approvals.
- This table primarily shows the indications for which we will actively pursue approval. We are also conducting additional studies of certain assets to examine their potential for use in further indications and in additional formulations.
- The listings in this table are limited to the U.S., EU and Japan and China, but we are also actively conducting development activities in other regions, including in Emerging Markets. Country/region in the "Stage" column denote where a clinical study is ongoing or a filing has been made with our specific intention to pursue approval in any of the U.S., EU, Japan or China. 'Global' refers to U.S., EU, Japan and China.
- Brand name and country/region indicate the brand name and country in which the specific asset has already been approved for any indication in any of the U.S., EU, Japan or China and Takeda has commercialization rights for such asset.
- Stage-ups are recognized in the table upon achievement of First Subject In.

■ Oncology Pipeline

Development code <generic name> Brand name (country/region)	Drug Class (administration route)	Indications / additional formulations	Stage	
SGN-35*[1] <brentuximab vedotin> *ADCETRIS* (EU, Japan)	CD30 monoclonal antibody-drug conjugate (injection)	Front line Peripheral T-cell Lymphoma	EU Japan	P-III Filed (March 2019)
		Relapsed/refractory Hodgkin Lymphoma	China	Filed (March 2019)
		Relapsed/refractory systemic Anaplastic large-cell lymphoma	China	Filed (March 2019)
<brigatinib> *ALUNBRIG* (U.S., EU)	ALK inhibitor (oral)	1L ALK-positive Non-Small Cell Lung Cancer	U.S. EU China	P-III P-III P-I
		2L ALK-positive Non-Small Cell Lung Cancer in patients previously treated with ALK inhibitors	Japan China	P-II(a) P-II(a)
		2L ALK-positive Non-Small Cell Lung Cancer in patients progressed on 2nd generation TKI	Global	P-II
		2L ALK-positive Non-Small Cell Lung Cancer (head-to-head with alectinib)	Global	P-III
MLN9708 <ixazomib> *NINLARO* (Global)	Proteasome inhibitor (oral)	Newly diagnosed Multiple Myeloma	Global	P-III
		Maintenance therapy in patients with newly diagnosed Multiple Myeloma following autologous stem cell transplant	Japan U.S. EU China	Filed (April 2019) P-III P-III P-III
		Maintenance therapy in patients with newly diagnosed Multiple Myeloma not treated with stem cell transplant	Global	P-III
		Relapsed/refractory primary amyloidosis	Global	P-III
		Relapsed/refractory Multiple Myeloma (doublet regimen with dexamethasone)	U.S. EU Japan	P-III P-III P-III
		Relapsed/refractory Multiple Myeloma (triplet regimen with daratumumab and dexamethasone)	Global	P-II
<ponatinib> *ICLUSIG* (U.S.)	BCR-ABL inhibitor (oral)	Front line Philadelphia chromosome-positive Acute Lymphoblastic Leukemia	U.S.	P-III
		Dose ranging study for TKI resistant patients with chronic-phase Chronic Myeloid Leukemia	U.S.	P-II(b)
TAK-924 <pevonedistat>	NEDD 8 activating enzyme inhibitor (injection)	High-risk Myelodysplastic Syndromes, Chronic Myelomonocytic Leukemia, Low-blast Acute Myelogenous Leukemia	U.S. EU Japan	P-III P-III P-III
TAK-385 <relugolix>	LH-RH antagonist (oral)	Prostate cancer	Japan China	P-III P-I
<cabozantinib>*[2]	Multi-targeted kinase inhibitor (oral)	1L Renal cell carcinoma in combination with nivolumab	Japan	P-III
		2L Renal cell carcinoma	Japan	Filed (April 2019)
		2L Hepatocellular carcinoma	Japan	P-II(a)
<niraparib>*[3]	PARP1/2 inhibitor (oral)	Ovarian cancer – maintenance	Japan	P-II
		Ovarian cancer – salvage	Japan	P-II
TAK-228 <sapanisertib>	mTORC1/2 inhibitor (oral)	Endometrial cancer	U.S.	P-II(b)

TAK-659	SYK/FLT3 kinase inhibitor (oral)	Diffuse Large B-cell Lymphoma	-	P-II(a)
		Hematologic malignancies	-	P-I
TAK-931	CDC7 inhibitor (oral)	Squamous esophageal cancer, Squamous Non-Small Cell Lung Cancer		P-II(a)
TAK-079	Anti-CD38 monoclonal antibody (injection)	Relapsed/refractory Multiple Myeloma	-	P-I
		Systemic lupus erythematosus	-	P-I
TAK-164	Anti-guanylyl cyclase C antibody drug conjugate (injection)	GI malignancies	-	P-I
TAK-573*[4]	CD38-targeted IgG4 genetically fused with an attenuated IFNα (injection)	Relapsed/refractory Multiple Myeloma	-	P-I
TAK-788	EGFR/HER2 exon 20 inhibitor (oral)	Non-Small Cell Lung Cancer with Exon-20 insertion	Global	P-II
TAK-981	SUMO inhibitor (injection)	Multiple cancers	-	P-I
TAK-252 / SL-279252*[5]	PD-1-Fc-OX40L (injection)	Solid tumors		P-I

*1 Partnership with Seattle Genetics, Inc.
*2 Partnership with Exelixis, Inc.
*3 Partnership with GlaxoSmithKline
*4 Partnership with Teva Pharmaceutical Industries Ltd.
*5 Partnership with Shattuck Labs, Inc.

Additions since FY2018 Q3: brigatinib - 2L ALK-positive Non-Small Cell Lung Cancer in patients progressed on 2nd generation TKI (Global P-III)
brigatinib - 2L ALK-positive Non-Small Cell Lung Cancer in patients progressed on crizotinib (patients randomized to brigatinib or alectinib) (Global P-III)
TAK-252 - Solid tumors (P-I)

Removals since FY2018 Q3: brentuximab vedotin - Front line Hodgkin Lymphoma (EU, Approved February 2019)
TAK-931 - Metastatic colorectal cancer (P-IIa) discontinued

■ GI Pipeline

Development code <generic name> Brand name (country/region)	**Drug Class (administration route)**	**Indications / additional formulations**	**Stage**	
MLN0002 <vedolizumab> *ENTYVIO* (U.S., EU, Japan)	Humanized monoclonal antibody against α4β7 integrin (injection)	Crohn's disease	Japan China	Filed (July 2018) P-III
		Ulcerative colitis	China	P-III
		Subcutaneous formulation for ulcerative colitis	U.S. EU Japan	Filed (March 2019) Filed (March 2019) P-III
		Subcutaneous formulation for Crohn's disease	U.S. EU Japan	P-III Filed (March 2019) P-III
		Adalimumab head-to-head in patients with ulcerative colitis	Global	Trial readout (Mar 2019)
		Graft-versus-Host Disease prophylaxis in patients undergoing allogeneic hematopoietic stem cell transplantation	EU	P-III
TAK-438 <vonoprazan> *TAKECAB* (Japan)	Potassium-competitive acid blocker (oral)	Acid-related diseases	China	Filed (February 2018)
		Gastro-esophageal reflux disease in patients who have a partial response following treatment with a proton pump inhibitor	EU	P-II(b)
TAK-633/SHP633 <teduglutide> *GATTEX* (U.S.) *REVESTIVE* (EU)	GLP-2 analogue (injection)	Short bowel syndrome (pediatric indication)	U.S. Japan	Filed (September 2018) P-III
		Short bowel syndrome (in adults)	Japan	P-III
Cx601 <darvadstrocel> *ALOFISEL* (EU)	A suspension of allogeneic expanded adipose-derived stem cells (injection)	Refractory complex perianal fistulas in patients with Crohn's disease	U.S. Japan	P-III P-III
TAK-721/SHP621*[1] <budesonide>	Glucocorticosteroid (oral)	Eosinophilic esophagitis	U.S.	P-III
TAK-906	Dopamine D2/D3 receptor antagonist (oral)	Gastroparesis	-	P-II(b)
TAK-954*[2]	5-HT_4 - hydroxytryptamine receptor agonist (injection)	Post-operative gastrointestinal dysfunction	-	P-II(b)

TIMP-GLIA*[3]	Tolerizing Immune Modifying nanoParticle (TIMP) (injection)	Celiac disease	-	P-II(a)
TAK-951	Peptide agonist	Nausea and vomiting	-	P-I
TAK-671	Protease inhibitor (injection)	Acute pancreatitis	-	P-I
TAK-018/EB8018*[4]	FimH antagonist (oral)	Crohn's disease	-	P-I
TAK-681	GLP-2 long-acting analogue (injection)	Short bowel syndrome		P-I
Kuma062*[5]	Glutenase (oral)	Celiac disease	-	P-I

*1 Partnership with UCSD and Fortis Advisors
*2 Partnership with Theravance Biopharma, Inc.
*3 Partnership with Cour Pharmaceutical Development Company
*4 Partnership with Enterome Bioscience SA
*5 Partnership with PvP Biologics, Inc. PvP leads Phase 1 development.

Additions since FY2018 Q3: TAK-681 – short bowel syndrome (P-I)
TAK-951 – nausea and vomiting (P-I)
TAK-954 - post-operative gastrointestinal dysfunction (P-IIb)

Removals since FY2018 Q3: prucalopride - Chronic idiopathic constipation (U.S., Approved December 2018)

■ Rare Diseases Pipeline

Development code <generic name> Brand name (country/region)	**Drug Class (administration route)**	**Indications / additional formulations**	**Stage**	
TAK-743/SHP643 <lanadelumab> *TAKHZYRO* (U.S., EU)	Plasma kallikrein inhibitor (injection)	Hereditary angioedema	China	Filed (December 2018)
TAK-672/SHP672*[1] *OBIZUR* (U.S., EU)	Antihemophilic factor [recombinant], porcine sequence (injection)	Congenital hemophilia A with inhibitors	U.S. EU	P-III P-III
TAK-577/SHP677 *VONVENDI* (U.S.), *VEYVONDI* (EU)	von Willebrand factor [recombinant] (injection)	Prophylactic treatment of von Willebrand disease	Global	P-III
		Pediatric on-demand treatment of von Willebrand disease	Global	P-III
TAK-660/SHP660 *ADYNOVATE* (U.S.), *ADYNOVI* (EU)	Antihemophilic factor [recombinant], PEGylated (injection)	Pediatric Hemophilia A	EU	P-III
TAK-755/SHP655*[2]	Replacement of the deficient-ADAMTS13 enzyme (injection)	Congenital Thrombotic Thrombocytopenic Purpura	U.S. EU	P-III P-III
TAK-620/SHP620*[3] <maribavir>	Benzimidazole riboside inhibitor (oral)	Cytomegalovirus infection in transplant patients	U.S. EU	P-III P-III
TAK-607/SHP607	Insulin-like Growth Factor / IGF Binding Protein (injection)	Chronic lung disease	-	P-II
TAK-609/SHP609	Recombinant human iduronate-2-sulfatase for intrathecal administration (injection)	Hunter syndrome CNS	U.S. EU	P-II P-II
TAK-611/SHP611	Recombinant human arylsulfatase A (injection)	Metachromatic leukodystrophy	-	P-I/II
TAK-754/SHP654*[4]	Gene therapy to restore endogenous FVIII expression	Hemophilia A	-	P-I/II
TAK-531/SHP631*[5]	Fusion protein of iduronate-2-sulfatase+antibody (injection)	Hunter syndrome CNS	-	P-I
TAK-834/SHP634 *NATPARA* (U.S.), *NATPAR* (EU)	Parathyroid hormone (injection)	Hypoparathyroidism	Japan	P-I

*1 Partnership with Ipsen
*2 Partnership with KM Biologics
*3 Partnership with GlaxoSmithKline
*4Partnerships with ArmaGen
*5 Partnership with Asklepios Biopharmaceuticals

■ Neuroscience Pipeline

Development code <generic name> Brand name (country/region)	Drug Class (administration route)	Indications / additional formulations	Stage	
Lu AA21004[*1] **<vortioxetine>** *TRINTELLIX* (U.S.)	Multimodal anti-depressant (oral)	Major depressive disorder	Japan	Filed (September 2018)
TAK-815/SHP615 <midazolam> *BUCCOLAM* (EU)	GABA Allosteric Modulator (oral)	Status epilepticus (seizures)	Japan	P-III
TAK-831	D-amino acid oxidase (DAAO) inhibitor (oral)	Negative symptoms and/or cognitive impairment associated with schizophrenia	-	P-II(a)
TAK-935[*2]	CH24H inhibitor (oral)	Rare pediatric epilepsies	-	P-II(a)
WVE-120101[*3]	mHTT SNP1 antisense oligonucleotide (injection)	Huntington's disease	-	P-I/II
WVE-120102[*3]	mHTT SNP2 antisense oligonucleotide (injection)	Huntington's disease	-	P-I/II
TAK-041	GPR139 agonist (oral)	Negative symptoms and/or cognitive impairment associated with schizophrenia	-	P-I
MEDI1341[*4]	Alpha-synuclein antibody (injection)	Parkinson's disease	-	P-I
TAK-418	LSD1 inhibitor (oral)	Kabuki syndrome	-	P-I
TAK-653	AMPA receptor potentiator (oral)	Treatment resistant depression	-	P-I
TAK-925	Orexin 2R agonist	Narcolepsy	-	P-I

*1 Partnership withH. Lundbeck A/S
*2 Co-development with Ovid Therapeutics Inc.
*3 50:50 co-development and co-commercialization option with Wave Life Sciences Ltd.
*4 Partnership with AstraZeneca. AstraZeneca leads Phase 1 development
Removals since FY2018 Q3: Lisdexamfetamine dimesylate - Attention-Deficit/Hyperactivity Disorder (Japan), approved March 2019
TAK-831 – Friedreich's ataxia (P-IIa) discontinued
TAK-680 – neurological conditions (P-I) discontinued

■ Plasma-Derived Therapies Pipeline

Development code <generic name> Brand name (country/region)	Drug Class (administration route)	Indications / additional formulations	Stage	
TAK-616/SHP616 *CINRYZE* (U.S., EU)	C1 esterase inhibitor [human] (injection)	Hereditary angioedema	Japan	P-III
TAK-771/SHP671[*1] **<IG Infusion 10% (Human) w/ Recombinant Human Hyaluronidase>** *HYQVIA* (U.S., EU)	Immunoglobulin (IgG) + recombinant hyaluronidase replacement therapy (injection)	Pediatric indication for primary immunodeficiency	U.S.	P-III
		Chronic inflammatory demyelinating polyradiculoneuropathy	U.S. EU	P-III P-III

*1 Partnership with Halozyme
Removals since FY2018 Q3: TAK-616/SHP616 Acute Antibody Mediated Rejection (P-III), discontinued
TAK-616/SHP616 Hereditary angioedema subcutaneous administration (P-III), discontinued

■ Vaccines Pipeline

Development code Brand name (country/region)	Type of vaccine (administration route)	Indications / additional formulations	Stage	
TAK-003	Tetravalent dengue vaccine (injection)	Prevention of dengue fever caused by dengue virus	-	P-III
TAK-214	Norovirus vaccine (injection)	Prevention of acute gastroenteritis (AGE) caused by norovirus	-	P-II(b)
TAK-021	EV71 vaccine (injection)	Prevention of hand, foot and mouth disease caused by enterovirus 71	-	P-I
TAK-426[*1]	Zika vaccine (injection)	Prevention of zika virus infection	-	P-I

*1 Partnership with The Biomedical Advanced Research and Development Authority (BARDA) - U.S. Government
Removals since FY2018 Q3: TAK-195 Sabin inactivated polio vaccine (PI/II), discontinued

2. Recent Progress in stage [Progress in stage disclosed since release of FY2017 results (May 14th, 2018)]

Development code <generic name>	Indications / additional formulations	Country/Region	Progress in stage
MLN0002 <vedolizumab>	Ulcerative colitis	Japan	Approved (Jul 2018)
SGN-35 <brentuximab vedotin>	Front line Hodgkin Lymphoma	Japan	Approved (Sep 2018)
Lu AA21004 <vortioxetine>	Data added to labeling that demonstrated superiority over escitalopram in improving SSRI-induced sexual dysfunction in patients with Major Depressive Disorder	U.S.	Approved (Oct 2018)
<brigatinib>	2L ALK-positive metastatic Non-Small Cell Lung Cancer in patients previously treated with crizotinib	EU	Approved (Nov 2018)
TAK-555/SHP555 <prucalopride>	Chronic idiopathic constipation	U.S.	Approved (Dec 2018)
MLN0002 <vedolizumab>	Crohn's disease	Japan	Filed (Jul 2018)
Lu AA21004 <vortioxetine>	Major depressive disorder	Japan	Filed (Sep 2018)
<ponatinib>	Front line Philadelphia chromosome-positive Acute Lymphoblastic Leukemia	U.S.	P-III
<cabozantinib>	1L Renal cell carcinoma in combination with nivolumab	Japan	P-III
TAK-906	Gastroparesis	U.S.	P-II(b)
MLN9708 <ixazomib>	Relapsed/refractory Multiple Myeloma (triplet regimen with daratumumab and dexamethasone)	Global	P-II
<niraparib>	Ovarian Cancer – maintenance	Japan	P-II
<niraparib>	Ovarian Cancer – salvage	Japan	P-II
<brigatinib>	2L ALK-positive Non-Small Cell Lung Cancer in patients previously treated with ALK inhibitors	China	P-II
MLN0002 <vedolizumab>	Graft-versus-Host Disease prophylaxis in patients undergoing allogeneic hematopoietic stem cell transplantation	-	P-II(a)
<cabozantinib>	2L hepatocellular carcinoma	Japan	P-II(a)
WVE-120101	Huntington's disease	-	P-I/II
WVE-120102	Huntington's disease	-	P-I/II
Kuma062	Celiac Disease	-	P-I
TAK-079	Systemic lupus erythematosus	-	P-I
TAK-164	GI Malignancies	-	P-I
TAK-671	Acute pancreatitis	-	P-I
TAK-981	Multiple cancers	-	P-I
TAK-018 / EB8018	Crohn’s disease	-	P-I
SGN-35 <brentuximab vedotin>	Front line Hodgkin Lymphoma	EU	Approved (Feb 2019)
TAK-489/SHP489 <lisdexamfetamine dimesylate>	Attention-Deficit/Hyperactivity Disorder	Japan	Approved (Mar 2019)
MLN0002 <vedolizumab>	Subcutaneous formulation for Crohn's disease	EU	Filed (Mar 2019)
MLN0002 <vedolizumab>	Subcutaneous formulation for ulcerative colitis	EU	Filed (Mar 2019)
SGN-35 <brentuximab vedotin>	Front line Peripheral T-cell Lymphoma	Japan	Filed (Mar 2019)
SGN-35 <brentuximab vedotin>	Relapsed/refractory Hodgkin Lymphoma	China	Filed (Mar 2019)
SGN-35 <brentuximab vedotin>	Relapsed/refractory systemic Anaplastic large-cell lymphoma	China	Filed (Mar 2019)
Cabozantinib	2L Renal cell carcinoma	Japan	Filed (Apr 2019)

<brigatinib>	2L ALK-positive Non-Small Cell Lung Cancer (head-to-head with alectinib)	Global	P-III
<brigatinib>	2L ALK-positive Non-Small Cell Lung Cancer in patients progressed on 2nd generation TKI	Global	P-II
Cx601 <darvadstrocel>	Refractory complex perianal fistulas in patients with Crohn's disease	Japan, U.S.	P-III
MLN0002 <vedolizumab>	Graft-versus-Host Disease prophylaxis in patients undergoing allogeneic hematopoietic stem cell transplantation	-	P-III
TAK-788	Non-Small Cell Lung Cancer with Exon-20 insertion	Global	P-II
TAK-954	Post-operative gastrointestinal dysfunction	-	P-II(b)
TIMP-GLIA	Celiac Disease	-	P-II(a)
TAK-951	Nausea and vomiting	-	P-I
TAK-681	Short bowel syndrome	-	P-I
TAK-252	Solid tumors		P-I

Progress in stage disclosed since the announcement of FY2018 Q3 results (February 1, 2019) are listed under the bold dividing line

3. Discontinued projects [Update disclosed since release of FY2017 results (May 14th, 2018)]

Development code <generic name>	Indications (Stage)	Reason
MLN0002 <vedolizumab>	Graft-versus-Host Disease steroid refractory (P-II(a))	Co-morbidities in steroid-refractory acute Graft-versus-Host Disease patients impair ability to demonstrate efficacy to justify continued development.
SPI 0211 <lubiprostone>	New formulation (U.S., P-III)	The P-III study to evaluate the bioequivalence of sprinkle and capsule formulations of lubiprostone compared to placebo in adult subjects with chronic idiopathic constipation (CIC) did not achieve bioequivalence.
TAK-522 / XMT-1522 < - >	HER2 positive solid tumors (P-I)	The decision to terminate the further development of XMT-1522 was made due to the competitive environment for HER2-targeted therapies.
TAK-438 <vonoprazan>	Non-Erosive Reflux Disease in patients with Gastro-esophageal Reflux Disease (P-III)	Data from the P-III study did not justify pursuing a regulatory submission in this indication. There were no new safety findings
TAK-954	Enteral feeding intolerance (P-IIb)	The EFI study was terminated because of patient recruitment challenges due to evolving practices in patient management. The program is pursuing the new indication post-operative gastrointestinal dysfunction (POGD); anticipate dosing first-patient by or before Q1 FY19.
TAK-616/SHP616	Hereditary Angioedema subcutaneous administration (EU, P-III)	The decision to terminate further development of TAK-616/SHP616 subcutaneous administration was made given the availability of Takhzyro in addition to changes in the competitive environment
TAK-616/SHP616	Acute Antibody Mediated Rejection (AMR) (U.S., EU P-III)	TAK-616 did not meet the prespecified criteria to justify further development in acute AMR
TAK-680/SHP680	Neurological conditions (P-I)	The decision to terminate further development of TAK-680/SHP680 was made due to the existing competitive environment and insufficient differentiation.
TAK-831 <->	Friedreich's ataxia (P-IIa)	Efficacy data from the proof-of-concept study of TAK-831 in Friedreich's ataxia did not meet prespecified criteria to justify further development in this indication.
TAK-931	Metastatic colorectal cancer (P-IIa)	TAK-931 did not meet prespecified efficacy criteria to justify further development in metastatic colorectal cancer
TAK-195 <->	Prevention of poliomyelitis (P-I/II)	The P-I/II study did not meet its primary immunogenicity endpoint, though it was found to be safe and well tolerated in study participants. Takeda and its partner, the Bill & Melinda Gates Foundation, reached a mutual agreement to voluntarily discontinue the TAK-195 development program given that delays in the program would limit the public health impact of the vaccine.

Discontinuations disclosed since the announcement of FY2018 Q3 results (February 1, 2019) are listed under the bold dividing line

4. Exploring Alternative Value Creation [Update disclosed since release of FY2017 results (May 14th, 2018)]

Development code <generic name>	Indications (Stage)	Reason
TAK-385 <relugolix>	Uterine fibroids (Japan Approved) Endometriosis (Japan P-II(b))	Out-licensed to ASKA Pharmaceutical Co., Ltd., which has a strong presence in the gynecology therapeutic area in Japan, to maximize product value and to deliver relugolix to as many patients as possible.
SHP647 < - >	Inflammatory bowel disease	As announced on October 27, 2018, Takeda has proposed a remedy to the European Commission of a potential divestment of SHP647 and certain associated rights.

5. Main Research & Development collaborations*

Oncology

Partner	Country	Subject
Adimab‡	U.S.	Agreement for the discovery, development and commercialization of three mAbs and three CD3 Bi-Specific antibodies for oncology indications.
Centre d'Immunologie de Marseille-Luminy	France	The collaboration agreement will bring together expertise and knowledge in innate biology with Takeda's BacTrap capabilities to identify novel targets and pathways in myeloid cells.
ASKA Pharmaceutical Co., Ltd‡	Japan	Takeda granted exclusive commercialization rights for uterine fibroids and exclusive development and commercialization rights for endometriosis for Japan to maximize the product value of relugolix (TAK-385).
Crescendo Biologics	UK	Collaboration and licensing agreement for the discovery, development and commercialization of Humabody®-based therapeutics for cancer indications.
Exelixis, Inc.	U.S.	Exclusive licensing agreement to commercialize and develop novel cancer therapy cabozantinib and all potential future cabozantinib indications in Japan, including advanced renal cell carcinoma and hepatocellular carcinoma.
GammaDelta Therapeutics	UK	Collaboration agreement to discover and develop new immunotherapies in oncology using GammaDelta Therapeutics' novel T cell platform based on the unique properties of gamma delta T cells derived from human tissues.
Haemalogix‡	Australia	A research collaboration and licensing agreement for the development of new therapeutics to novel antigens in multiple myeloma.
Heidelberg Pharma	Germany	Antibody-Drug-Conjugate (ADC) research collaboration on 2 targets and licensing agreement (α-amanitin payload and proprietary linker).
ImmunoGen, Inc.	U.S.	Licensing agreement for rights to use ImmunoGen's Inc. ADC technology to develop and commercialize targeted anticancer therapeutics (TAK-164).
Maverick Therapeutics	U.S.	Colabboration agreement for the development of Marveric Theraprutics' T-cell engagement platform created specifically to improve the utility of T-cell redirection therapy for the treatment of cancer. Under the agreement, Takeda have the exclusive option to acquire Marverick Therapeutics after 5 years.
Myovant Sciences	Switzerland	Takeda granted Myovant an exclusive, worldwide license (excluding Japan and certain other Asian countries) to relugolix (TAK-385) and an exclusive, worldwide license to MVT-602 (TAK-448).
Memorial Sloan Kettering Cancer Center‡	U.S.	Alliance to discover and develop novel Chimeric Antigen Receptor T (CAR-T) cell products for the potential treatment of hematological malignancies and solid tumors.
Molecular Templates‡	U.S.	Initial collaboration agreement applied Molecular Templates' engineered toxin bodies (ETBs) technology platform to potential therapeutic targets. The second collaboration agreement is for the joint development of CD38-targeted ETBs for the treatment of patients with diseases such as multiple myeloma.‡
Nektar Therapeutics‡	U.S.	Research collaboration agreement to explore combination cancer therapy with five Takeda oncology compounds and Nektar's lead immuno-oncology candidate, the CD122-biased agonist NKTR-214.
Noile-Immune Biotech	Japan	Collaboration agreement for the development of next generation CAR-T cell therapy, developed by Professor Koji Tamada at Yamaguchi University. Takeda has excusive options to obtain licensing rights for the development and commecialization of Noile-Immune Biotech's pipeline and products resulting from this partnership. Due to the success of the collaboration, Takeda licensed NIB-102 and NIB-103.
Seattle Genetics	U.S.	Agreement for the joint development of ADCETRIS, an ADC technology which targets CD30 for the treatment of HL. Approved in 67 countries with ongoing clinical trials for additional indications.
Shattuck Labs	U.S.	Collaboration agreement to explore and develop checkpoint fusion proteins utilizing Shattuck's unique Agonist Redirected Checkpoint (ARC)™ platform which enables combination immunotherapy with a single product. Takeda will have the option to take an exclusive license to further develop and commercialize TAK-252/SL-279252
GlaxoSmithKline	U.S.	Exclusive licensing agreement to develop and commercialize novel cancer therapy niraparib for the treatment of all tumor types in Japan, and all tumor types excluding prostate cancer in South Korea, Taiwan, Russia and Australia.
Teva	Israel	Agreement for worldwide License to TEV-48573 (TAK-573) (CD38-Attenukine) and multi-target discovery collaboration accessing Teva's attenukine platform.

‡ Executed since April 1, 2018

Gastroenterology

Partner	Country	Subject
Ambys Medicines	U.S.	Collaboration agreement for the application of novel modalities, including cell and gene therapy and gain-of-function drug therapy, to meet the urgent need for treatments that restore liver function and prevent the progression to liver failure across multiple liver diseases. Under the terms of the agreement, Takeda has an option to ex-U.S. commecialization rights for the first 4 products that reach an investigational new drug application.
Arcturus	U.S.	Collaboration agreement to develop RNA-based therapeutics for the treatment of non-alcoholic steatohepatitis and other gastrointestinal related disorders using Arcturus' wholly-owned LUNAR™ lipid-mediated delivery systems and UNA Oligomer chemistry.
Beacon Discovery	U.S.	Collaboration agreement for the G-protein coupled receptor drug discovery and development program to identify drug candidates for a range of gastrointestinal disorders. The agreement grants Takeda worldwide rights to develop, manufacture and commercialize products resulting from the collaboration.

Cour Pharmaceutical Development Company	U.S.	Collaboration agreement to research and develop immune modulating therapies for the potential treatment of celiac disease and other gastrointestinal diseases, utilizing Cour's Tolerizing Immune Modifying nanoParticle (TIMP) platform to co-develop TIMP-Gliadin
Enterome‡	France	Collaboration agreement to research and develop microbiome targets thought to play crucial roles in gastrointestinal disorders, including inflammatory bowel diseases (e.g. ulcerative colitis). The agreement includes a global license and co-development of EB8018/TAK-018 in Crohn's disease.
Finch Therapeutics	U.S.	Global agreement to develop FIN-524, a live biotherapeutic product composed of cultured bacterial strains linked to favorable clinical outcomes in studies of microbiota transplantations in inflammatory bowel disease. Under the terms of the agreement, Takeda obtains the exclusive worldwide rights to develop and commercialize FIN-524 and rights to follow-on products in inflammatory bowel diseases.
Hemoshear Therapeutics	U.S.	Collaboration agreement for novel target and therapeutic development for liver diseases, including nonalcoholic steatohepatitis using Hemoshear's proprietary REVEAL-Tx drug discovery platform.
Janssen	Belgium	Exclusive license agreement to develop and market prucalopride as a treatment for chronic constipation in the U.S. Motegrity, approved in December 2018.
NuBiyota	Canada	Agreement for the development of Microbial Ecosystem Therapeutic products for gastroenterology indications.
PvP Biologics	U.S.	Global agreement to develop Kuma062, a novel enzyme designed to break down the immune-reactive parts of gluten in the stomach. Under the terms of the agreement, Takeda obtains an exclusive option to acquire PvP Biologics following receipt of a pre-defined data package.
Samsung Bioepis	Korea	Strategic collaboration agreement to jointly fund and co-develop multiple novel biologic therapies in unmet disease areas. The program's first therapeutic candidate is TAK-671, which is intended to treat severe acute pancreatitis.
Theravance Biopharma	U.S.	Global license, development and commercialization agreement for TAK-954, a selective 5-HT4 receptor agonist for motility disorders.
UCSD/Fortis Advisors	U.S.	Technology license for the development of oral budesonide formulation (TAK-721/SHP621) for treatment of eosinophilic esophagitis.

‡ Executed since April 1, 2018

Rare Diseases

Partner	Country	Subject
AB Biosciences	U.S.	Research collaboration agreement to potentially develop assets for rare disease with pan-receptor interacting molecules targeted for specific immunological conditions with a focus on autoimmune modulated inflammatory diseases
ArmaGen	U.S.	Worldwide licensing and collaboration agreement to develop AGT-182 (TAK-531/SHP631), an investigational enzyme replacement therapy for potential treatment of both the central nervous system (CNS) and somatic (body-related) manifestations of Hunter syndrome.
Asklepios Biopharmaceuticals	U.S.	Agreement for multiple research and development collaborations using FVIII Gene Therapy for the treatment of Hemophilia A and B.
BioMarin	U.S.	Agreement for the in-license of enabling technology for the exogenous replacement of iduronate-2-sulfatase with Idursulfase-IT in patients via direct delivery to the CNS for the long-term treatment of Hunter Syndrome in patients with cognitive impairment in order to slow progression of cognitive impairment (TAK-609/SHP609).
GlaxoSmithKline	UK	In-license agreement between GSK and University of Michigan for TAK-620/SHP620 (marabivir) in the treatment of human cytomegalovirus.
Harrington Discovery Institute at University Hospitals in Cleveland, Ohio	U.S.	Collaboration agreement for the advancement of medicines for rare diseases.
IPSEN	France	Agreement for the development of Obizur for the treatment of Acquired Hemophilia A including for patients with Congenital Hemophilia A with inhibitorsindication in elective or emergency surgery.
KM Biologics	Japan	Agreement for the development collaboration of TAK-755/SHP655 to overcome the ADAMTS13 deficiency, induce clinical remission thus reducing cTTP and aTTP related morbidity and mortality.
Max Planck Institute	Germany	Agreement for the exclusive worldwide license under certain intellectual property to develop and commercialize the licensed products in the field
NanoMedSyn	France	Pre-clinical research collaboration agreement to evaluate a potential enzyme replacement therapy using NanoMedSyn's proprietary synthetic derivatives named AMFA
Novimmune	Switzerland	Agreement for the exclusive worldwide rights to develop and commercialize an innovative, bi-specific antibody in pre-clinical development for the treatment of hemophilia A
Rani Therapeutics	U.S.	Research collaboration agreement to evaluate a micro tablet pill technology for oral delivery of FVIII therapy in hemophilia
Ultragenyx	U.S.	Collaboration agreement to develop and commercialize therapies for rare genetic diseases.
Xenetic Biosciences	U.S.	Exclusive R & D license agreement for PolyXen delivery technology for hemophilia factors VII, VIII, IX, X.

Neuroscience

Partner	Country	Subject
AstraZeneca	UK	Agreement for the joint development and commercialization of MEDI1341, an alpha-synuclein antibody currently in development as a potential treatment for Parkinson's disease.
Denali Therapeutics	U.S.	A strategic option and collaboration agreement to develop and commercialize up to three specified therapeutic product candidates for neurodegenerative diseases, incorporating Denali's ATV platform for increased exposure of biotherapeutic products in the brain.
Lundbeck	Denmark	Collaboration agreement to develop and commercialize vortioxetine.
Mindstrong Health	U.S.	Agreement to explore development of digital biomarkers for selected mental health conditions, in particular schizophrenia and treatment-resistant depression.
Ovid Therapeutics	U.S.	Agreement for the dDevelopment of TAK-935, an oral CH24H inhibitor for rare pediatric epilepsies. Takeda and Ovid Therapeutics will share in the development and commercialization costs of TAK-935 on a 50/50 basis and, if successful, share in the profits on a 50/50 basis.
StrideBio‡	U.S.	Collaboration and license agreement to dev 'op *in vivo* AAV based therapies for Friedreich's Ataxia (FA) and two additional undisclosed targets.
Wave Life Sciences	U.S.	Research, development and commercial collaboration and multi-program option agreement to develop antisense oligonucleotides for a range of neurological diseases.

‡ Executed since April 1, 2018

Plasma Derived Therapies

Partner	Country	Subject
Halozyme	U.S.	Agreement for the in-license of Halozyme's proprietary ENHANZE™ platform technology to increase dispersion and absorption of HyQvia. Ongoing development work for a U.S. pediatric indication to treat primary and secondary immunodeficiencies and a Phase 3 indication in Chronic Inflammatory Demyelinating Polyradiculoneuropathy.
Kamada	Israel	In-license agreement to develop and commercialize Alpha-1 proteinase inhibitor (Glassia) ; Exclusive supply and distribution of Glassia in the U.S., Canada, Australia and New Zealand; Development of protocol for post market commitment trial ongoing.

Vaccines

Partner	Country	Subject
Biological E. Limited	India	Takeda agreed to transfer existing measles and acellular pertussis vaccine bulk production technology to develop low-cost combination vaccines for India, China and low- and middle-income countries.
U.S. Government - The Biomedical Advanced Research and Development Authority (BARDA)	U.S.	Partnership to develop TAK-426, a Zika vaccine candidate, to support the Zika response in the U.S. and affected regions around the world.
Bill & Melinda Gates Foundation	U.S.	Partnership to develop TAK-195, a Sabin-strain Inactivated Polio vaccine (sIPV) candidate, to support polio eradication in developing countries.
Zydus Cadila	India	Partnership to develop TAK-507, a Chikungunya vaccine candidate, to tackle an emerging and neglected infectious disease in the world.

Other / Multiple Therapeutic Area

Partner	Country	Subject
Bridge Medicines	U.S.	Partnership with Tri-Institutional Therapeutics Discovery Institute, Bay City Capital and Deerfield Management in the establishment of Bridge Medicines. Bridge Medicines will give financial, operational and managerial support to move projects seamlessly from a validating, proof-of-concept study to an in-human clinical trial.
Center for iPS Cell Research Application, Kyoto University	Japan	Collaboration agreement for clinical applications of iPS cells in Takeda strategic areas including applications in neurosciences, oncology and GI as well as discovery efforts in additional areas of compelling iPSC translational science.
HITGen	China	Agreement that HitGen will apply its advanced technology platform, based on DNA-encoded library design, synthesis and screening, to discover novel leads which will be licensed exclusively to Takeda.
HiFiBio	U.S.	Collaboration agreement for functional therapeutics high-throughput antibody discovery platform that enables identification of antibodies for rare events for discovery of therapeutic antibodies for GI & Oncology therapeutic areas.
Isogenica	UK	Agreement for the access to a sdAb platform to generate a toolbox of VHH to various immune cells and targets for pathway validation and pipeline development across Oncology and GI portfolio.
National Cancer Center of Japan	Japan	A partnership to develop basic research to clinical development by promoting exchanges among researchers, physicians, and others engaged in anti-cancer drug discovery and cancer biology research.
Numerate	U.S.	Agreement for joint-discovery programs aimed at identifying clinical candidates for use in Takeda's core therapeutic areas: oncology, gastroenterology, and central nervous system disorders, which is using its AI-driven platform, from hit finding and expansion through lead design/optimization and ADME toxicity modeling.

Parion	U.S.	Agreement for the exclusive worldwide license granted for the development and commercialization of TAK-759/SHP659 for Dry Eye Disease.
Portal Instruments	U.S.	Agreement for the development and commercialization of Portal's jet injector drug delivery device for potential use with Takeda's investigational or approved biologic medicines.
Recursion Pharmaceuticals	U.S.	Agreement to provide pre-clinical candidates for Takeda's TAK-celerator™ development pipeline.
Schrödinger	U.S.	Agreement for the multi-target research collaboration combining Schrödinger's in silico platform-driven drug discovery capabilities with Takeda's deep therapeutic area knowledge and expertise in structural biology.
Seattle Collaboration	U.S.	Agreement for SPRInT (Seattle Partnership for Research on Innovative Therapies) to accelerate the translation of Fred Hutchinson Cancer Research Center's and University of Washington's cutting-edge discoveries into treatments for human disease (focusing on Oncology, GI and Neuroscience).
Stanford University	U.S.	Collaboration agreement with Stanford University to form the Stanford Alliance for Innovative Medicines to more effectively develop innovative treatments and therapies.
Tri-Institutional Therapeutics Discovery Institute (Tri-I TDI)	U.S.	Agreement for the collaboration of academic institutions and industry to more effectively develop innovative treatments and therapies.

‡ Executed since April 1, 2018; * List is not inclusive of all Takeda R&D collaborations. Going forward, list will not include partnerships from Takeda Ventures (TVI), Takeda Entrepreneurship Venture Program (EVP), and other select partnerships previously part of this table.

Completed Partnerships

Partner	Country	Subject
Gencia LLC	U.S.	Mitochondrial Associated Glucocorticoid Receptors (MAGR) agonists for potential use primarily in hematological and inflammatory diseases.
Mersana	U.S.	The decision to terminate the further development of TAK-522/XMT-1522 was made due to the competitive environment for HER2-targeted therapies.
Prana Biotechnology Ltd.	Australia	Collaboration with Takeda to study ability of Prana's pbt434, to slow or prevent neurodegeneration of gastrointestinal system.
TiGenix	Belgium	Takeda acquired TiGenix
Keio University, Niigata University, Kyoto University	Japan	The search for and functional analysis of disease-related RNA-binding proteins, that may lead to treatments in the areas such as neuroscience and oncology.
Astellas, Daiichi Sankyo	Japan	Fundamental biomarker data on healthy adult volunteers in order to optimize and accelerate the development of innovative medicines.

■ Clinical study protocol summaries

Clinical study protocol summaries are disclosed on the English-language web-site (https://takedaclinicaltrials.com/) and clinical study protocol information in the Japanese-language is disclosed on the Japanese-language web-site (https://www.takeda.com/jp/what-we-do/research-and-development/takeda-clinical-trial-transparency/).

We anticipate that this disclosure will assure transparency of information on Takeda's clinical trials for the benefit of healthcare professionals, their patients and other stakeholders, which we believe will contribute to the appropriate use of Takeda's products worldwide.

Takeda Pharmaceutical Company Limited