

American Association for Cancer Research (AACR) Cancer Progress Report 2016

**AACR CANCER** PROGRESS REPORT 2016





AACR American Association for Cancer Research

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Acute lymphocytic leukemia 6,590 Chronic lymphocytic leukemia 18,960					
Chronic lymphocytic leukemia 18,960	34,090	26,050	24,400	14,130	10,270
	3,590	3,000	1,430	800	630
Acute myeloid leukemia 19,950	10,830	8,130	4,660	2,880	1,780
2	11,130	8,820	10,430	5,950	4,480
Chronic myeloid leukemia 8,220	4,610	3,610	1,070	570	500
ymphoma 81,080	44,960	36,120	21,270	12,160	9,110
Hodgkin lymphoma 8,500	4,790	3,710	1,120	640	480
Non-Hodgkin lymphoma 72,580 Iyeloma 30,330	40,170 17.900	32,410 12.430	20,150	11,520 6,430	8,630 6,220
The same of the sa	17,900	12,430	12,650	6,430	6,220
ther Cancers					
ones & joints 3,300	1,850	1,450	1,490	860	630
oft tissue (including heart) 12,310	6,980	5,330	4,990	2,680	2,310

AACR American Association for Cancer Research

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acteria		
Infectious Agent	Cancer	% of global cancer cases attributable to infection*
Helicobacter pylori	Stomach cancers	32.5
arasites		
Infectious Agent	Cancer	% of global cancer cases attributable to infection*
Clonorchis sinensis	Biliary, gallbladder, and pancreatic cancers	0.1
Opisthorchis viverrini	Biliary, gallbladder, and pancreatic cancers	unknown
Schistosoma haematobium	Bladder cancer	0.3
'iruses		
Infectious Agent	Cancer	% of global cancer cases attributable to infection*
Epstein-Barr Virus (EBV)	Hodgkin and certain non-Hodgkin lymphomas,and stomach and nasopharyngeal cancers	5.4
Hepatitis B/C Virus (HBV and HCV)	Hepatocellular carcinoma	29.5
Human Herpes Virus type -8 (HHV-8; also known as Kaposi sarcoma herpes virus)	Kaposi sarcoma and certain forms of lymphoma	2.1
Human Immunodeficiency Virus (HIV)	Kaposi sarcoma and non-Hodgkin lymphoma	unknown
Human Papillomavirus (HPV)	Anal, cervical, head and neck, oral, penile, vaginal, and vulvar cancers	30
Human T-cell Lymphotrophic Virus, type 1 (HTLV-1)	T-cell leukemia and lymphoma	0.1
A MAN DE CONTRACTOR DE CONTRAC	Skin cancer	unknown



## TABLE 5

# INHERITED CANCER RISK

Cancers	Syndrome	Associated Gene(s)
Leukemias and lymphomas	Ataxia telangiectasia	ATM
Basal cell carcinoma	Basal cell nevus syndrome	PTCH1, PTCH2, SUFU
All cancers	Bloom syndrome	BLM
Breast, ovarian, pancreatic, and prostate cancers	Breast-ovarian cancer syndrome	BRCA1, BRCA2
Breast, thyroid, and endometrial cancers	Cowden syndrome	PTEN
Breast and stomach cancers	Diffuse gastric and lobular breast cancer syndrome	CDH1
Colorectal cancer	Familial adenomatous polyposis (FAP)	APC
Melanoma and pancreatic cancer	Familial atypical multiple mole-melanoma syndrome (FAMM)	CDKN2A
Retinal cancer	Familial retinoblastoma	RB1
Leukemia	Fanconi's anemia	FACC, FACA
Kidney cancer and uterine fibroids	Hereditary leiomyomatosis and renal cell cancer	FH
Pancreatic cancer	Hereditary pancreatitis/familial pancreatitis	PRSS1, SPINK1
Leukemias, breast, brain, and soft tissue cancers	Li-Fraumeni syndrome	TP53
Colorectal and endometrial cancers	Lynch syndrome	EPCAM, MLH1, MSH2, MSH6, PMS2
Pancreatic cancers, pituitary adenomas, benign skin, and fat tumors	Multiple endocrine neoplasia 1	MEN1
Thyroid cancer and pheochromacytoma	Multiple endocrine neoplasia 2	RET, NTRK1
Pancreatic, liver, lung, breast, ovarian, uterine, and testicular cancers	Peutz-Jeghers syndrome	STK11/LKB1
Tumors of the spinal cord, cerebellum, retina, adrenals, and kidneys	von Hippel-Lindau syndrome	VHL
Kidney cancer	Wilms' tumor	WT1
Skin cancer	Xeroderma pigmentosum	XPD, XPB, XPA

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#### TABLE 6 SURGERIES FOR THE PREVENTION OF CANCER Genetic Mutation(s) Technique Cancer Removes Colon/large intestine APC Colon Cancer Colectomy BRCA1 or BRCA2 **Breast Cancer Breasts** Mastectomy BRCA1 or BRCA2 Ovarian Cancer Ovaries and fallopian tubes Salpingo-oophorectomy CDH1 Stomach Cancer Gastrectomy Stomach RET Medullary thyroid cancer Thyroidectomy Thyroid American Association for Cancer Research (AACR) Cancer Progress Report 2016







#### SUPPLEMENTAL TABLE 2

### FDA-APPROVED THERAPEUTICS FOR THE TREATMENT OF CANCER

Approved Indication	Generic Name	Trade Name
Multiple cancers	5-fluorouracil (5-	-FU) Adruci
Certain leukemias	6-mercaptopurir	ne Purinetho
Breast and colorectal cancers	capecitabine	Xeloda
Certain leukemias; lymphoma	cladribine	Litrak; Movectro
Certain leukemias	clofarabine	Clola
Certain leukemias; lymphoma	cytarabine De	epoCyt; Cytosar-L
Stomach cancer	floxuridine	FUDE
Certain leukemias; lymphoma	fludarabine	Fludara
Breast; lung; ovarian; and pancreatic cancers	gemcitabine	Gemza
Certain leukemias	hydroxyurea	Droxia
Multiple cancers	methotrexate Ri	heumatrex; Trexal
Multiple cancers	mitomycin	Mutamycir
Certain leukemias; lymphoma	nelarabine	Arranor
Lung and ovarian cancers; mesothelioma	pemetrexed	Alimta
Certain leukemias	pentostatin	Nipen
Certain lymphomas	pralatrexate	Folotyr
DNA-damaging Agen	ts	
Approved Indication	Generic Name	Trade Name
Ovarian cancer	altretamine	Hexaler
Certain leukemias	arsenic trioxide	Triseno
Multiple cancers	bendamustine	Treanda
Certain lymphomas; squamous cell and testicular cancers	bleomycin sulfate	Blenoxan
Certain leukemias	busulfan	Myleran; Busulfe:
Breast, lung, and ovarian cancers	carboplatin Pa	araplatin; Parapla
Brain tumors; certain lymphomas	carmustine	BICNU
Multiple cancers	chlorambucil	Leukerar
	cisplatin	Platinol-AC
Multiple cancers	cispiatin	Placifior-AG
100000000000000000000000000000000000000	cyclophosphami	
Multiple cancers Multiple cancers Melanoma; certain brain cancers		

dactinomycin

daunorubicin

doxorubicin

ifosfamide

hydrochloride

Cosmegen

Cerubidine

Adriamycin PFS

Adriamycin RDF

Idamycin PFS

Camptosar, Campostar

Multiple cancers

Certain leukemias

Multiple cancers

Testicular and

Certain leukemias

Colon, lung, and rectal cancers

Multiple cancers

and stomach cancers

Approved Indication	Generic Name	Trade Name
	VALUE SAN	Tonda No
Radiation-emitting	Drugs	
Certain leukemias	tretinoin (all-trans retinoic acid)	Vesanoid
eiomyosarcoma		10-11-0-01-0
Jiposarcoma and	trabectedin	Yondelis
Approved Indication Certain lymphomas	Generic Name bexarotene	Trade Name Targretin
Gene-transcription		
Certain leukemias		par: Kidrolase
Approved Indication	Generic Name	Trade Name
Antinutrients		
Breast and lung cancers	vinorelbine tartrate	Navelbine
Certain leukemias and lymphomas	vincristine sulfate liposomes	Marqibo
and lymphomas		
Multiple cancers Certain leukemias	vinblastine vincristine	Velban
and pancreatic cancers	albumin-bound partic	
Breast, lung,	paclitaxel	Abraxane
Multiple cancers	paclitaxel	Taxo
Breast cancer	ixabepilone	Ixempra
Breast cancer; liposarcom		Halaven
Multiple cancers	docetaxel	Taxotere
Prostate cancer	cabazitaxel	Jevtana
Approved Indication	Generic Name	Trade Name
Cell Cytoskeleton-	modifying Agents	
Bladder cancer	valrubicin	Valstar
Colorectal cancer	trifluridine AND tipira	acil Lonsurt
Ovarian and small cell lung cancers	topotecan	Hycamtin
Multiple cancers	thiotepa	Thioplex
Certain leukemias		anine Tabloid
certain brain cancers		
Melanoma:	temozolomide	Temodar
Pancreatic cancer	procarbazine streptozocin	Zanosai
Testicular cancer Certain lymphomas	procarbazine	Mithracin
Loion cancer Festicular cancer	oxaliplatin	Mithracin
Multiple cancers Colon cancer	oxaliplatin	Floxatin
Lertain lymphomas Multiple cancers	metnoxsalen mitoxantrone	Novantrone
Multiple cancers Certain lymphomas	melphalan methoxsalen	Alkeran Uvadex
100000000000000000000000000000000000000	hydrochloride	Alkeran
Multiple cancers	mechlorethamine	Mustargen
Brain tumors	lonustine	CeeNU
	liopsome injection	

ell-death Promoting	Agents			DNA-repair Inhibitor	
Approved Indication	Generic Name	Trade Name	7	Approved Indication	Generic Name
Certain form of leukemia	venetoclax	Venclexta	Н	Certain form of ovarian cancer*	olaparib
lormones/Antihormo	nes			Immune-checkpoint	Inhibitors
Approved Indication	Generic Name	Trade Name		Approved Indication	Generic Name
rostate cancer	abarelix	Plenaxis		Certain type of	atezolizumab
Prostate cancer	abiraterone aceta	ate Zytiga	ž	bladder cancer	atezonzarriab
Breast cancer	anastrozole	Arimidex	SE	Melanoma	ipilimumab
rostate cancer	bicalutamide	Casodex	> A	Multiple cancers	nivolumab
Prostate cancer	degarelix	Firmagon	ž	Melanoma; lung cancer*	pembrolizumab
Prostate cancer	enzalutamide	Xtandi	G P		
Prostate cancer	estramustine	Emcyt; Estracyt	PRE	Bone-remodeling Inl	libitors
Breast cancer	exemestane	Aromasin	CIS	Approved Indication	Generic Name
Prostate cancer	flutamide	Eulexin	Ö	Potentially lethal	denosumab
Metastatic breast cancer	fulvestrant	Faslodex	z	complication of advanced cancers	
Prostate and breast cancer	goserelin acetate	Zoladex	ľ	advanced cancers	
Breast cancer	letrozole	Femara		Angiogenesis Inhibit	ors
Prostate cancer	leuprolide acetate	Eligard; Lupron: Viadur	Н	Approved Indication	Generic Name
Rreast and		Megace: Megace		Kidney cancer	axitinib
ndometrial cancers	acetate	Oral Suspension		Multiple cancers	bevacizumab
Breast cancer	tamoxifen	Nolvadex		Thyroid cancer;	cabozantinib
Prostate cancer	triptorelin pamoa	te Treistar Depot		kidney cancer	100000000000000000000000000000000000000
mmune-system Modil	Hors		н	Certain type of thyroid cancer, kidney cancer	lenvatinib
Approved Indication	Generic Name	Trade Name	7	Kidney cancer; soft tissue sarcomas; gastrointestinal	pazopanib
fultiple cancers	interferon alfa-2b	Intron A	П	stromal tumors	
felanoma; kidney cancer	aldesleukin	Proleukin		Certain types of lung and stomach cancers	ramucirumab
Yyelodysplastic syndrome; ertain lymphomas	lenalidomide	Revlimid	П	Colorectal cancer;	regorafenib
fultiple myeloma	pomalidomide	Pomalyst	L	gastrointestinal stromal tumors	
roteasome Inhibitors	i.		н	Kidney cancer; certain type of thyroid cancer	sorafenib
Approved Indication	Generic Name	Trade Name	7	Gastrointestinal stromal	sunitinib
fultiple myeloma	bortezomib	Velcade	П	tumors; kidney cancer; some pancreatic cancers	
fultiple myeloma	carfilzomib	Kyprolis		Thyroid cancer	vandetanib
fultiple myeloma	ixazomib	Ninlaro		Colorectal cancer	ziv-aflibercept
rotein-translation In		Nilliaro	ь	Cell-lysis Mediators	ziv dilibercept
West and the second second	AVAILABLE TO THE STATE OF THE S		P	Approved Indication	Generic Name
Approved Indication	Generic Name	Trade Name			
Certain type of leukemia	omacetaxine mepesuccinate	Synribo		Certain leukemias	alemtuzumab
	mepesaccinate		L	Certain types of leukemia	blinatumomab
pigenome-modifying	Agents			Certain lymphomas	brentuximab ve
Approved Indication	Generic Name	Trade Name	1	Multiple myeloma	daratumumab
	azacitidine	Vidaza		Neuroblastoma	dinutuximab
lyelodysplastic syndrome				Multiple myeloma	elotuzumab
ertain lymphomas	belinostat	Beleodaq		Certain lymphomas	ibritumomab
velodysplastic syndrome	decitabine	Dacogen		Certain form of leukemia;	obinutuzumab
Aultiple myeloma Certain lymphomas	panobinostat romidepsin	Farydak Istodax		certain form of lymphoma Certain leukemias	ofatumumab

	Oncolytic Virus		
de Name	Approved Indication	Generic Name	Trac
parza	Melanoma	talimogene laherparepvec	
Name	Therapeutic Vaccine	\$	
ntrig	Approved Indication	Generic Name	Trac
ici iq	Prostate cancer	sipuleucel-T	P
voy	The same of the sa	2041	
vo	Cell-signaling Inhibit	ors	
ıda	Approved Indication	Generic Name	Trac
	HER2+ breast cancer	ado-trastuzumab emtansine	
me	Control to the control	emtansine afatinib	
a	Certain type of lung cancer	aratinib	
	Certain form of	alectinib	-
	lung cancer		
ne	Certain type of leukemia	bosutinib	
ta	Certain type of	ceritinib	
	metastatic ALK-positive	ee.anno	
	lung cancer		
	Colon cancer*; head and neck cancer	cetuximab	
	Certain form	cobimetinib	Cote
	of melanoma*		
	Specific lung cancers*	crizotinib	
	Some leukemias	dasatinib	
a	Certain type of melanoma*	dabrafenib	
	Some lung cancers*; pancreatic cancer	erlotinib	
ıt	Multiple cancers	everolimus	
	Lung cancer	gefitinib	
	Certain form of	ibrutinib	In
	lymphoma and non-Hodgkin lymphoma		
	Certain types of leukemia and lymphoma	idelalisib	
	Some leukemias;	imatinib	Gleeve
	stomach cancer; certain type of skin cance	er.	
	HER2+ breast cancers	lapatinib	
	Certain form of	necitumumab	F
	lung cancer		
n ti	Some leukemias	nilotinib	
	Certain form of	osimertinib	
va	lung cancer*  Certain subtype of	palbociclib	
	breast cancer	paidociclib	
ra an	Colon cancer	panitumumab	

brentuximab vedotin

ncolytic Virus				0.0000 0.0000 0.0000 0.000
pproved Indication	Generic Name	Trade Name	HER2+ breast cancer	pertuzumab
elanoma	talimogene laherparepvec	Imlygic	Certain types of leukemia	ponatinib
			Myelofibrosis	ruxolitinib
nerapeutic Vaccine	S		Most common type of skin cancer	sonidegib
proved Indication	Generic Name	Trade Name	Certain types	trametinib
ostate cancer	sipuleucel-T	Provenge	of melanoma*	
II-signaling Inhibit	ors		HER2+ breast cancer	trastuzumab
proved Indication	Generic Name	Trade Name	Kidney cancer	temsirolimus
R2+ breast cancer	ado-trastuzumab	Kadcyla	Thyroid cancer	vandetanib
K2+ Dieast Cancer	emtansine	Raucyia	Melanoma*  Most common type	vemurafenib vismodegib
rtain type of g cancer	afatinib	Gilotrif	of skin cancer	visitiodegio
rtain form of ng cancer	alectinib	Alecensa	G PR	
rtain type leukemia	bosutinib	Bosulif	PRECISION .	
rtain type of etastatic ALK-positive ng cancer	ceritinib	Zykadia	Some drugs are available in mu	itiple formulations;
lon cancer*; ad and neck cancer	cetuximab	Erbitux	these have only been listed on Where multiple trade names ar	
rtain form melanoma*	cobimetinib	Cotellic AND Zelboraf	have been listed.	
ecific lung cancers*	crizotinib	Xalkori		
me leukemias	dasatinib	Sprycel		
tain type nelanoma*	dabrafenib	Tafinlar		
me lung cancers*; ncreatic cancer	erlotinib	Tarceva		
Itiple cancers	everolimus	Afinitor		
g cancer	gefitinib	Iressa		
rtain form of nphoma and n-Hodgkin lymphoma	ibrutinib	Imbruvica		
rtain types of kemia and lymphoma	idelalisib	Zydelig		
me leukemias; mach cancer; tain type of skin cance	imatinib er	Gleevec; Glivec		
R2+ breast cancers	lapatinib	Tykerb		
ain form of cancer	necitumumab	Portrazza		
ne leukemias	nilotinib	Tasigna		
tain form of g cancer*	osimertinib	Tagrisso		
rtain subtype of	palbociclib	Ibrance		
ast cancer		1,000,000,000,000		

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