

Table: Recombinant drugs approved for use, grouped by producing host types.

Product name and nature	WHO indication^a	Approval date and place
Host: <i>E. coli</i>		
Dukoral (Oral cholera vaccine)	A	2004 EU, US
Pegasys (Peginterferon alfa-2a)		2002 US
PegIntron (Peginterferon alfa-2b)		2000 EU 2001 US
Infergen (Interferon alfacon-1)		1997 US 1999 EU
Rebetron (Interferon alfa-2b)		1999 US
Roferon A (Interferon alfa-2 ^a)		1986 US
Viraferon (Interferon alfa-2b)		2000 EU
ViraferonPeg (Peginterferon alfa-2b)		2000 EU
Intron A (Interferon alfa-2b)	A, C	1986 US 2000 EU
Beromun (Tasonermin)	C	1999 EU
Actimmune (Interferon gamma-1b)	D	1990 US
IPLEX (Mecasermin rinfabate recombinant)		2005 US
Kepivance (Palifermin)		2004 EU 2005 US
Neulasta (Pegfilgrastim)		2002 US 2002 EU
Neumega (Oprelvekin)		1997 US
Neupogen (Filgrastim)		1991 US
Humalog (Insulin lispro)	E	1996 US, EU
Humatrope (Somatotropin)		1987 US
Humulin (Human insulin)		1982 US
Insuman (Human insulin)		1998 EU
Lantus (Insulin glargine)		2000 EU, US
Fortical (Salmon calcitpnin)		2005 US
Apidra (Insulin glulisine)		2004 EU, US
Exubera (Human insulin)		2006 EU
Forcaltonin (Salmon calcitonin)		1999 EU
Forsteo (Teriparatide)		2003 EU
Forsteo/Forteo (Teriparatide)		2002 US 2003 EU
Genotropin (Somatotropin)		1995 US
Glucagon		1998 US
Increlex (Mecasermin)		2005 US 2007 EU
Insulin human Winthrop (Insulin human)		2007 EU
Norditropin (Somatotropin)		1995 US
Nutropin (Somatotropin)		1999 US
NutropinAQ (Somatotropin)		2001 EU 1995 US
Optisulin (Insulin glargine)		2000 EU

Preotact (Human parathyroid hormone)		2006 EU
Protropin (Somatrem)		1985 US
Somavert (Pegvisomant)		2002 EU 2003 US
Betaferon/Betaseron (Interferon beta-1b)	G	1993 US 1995 EU
Lucentis (Ranibizumab)	H	2006 US 2007 EU
Natrecor (Nesiritide)	I	2001 US
Rapilysin/Retavas e (Retepase)		1996 EU, US
Ontak (Denileukin diftitox)	M	1999 US
Kineret (Anakinra)		2001 US 2002 EU
Omnitrope (Somatropin)	Q	2006 EU

Host: *S. cerevisiae*

Ambirix (Hepatitis A inactivated, hepatitis B antigen (rDNA))	A	2002 US
Comvax (Meningococcal protein conjugate)		1996 US
Engerix-B (Hepatitis B vaccine)		1998 US
Fendrix (Hepatitis B vaccine)		2005 EU
Gardasil/Silgard (Human papillomavirus vaccine [type 6,11,16,18])		2006 EU, US
HBVAXPRO (Hepatitis B vaccine)		2001 EU
Hexavac (Hexavalent vaccine, hepatitis B (rDNA))		2000 EU
INFANRIX HepB (Tetravalent vaccine, hepatitis B (rDNA))		1997 EU
Infanrix Hexa (Hexavalent vaccine, hepatitis B (rDNA))		2000 EU
Infanrix Pent/Pediatric (Pentavalent vaccine, hepatitis B (rDNA))		2000 EU 2002 US
M-M-RVAXPRO (Measles, mumps and rubella vaccine)		2006 EU
Procomvax/comvax (Mixed vaccines)		1999 EU 1996 US
Quintanrix (Mixed vaccines)		2005 EU
Recombivax (Hepatitis B vaccine)		1986, 1999, 2000 US
Tritanrix HepB (Mixed vaccines)		1996 EU
Twinrix Adult (Mixed vaccines)		1996 EU 2001 US
Twinrix Paediatric (Mixed vaccines)		1997 EU
Leukine (Sargramostim)	C	1991 US
Refludan (Lerpirudin)	D	1997 EU 1998 US
Fasturect (Rasburicase)	E	2001 EU
Fasturetec/Elitek (Rasburicase)		2001 EU 2002 US
GlucaGen (Glucagon)		1998 US
Levemir (Insulin detemir)		2004 EU 2005 US
Novolin/Actrapid/ Insulatard/Mixtard /Monotrad/Ultratard/Velosulin (Human insulin)		2002 EU 2001 US
NovoRapid Novolog/NovoMi x 30/NovoLog Mix 70/30 (Insulin)		1999 EU 2000 US
Valtropin (Somatropin)		2006 EU

Regranex (Becaplermin)	L	1997 US 1999 EU
Revasc (Desirudin)	T	1997 EU

Host: Insect cells

Cervarix (human papillomavirus vaccine)	A	2007 EU
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Host: Hybridomas

Mylotarg (Gemtuzumab)	A	2000 US
Synagis (Palivizumab)		1998 US 1999 EU
CEA-Scan (Arcitumomab)	C	1996 EU, US
Erbix (Cetuximab)		2004 US, EU
HumaSPECT (Votumumab)		1998 EU
OncoScint CR/OV (Satumomab)		1992 EU
ProstaScint (Capromab pendetide)		1996 US
Verluma (Nofetumomab)		1996 US
Tysabri (Natalizumab)	G	2004 US 2006 EU
ReoPro (Abciximab)	I	1994 US
NeuroSpec (Fanolesomab)	K	2004 US, EU
leukoScan (Sulesomab)	M	1997 EU
Orthoclone OKT-3 (Murumonab-Cd3)	T	1996 US
Simulect (Basiliximab)		1998 EU 2001 US
Soliris (Eculizumab)		2007 EU
Zenapax (Daclizumab)		1997 US 1999 EU

Host: Mammalian cells

Dynepo (Epoetin delta)	A	2002 EU
Xigris (Drotrecogin alfa)		2001 US 2002 EU
Avastin (Bevacizumab)	C	2004 US, EU
Erbix (Cetuximab)		2004 EU, US
Herceptin (Trastuzumab)		1998 US 2000 EU
MabCampath/Campath (Alemtuzumab)		2001 EU, US
MabThera/Rituxan (Rituximab)		1997 US 1998 EU
Thyrogen (Thyrotropin alfa)		1998 US 2000 EU
Vectibix (Panitumumab)		2006 US
Zevalin (Ibritumomab tiuxetan)		2002 US 2004 EU
Advata (Octocog alfa)	D	2004 EU, US
Abseamed (Erythropoietin alfa)		2007 US
BeneFIX (Nonacog alfa)		1997 US, EU

Binocrit (Rh erythropoietin alfa)		2007 EU
Bioclata (Antihemophilic factor VIII)		1993 US
Epoetin alfa Hexal (Rh erythropoietin alfa)		2007 EU
Epogen/Procrit (Epoetin)		1989 US 1990 EU
Helixate NexGen, Helixate FS, Kogenate FS (Octocog alfa)		2000 EU 2000 US
Mircera (Methoxy polyethylene glycol-epoetin beta)		2007 EU
NeoRecormon (Epoetin beta)		1997 EU
Nespo/Aranesp (Darbepoetin alfa)		2001 EU 2001 US
Novoseven (Eptacog alfa)		1996 EU 1999 US
Recombinate (Antihemophilic factor)		1992 US
Recothrom (Thrombin)		2008 US
ReFacto (Morotcocog alfa)		1999 EU 2000 US
Soliris (Eculizumab)		2007 US
Xyntha (Morotcocog alfa)		2008 US
Aldurazyme (Laronidase)	E	2003 EU, US
Cerezyme (Imiglucerase)		1994 US 1997 EU
Elaprase (Idursulfase)		2006 US 2007 EU
Fabrazyme (Agalsidase beta)		2001 EU 2003 US
Gonal-F (Follitropin alfa)		1995 EU 1997 US
Luveris (Lutropin alfa)		2000 EU 2004 US
Myozyme (Alglucosidase alfa)		2006 EU, US
Naglazyme (Galsulfase)		2005 US 2006 EU
Ovitrelle/Ovidrel (Choriogonadotropin alfa)		2001 EU 2001 US
Pergoveris (Follitropinalfa/ lutropinalfa)		2007 EU
Pulmozyme (Dornase alfa)		1993 US
Puregon/Follistim (Follitropin beta)		1996 EU 1997 US
Replagal (Agalsidase alfa)		2001 EU
Saizen (Somatotropin)		1996 US
Avonex (Interferon beta-1a)	G	1996 US 1997 EU
Rebif (Interferon beta-1a)		1998 EU 2002 US
Activase (Alteplase)	I	1987 US
Metalyse/TNKase (Tenecteplase)		2000 US 2001 EU
Xolair (Omalizumab)	J	2003 US 2005 EU
Remicade (Inflixmab)	K	1999 US 2000 EU
Bexxar (Tositumomab)	L	2003 US
Amevive (Alefacept)		2003 US
Hylenex (Hyaluronidase human)		2005 US
Raptiva (Efalizumab)		2004 EU 2003 US
Enbrel (Etanercept)	M	1998 US 2000 EU
InFUSE-InductOs Bone Graf (BMP-2; diboterminalfa)		2002 US 2007 EU

Humira (Adalimumab, human monoclonal antibody)		2002 US 2003 EU
Humira (Adalimumab, monoclonal antibody)		2003 EU
Osigraft/OP-1 Implant (Eptotermin alfa)		2001 EU 2001 US
Serostim (Somatropin)	R	1996 US
InductOs (Dibotermin alfa)	T	2002 EU
Orencia (Abatacept)		2005 US 2007 EU
Raptiva (Efalizumab)		2004 EU 2003 US

Host: Transgenic animals:

ATryn (Antithrombin alfa)	D	2006 EU
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^a WHO indications are as follows (the whole list is available at the URL <http://www.who.int/classifications/apps/icd/icd10online/>)

- A Infectious diseases (Protection or treatment)
- C Neoplasms (Imaging or treatment)
- D Diseases of the blood and disorders involving the immune mechanism.
- E Endocrine, nutritional and metabolic diseases
- G Diseases of the nervous system
- H Diseases of the eye and the ear
- I Diseases of the circulatory system
- J Diseases of the respiratory system
- K Diseases of the digestive system
- L Diseases of the skin and subcutaneous tissue
- M Diseases of the musculoskeletal system and connective tissue
- N Diseases of the genitourinary system
- Q Congenital malformations and chromosomal abnormalities
- R Symptoms and signs not elsewhere classified: Pain, cachexia.
- T Injuries and surgical complications: Organ rejection.
- Y External causes of morbidity and mortality
- Z Factors influencing health status and contact with health services