

# Healthcare

## (Overweight/Maintain)

### Pipeline status check: Watch for commercial progress and foreign licensing deals

- Domestic firms' R&D spending has led to an increasing number of new drug approvals and foreign licensing deals
- We see further commercial progress and foreign licensing deals on the horizon
- As a result, valuation multiples could expand further

#### Domestic firms' R&D capabilities are strengthening

Following the policy reform in 2000 that led to the separation of prescribing and dispensing, domestic pharmaceuticals and biotech firms reoriented their businesses towards research and development, similar to those of developed economies. After investing heavily in R&D over the past decade, their efforts have paid off in the form of new drug approvals and foreign licensing deals. Over time, domestic companies have been delivering more progress on this front, demonstrating their strong R&D capabilities.

According to the Korean Ministry of Food and Drug Safety (MFDS), domestic pharma and biotech firms have so far developed and gained approval for a total of 25 new drugs. Of these, 10 new drugs were approved in the last five years (vs. nine from 2001 to 2005 and only five from 2006 to 2010), four of which have been approved in 2015 alone—the highest number for any single year.

There have so far been a total of 146 licensing and supply contracts for drugs developed by domestic pharma and biotech firms. Since 2000, the number of collaborations with foreign companies has been growing. Nineteen deals were made from 2001 to 2005, 42 from 2006 to 2010, and a record 68 from 2011 to 2015. In particular, agreements with firms based in developed markets have been on the rise, with nine such deals inked from 2001 to 2005, 21 from 2006 to 2010, and 27 from 2011 to 2015. In our view, the increase in recognition from pharmaceutical firms in developed markets (where the validation process is more stringent) underscores the strong commercial potential of domestic firms' pipeline.

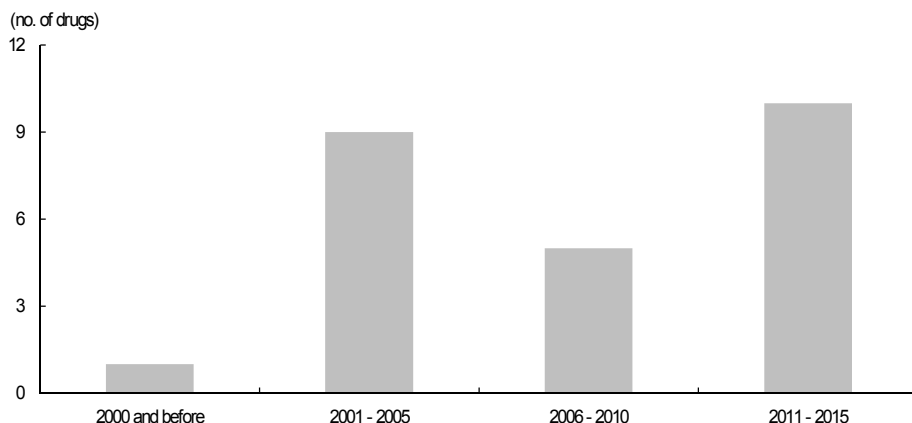
#### Pipeline status check: Watch for commercial progress and foreign licensing deals

We expect a number of domestic pharma and biotech firms to deliver commercial progress domestically or overseas. On the domestic front, CrystalGenomics' arthritis treatment Acelex, GemVax's pancreatic cancer drug Riavax, and Dong-A ST's antibiotic Sivextro are set to hit the market, while Dong-A ST's diabetes treatment DA-1229 is anticipated to gain regulatory approval. Looking overseas, Dong-A ST's Sivextro is expected to go on sale in Europe, while Celltrion's rheumatoid arthritis drug Remsima is awaiting US FDA approval. Green Cross is expected to file for US FDA approval for its immune deficiency treatment IVIG-SN, and Mezzion Pharma's erectile dysfunction drug Udenafil is projected to obtain US FDA approval in early 2016.

Several out-licensing deals with foreign companies are also in the works. As illustrated by Hanmi Pharmaceuticals' recent deal with Eli Lilly, a successful out-license contract can have a significant impact on a company's enterprise value, with the extent of the impact varying depending on the size of the deal as well as the stature of the partner company.

Since the beginning of the year, pharmaceuticals and biotech stocks have been undergoing a re-rating, fueled by progress in overseas commercialization and licensing deals. In 2H, we expect to see more progress in the US and other developed markets, which could trigger further multiple expansion.

**Figure 1. Number of approved drugs developed by domestic pharma and biotech firms**



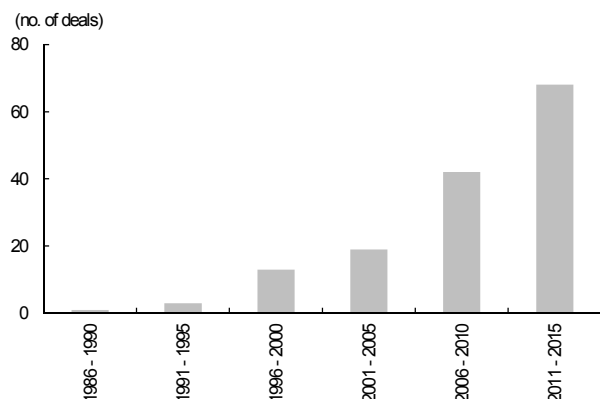
Source: MFDS, KDB Daewoo Securities Research

**Table 1. Approved drugs developed by domestic pharma and biotech firms**

	Drug	Company	Active ingredient	Indication	Approval date
1	Sunpla	SK Chemicals	Heptaplatin	Gastric cancer	7/15/1999
2	Easyef	Daewoong	Human epidermal growth factor	Diabetic foot ulcers	5/30/2001
3	Milican	Dong Wha	Holmium nitrate-66	Liver cancer	7/6/2001
4	Q-Roxin	JW Pharmaceutical	Balofloxacin	Antibiotic	12/17/2001
5	Factive	LG Life Sciences	Methanesulfonate	Antibiotic	12/27/2002
6	Apitoxin	Guju Pharm	Dried apitoxin	Arthritis	5/3/2003
7	Pseudovaccin	CJ HealthCare	Dried purified vaccine	<i>Pseudomonas aeruginosa</i> vaccine	5/28/2003
8	Camtobell	Chong Kun Dang	Belotecan	Cancer	10/22/2003
9	Revanex	Yuhan	Revaprazan	Ulcers	9/15/2005
10	Zydena	Dong-A ST	Udenafil	Erectile dysfunction	11/29/2005
11	Revovir	Bukwang	Clevudine	Hepatitis B	11/13/2006
12	Pelubi	Daewon	Pelubiprofen	Osteoarthritis	4/20/2007
13	Mvix	SK Chemicals	Mirodenafil hydrochloride	Erectile dysfunction	7/18/2007
14	Noltec	Ilyang	Ilaprazole	Ulcers	10/28/2008
15	Kanarb	Boryung	Fimasartan potassium trihydrate	Hypertension	9/9/2010
16	Pyramax	Shin Poong	Pyronaridine phosphate, artesunate	Malaria	8/17/2011
17	Zepeed	JW Pharmaceutical	Avanafil	Erectile dysfunction	8/17/2011
18	Supect	Ilyang	Radotinib hydrochloride	Leukemia	1/5/2012
19	Zemiglo	LGLS	Gemigliptin	Diabetes	6/27/2012
20	Duvie	Chong Kun Dang	Lobeglitazone sulfate	Diabetes	7/4/2013
21	Riavax	GemVax & KAEL	Tertomotide hydrochloride	Pancreatic cancer	9/15/2014
22	Acelex	Crystalgenomics	Polmacoxib	Osteoarthritis	2/5/2015
23	Zabolante	Dong Wha	Zabofloxacin D-asparticacid	Antibiotic	3/20/2015
24	Sivextro oral	Dong-A ST	Tedizolid phosphate	Antibiotic	4/17/2015
25	Sivextro IV	Dong-A ST	Tedizolid phosphate	Antibiotic	4/17/2015

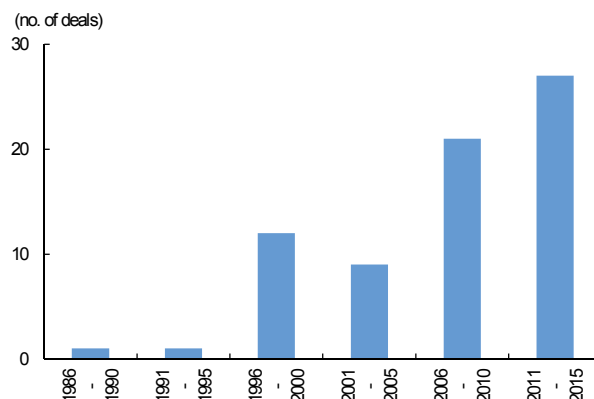
Source: MFDS, KDB Daewoo Securities Research

**Figure 2. Number of licensing and supply contracts for drugs developed by domestic pharma and biotech firms**



Source: KDRA, press, KDB Daewoo Securities Research

**Figure 3. Number of licensing and supply contracts signed with firms based in developed markets**



Source: KDRA, press, KDB Daewoo Securities Research

**Table 2. Technology/drug out-licensing deals (1)**

Year	Licensor	Licensee	Technology/drug	Terms
1989	Hanmi Pharm	Roche (Switzerland)	Antibiotics ceftriaxone (process patent)	- US\$6mn over a six-year period
1991	LG Chem	GlaxoSmithKline (UK)	Fourth generation cephalosporins (product patent)	- Upfront payment: US\$15mn - Running royalty: 7% of net revenue
1994	Yuhan	Grelan Pharmaceutical (Japan)	YH-439, hepatoprotective agent (product patent)	- Upfront payment: US\$2mn - Running royalty: 5% of net revenue
1995	Hanmi Pharm	Galena (Czech Republic)	Cyclosporine A, immunosuppressive agent (process patent)	- Running royalty: 6% of net revenue
1997	Hanmi Pharm	Novartis (Switzerland)	Microemulsion method for immunosuppressive drugs (process patent)	- Upfront payment: US\$3mn - Running royalty: US\$60mn over 10 years (since 1998)
1997	LG Chem	SKB (UK)	Quinolone antibiotics (product patent)	- Upfront payment: US\$37.5mn - Running royalty: 9% of annual revenue for 20 years
1997	LG Chem	Warner-Lambert (US)	Anticoagulants (product patent)	- Upfront payment: US\$40mn - Running royalty: 10% of annual revenue for 12 years
1997	Hanmi Pharm	Novartis (Switzerland)	Microemulsion method for immunosuppressive drugs (process patent)	- Upfront payment: US\$11mn - Running royalty: 15% of net revenue
1998	Bukwang Pharm	Triangle Pharmaceuticals (US)	L-FMAU, hepatitis B treatment (technology out-license)	- Upfront payment: US\$6mn - Milestone: US\$68.5mn - Running royalty: 14% of annual revenue for 10 years
1999	SK Chemicals	Stada (Germany)	Omed Tab.	-
1999	SK Holdings	Johnson & Johnson (US)	Anticonvulsant drug YKP509 (patent and sales license)	- Upfront payment and milestone - Royalty: Certain percentage of revenue
1999	Dong-A Pharm/ Korea Research Institute of Chemical Technology	Stiefel Laboratories (US)	Non-narcotic analgesic KR-2508(patent license)	- Upfront payment (fixed sum): US\$1.5mn - Running royalty: 5% of annual revenue
2000	Chong Kun Dang	Hexal AG (Germany)	Drug manufacturing technology for OMP (Omeprazole), gastroesophageal reflux treatment	- Upfront payment: US\$0.5mn - Running royalty: 3.5% of annual revenue in Germany, for 8 years
2000	Yuhan	SKB (UK)	YH1885, gastroesophageal reflux treatment (patent and sales license)	- Upfront payment (fixed sum): US\$100mn - Running royalty: 10% of annual revenue until 2015
2000	Chong Kun Dang	ALZA (US)	CKD-602, a camptothecin anticancer derivative (patent and sales license)	- Royalty (fixed sum): US\$30mn - Upfront payment: US\$3mn - Running royalty: 5% of annual revenue
2000	SK Holdings	Johnson & Johnson (US)	Antidepressant YKP10A (patent and sales license)	- Upfront payment and milestone - Royalty: A certain share of revenue
2000	Binex	Sichuan Deyang Biochemistry (China)	Development of new process for pancreatin extraction (supercritical fluid extraction)	-
2001	Il-Yang Pharm	Livzon Pharmaceutical (China)	IY-81149, a duodenal ulcer treatment (patent and sales license)	- Advance payment (before commercialization): US\$2.5mn - Additional payment: US\$325,000 - Running royalty (after commercialization): Until 2014 · 10% of total revenue for the first three years · 8% of total revenue for the next five years · 6% for the remaining period - Sales confined to China

Source: KDRA, media reports, KDB Daewoo Securities Research

Table 3. Technology/drug out-licensing deals (2)

Year	Licensor	Licensee	Technology/drug	Terms
2002	Ahngook Pharm	Vietnam	Tobicom Cap	-
2002	LG Life Sciences	GeneSoft (US)	Antibiotic Factive (US/Europe sales partnership)	- Milestone : US\$40.5mn - Running royalty: A certain % of revenue - Secure an exclusive right to supply raw materials and finished products around the globe - Acquire 14% of GeneSoft stock
2002	Daewoong Pharm	Hikma (Jordan)	EGF (sales license)	- Milestone : In addition to the upfront payment of US\$200,000 - Running royalty: A certain % of revenue - Middle East, excluding Iraq and Egypt
2004	ViroMed	Beijing Northland Biotech (China)	VM202RY	- Cross-licensing
2004	AmorePacific	Schwarz (Germany)	Vanilloid receptor (VR) antagonist (patent and sales license)	- Upfront payment (upon signing the contract): EUR3.25mn - Royalty (upon the completion of each development stage, until the approval stage): EUR107.5mn (W161bn) - Running royalty: After sales begin
2004	LG Life Sciences	Anadys (US)	LB80380, a hepatitis B treatment (patent and sales license)	- Milestone: US\$30mn - Running royalty: A certain % of revenue - Secure global exclusive right to supply raw materials - Development cost sharing: 5:5
2004	LG Life Sciences	Holling (Taiwan)	Antibiotic Factive (sales partnership in Taiwan)	- Running royalty: A certain % of revenue - Secure an exclusive right to supply finished products - Obligated to obtain approval for sales in the partner's market
2004	LG Life Sciences	Ache (Brazil)	Antibiotic Factive (sales partnership in Brazil)	- Running royalty: A certain % of revenue - Secure an exclusive right to supply finished products - Obligated to obtain approval for sales in the partner's market
2004	LG Life Sciences	Aspen (South Africa)	Antibiotic Factive (sales partnership in South Africa and four other countries)	- Running royalty: A certain % of revenue - Secure an exclusive right to supply finished products - Obligated to obtain approval for sales in the partner's market
2004	LG Life Sciences	Tabuk (Saudi Arabia)	Antibiotic Factive (sales partnership in the Middle East)	- Running royalty: A certain % of revenue - Secure an exclusive right to supply finished products - Obligated to obtain approval for sales in the partner's market
2004	LG Life Sciences	Vero Pharm (Russia)	Antibiotic Factive (sales partnership in Russia and the Commonwealth of Independent States)	- Running royalty: A certain % of revenue - Secure an exclusive right to supply finished products - Obligated to obtain approval for sales in the partner's market
2004	LG Life Sciences	Abdi Ibrahim (Turkey)	Antibiotic Factive (sales partnership in Turkey)	- Running royalty: A certain % of revenue - Secure an exclusive right to supply finished products - Obligated to obtain approval for sales in the partner's market
2004	Bukwang Pharm	Eisai (Japan)	Clevudine (development and sales license in 10 Asian countries, excluding Korea)	- Upfront payment: US\$5mn - Royalty : US\$40mn - Running royalty: Roughly 14% of net revenue
2005	JW Pharm	Chugui (Japan)	Colorectal cancer drug	-
2005	Ahngook Pharm	Vietnam	Soft cap technology	-
2005	Bukwang Pharm	Pharmasset (US)	Clevudine (development and sales license in the Americas, the Caribbean countries, Israel, etc., excluding Asia)	- Upfront payment: US\$6mn - Royalty: US\$30mn - Running royalty: Roughly 10-14% of net revenue
2005	Il-Yang Pharm	TAP(US)	Ilaprazole (patent, drug synthesis method, and sales licenses)	- Upfront payment: US\$3.5mn - Royalty: US\$44mn - Running royalty: 5-10% of global sales (excluding sales in Korea and China), for 15 years
2005	Samjin Pharm	ImQuest Pharmaceuticals (US)	Patent and sales licenses for antiviral agents (SJ-3366 and other similar chemical compounds)	- R&D and business licenses awarded to ImQuest - ImQuest bears the entire development cost - Running royalty: A certain % of revenue
2006	Daewon Pharm	N/A (Vietnam)	Soft capsule manufacturing process	-
2006	Digital Biotech	Grunenthal GmbH(Germany)	Next generation painkiller	Royalty: EUR40mn
2006	Green Cross	BIRD Projekt GmbH (Germany)	Patent and sales licenses for the genetic recombination technology related to osteoporosis treatment	- Global development/sales licenses (excluding Asia) - Royalty : EUR130mn ① EUR3mn (beginning of phase 3 trial) ② EUR3mn (upon sales approval) ③ EUR10mn (upon signing marketing partnership) ④ A 40% equity stake in BIRD - Running royalty: 3.5-4.5% of annual net revenue

Source: KDRA, media reports, KDB Daewoo Securities Research

Table 4. Technology/drug out-licensing deals (3)

Year	Licensor	Licensee	Technology/drug	Terms
2006	Samjin Pharm	ImQuest Pharmaceuticals (US)	Patent and sales licenses for piperazine-based cancer drug	- R&D and business licenses awarded to ImQuest - ImQuest bears the entire development cost - Running royalty: A certain % of revenue
2006	JW Pharm	Sandoz (Switzerland)	Imipenem (manufacturing and sales licenses)	- Upfront payment: US\$2.5mn - Running royalty: A certain % of net revenue - Secure exclusive right to supply core raw materials
2006	Hanlim Pharm	Rama Pharma (Syria)	Eye lotion (manufacturing and sales licenses)	- Running royalty: 6% of revenue from the Middle East - Secure exclusive right to supply core raw materials
2006	Dongbu Farm Hannong	Danube Pharmaceuticals (US)	Glaucoma drug (patent, manufacturing and sales licenses)	- Upfront payment: US\$1mn - Royalty: US\$115mn - Running royalty: 4-13% of revenue (20 years)
2006	Dong-A Pharm	GTS (Japan)	G-CSF (biosimilar)	-
2007	Dong-A Pharm	Trius Therapeutics (US)	DA-7218, a super bacteria-targeting antibiotic	-
2007	Hanall Biopharma	N/A (China)	PN-Mix Inj.	-
2007	Hanlim Pharm	Novtethical (Portugal)	Lodien tab.	-
2007	Yuhan	Zhizun (China)	REVANEX manufacturing license	-
2007	Hanmi Pharm	N/A (Australia)	Slimming capsule supply	-
2007	LG Life Sciences	Takeda (Japan)	Global licensing and research collaboration agreement to discover, develop and commercialize anti-obesity drugs	-
2007	Chong Kun Dang	OnKor (US)	Patent, manufacturing and sales licenses for CKD-602	-
2007	Dong Wha Pharm	Pacific Beach BioSciences (US)	Quinolone antimicrobial agents (joint research and development/sales licenses in countries excluding Asia)	- US\$56.5mn total payment, plus running royalty
2007	Dong Wha Pharm	Procter & Gamble Pharmaceuticals (US)	Osteoporosis treatment (development/sales licenses in countries excluding Asia)	- US\$5.11mn total payment, plus running royalty
2007	LG Life Sciences	Gilead Sciences (US)	Liver disease treatment (development/sales licenses in countries excluding Korea, India and China)	- Upfront payment: US\$20mn - Royalty: US\$200mn and running royalty
2008	Dong Wha Pharm	Teijin (Japan)	DW-1350	- Royalty: US\$97mn and exclusive rights in Japan
2008	CrystalGenomics	Proquest Investment (US)	Hypoxia treatment	-
2008	Hanall Biopharma	N/A (China)	Tomiporan injection	-
2008	Hanall Biopharma	N/A (Indonesia)	PN-Mix Inj.	-
2008	Yuhan	Andromaco (Chile)	Revanex	- Distribution Agreement
2008	Yuhan	Zhijun (China)	Revanex	- License Agreement
2008	SK Chemicals	Teva (Europe)	SID530	-
2009	Chong Kun Dang	Zafgen (US)	CKD-732	-
2009	GL PharmTech	Siegfried (Switzerland)	Tolterodine (technology license-out)	-
2009	SK Chemicals	CSL (Australia)	NBP601	-
2009	Yuhan	Cadila Healthcare (India)	Revanex	- License and Supply Agreement
2010	Digital Biotech	Roche (Switzerland)	RAGE antagonist	- Joint research and technology transfer related to new drug candidates - Total milestone of US\$290mn
2010	SK Biopharmaceuticals	Company N (US)	Diazepam Nasal Spray	-
2010	Handok	Sanofi-Aventis (France)	Amaryl-M Tab	-
2010	LG Life Sciences	DCPC (China)	Next-generation diabetes treatment	- Upfront payment: US\$4mn
2010	C&C Research Laboratories	Chuga Pharm (Japan)	Drug applicant licensing	-
2010	Dong-A Pharm	Warner Chilcott (US)	DA-8159 (PDE-V inhibitor)	-
2010	Hanall Biopharma	Dem Ilac(Turkey)	HL-143 (Interferon $\alpha$ )	- Development of Behcet's disease and HCV treatments

2010	Hanall Biopharma	BERNOFARM(Indonesia)	HL007, hypertension-hyperlipidemia complex	
2010	Korea United Pharm	Segmenta Pharm(Russia)	Clanza® CR Tabs	- Export to Russia and former CIS region (Ukraine, Kazakhstan, Uzbekistan)
2010	Korea United Pharm	Itrom Trading Drug Store(UAE)	Clanza® CR Tabs	- Export to 16 countries in the Middle East and Africa
2010	Hanall Biopharma	YSP(Malaysia)	HL009, adenosylcobalamin liposomal gel	- Export the adenosylcobalamin liposomal gel
2010	Ahngook Pharm	UK	Theobromine 300mg	-
2010	LG Life Sciences	Nobel Pharmaceuticals(Turkey)	Next-generation diabetes treatment	- Upfront payment: US\$2mn

Source: KDRA, media reports, KDB Daewoo Securities Research

**Table 5. Technology/drug out-licensing deals (4)**

Year	Licensor	Licensee	Technology/drug	Terms
2011	SK Biopharmaceuticals	Company A (US)	SKL-N05	- Development and commercialization of hypnolepsy treatment in the US
2011	SK Biopharmaceuticals	Medicilon (China)	SKL-PSY	- Development and SFDA IND approval in China
2011	Boryung Pharm	Stendhal (Mexico)	Kanarb Tab (exclusive sales license in Mexico)	- Royalty: US\$6.85mn (Exported US\$17mn worth of finished products since 2010)
2011	ViroMed	Enlyton(US)	VM503	- Upfront payment: US\$100,000 - Milestone : US\$4.6mn
2011	Samyang Biopharm	Takeda Pharmaceuticals (Japan)	Carriers for siRNA delivery	- Joint research and licensing
2011	Samyang Biopharm	Kalbe (Indonesia)	Genexol Injection manufacturing technology	- Manufacturing technology transfer
2011	Korea United Pharm	Laboratories Lafran (France)	Clanza® CR Tabs	- Manufacturing/sales contract for Incrementally Modified Drug(IMD) pipeline in France
2011	Dong-A Pharm	Meiji (Japan)	DMB-3111 (Herceptin biosimilar)	-
2011	Dong-A Pharm	Meiji (Japan)	DA-8159(PDE-V inhibitor)	-
2011	Hanmi Pharm	Kinex Pharmaceuticals (US)	Orascovery program, a development platform technology for oral cancer drugs	- Transfer of development/commercialization right in the US and Europe - US\$34mn, including upfront (running royalty to be payable)
2011	Ahngook Pharm	Vietnam, China	Synatura	-
2012	Hanmi Pharm	Spectrum Pharmaceuticals (US)	LAPS-GCSF (HM10460A)	- Joint development from phase 2 trials - Payment: Upfront, milestone, running royalty - Spectrum acquires all sales licenses (excluding Korea, China and Japan)
2012	Ahngook Pharm	Spain	Synatura	-
2012	Dong-A Pharm	Luye (China)	DA-1229 (DPP-IV inhibitor)	-
2012	Daewon Pharm	Sichuan Hebang Group Industry (China)	Pelubiprofen (Korea's 12 <sup>th</sup> new drug)	- Royalty payment by registration stage, and exclusive supply right for 8 years from 2015
2012	Bioneer	Sanofi-Aventis	SAMiRNA	- Technology transfer, and clinical research on new drug candidates in 2013
2012	Samsung SDS	CHRISTUS Health	Electronic medical record (EMR) solutions	- EMR solutions supply contract for 10 years
2012	RNL Bio	DB ilac (Turkey)	Adipose-derived stem cell-related technology	- Upfront royalty payment (US\$5mn), plus at least 15% of revenue afterwards (a total of US\$200mn in running royalties paid to RNL Bio)
2012	Green Cross	KAKETSUKEN (Japan)	Varicella vaccine virus (MAV/O6)	- Milestone and royalty payment from KAKETSUKEN
2012	Medipost	Eton (Hong Kong)	Cartistem (cartilage regenerative stem cell treatment)	- Sales license: W730mn, milestone: W3.8bn
2012	CTC Bio	Teva Pharmaceutical (Israel)	Film-type erectile-dysfunction drug	- W11bn in exports for three years
2012	Dong-A Pharm	Alkem (India)	DA-1229 (diabetes treatment)	- Upfront and milestone payments (running royalties after sales begin)
2012	LG Life Sciences	Sanofi-Aventis (France)	DPP_IV (diabetes treatment) inhibitor	- Sanofi develops/sells the drug in 80 nations including Russia, the Middle East, India and Africa (for Korea, LG Life Sciences has already signed a contract with Sanofi Korea) - Total milestone of up to W100bn, plus running royalties
2013	Korea United Pharm	Teva Pharmaceutical (Israel)	Clanza® CR Tabs	- Milestone payment
2013	Korea United	Jiangxi Jimin Kexin	Cilostan CR and Clanza® CR Tabs	- US\$68.81mn for the first 15 years

	Pharm	Pharmaceutical (JJK)		
2013	JW Holdings	Baxter (US)	Nutrient fluids containing Omega-3 acids	- Baxter is responsible for global marketing, promotion, distribution and sales (excluding Korea) - Upfront: US\$25mn, milestone: US\$10mn, plus running royalty
2013	Medytox	Allergan (US)	A neurotoxin applicant currently under development	- Domestic market: Medytox, Japan: Joint sales, other regions: Allergan (development and sales) - Upfront of US\$65mn, total milestone of US\$180mn, plus running royalty
2013	Daewoong Pharm	Evolus (US)	Botulinum toxin	- Exclusive supply to the US, Europe, Australia, and Canada - US\$269.6mn in royalties and five-year cumulative exports
2013	Green Cross	Algeria drug procurement authority (Algeria)	Hunterase (Hunter syndrome drug)	- EUR2.1mn
2013	Il-Yang Pharm	Yangzhou Il-Yang Pharmaceutical (China)	Supect (leukemia treatment)	- Technology out-licensing contract - Total upfront payment of US\$3mn
2013	Daewoong Pharm	Pharmavital (Panama)	NABOTA (wrinkle reduction)	- Sales agreement (15 South American countries including Brazil)
2013	LG Life Sciences	Stendhal (Mexico)	Zemiglo and Zemimet (diabetes drug)	- Development and sales rights in 23 Latin American countries - Total milestone and finished product exports of up to US\$25mn (including initial royalty payment)
2013	Medipost	Alkem (India)	Cartistem (cartilage regenerative stem cell treatment)	- Sales agreement - Milestone, etc.
2013	Myungin Pharm	China Resources Saikhe Pharmaceutical (China)	Parox CR (anti-depressant)	- Exclusive export contract

Source: KDRA, media reports, KDB Daewoo Securities Research

**Table 6. Technology/drug out-licensing deals (5)**

Year	Licensor	Licensee	Technology/drug	Terms
2013	Samsung Bioepis	Biogen Idec (US)	Biosimilar	- Development/commercialization - Upfront plus milestone
2014	Boryung Pharm	Gloria Pharmaceuticals (China)	Kanarb Tab (high blood pressure drug)	- License-out contract - License fee: US\$5.4mn
2014	Hyundai Pharm	Novetec Group (China)	Sulfolase Cap. (expectorant)	- License and supply agreements
2014	MG	Wuhan Halfsky Pharmacy (China)	3-chamber nutrient fluids	- Supply contract - US\$65mn over three years
2014	Dong-A ST	Sanwa Kagaku Kenkyusho (Japan)	DA-3880 (hematosis stimulant)	- License-out contract - Upfront plus milestone
2014	Bioneer	Sanofi-Aventis (Korea)	SAMiRNA	- Additional joint research contract - Additional cancer targets
2014	Daewoong Pharm	Bago (Argentina)	NABOTA (wrinkle reduction)	- Supply contract - Supply for five years from 2015
2014	Qurient	Infectex (Russia)	Q203 (TB)	- License-out (development/commercialization)
2014	Alteogen	Kissei Pharmaceutical (Japan)	Biosimilar	- Strategic alliance and licensing for R&D and sales
2014	Il-Yang Pharm	Abdi Ibrahim (Turkey)	Noltec (ulcer treatment)	- Exclusive sales contract
2014	Dongkook Pharm	NaSiBao Pharmaceutical (China)	Bellast (wrinkle reduction)	- Supply contract - Roughly W7bn for five years from 2018
2014	SK Chemicals	Sanofi Pasteur (France)	Pneumococcal vaccine	- Joint development agreement - W50bn, including initial royalty payment plus milestone
2014	Il-Yang Pharm	Abdi Ibrahim (Turkey)	Supect (leukemia treatment)	- Exclusive sales contract
2014	Dong-A ST	Suzhou Sino (China)	Closerin	- Exclusive sales contract in China - At least W25bn for five years
2014	Ribomic	Taisho Pharmaceutical (Japan)	Aptamer drug	- Joint research agreement
2014	Korea United Pharm	Teva Pharmaceutical (Israel)	Clanza® CR Tabs	- Additional contract (for South America)
2014	GCBT (subsidiary of Green Cross)	Héma-Québec (Canada)	IV-Globulin and albumin	- Supply from 2019
2014	Il-Yang Pharm	R-Pharm (Russia)	Supect (leukemia treatment)	- Term sheet sign-up - License fee and milestone: US\$13mn
2014	Il-Yang Pharm	Aché Laboratórios (Brazil)	Noltec (ulcer treatment)	- Term sheet sign-up - License fee and milestone: US\$18.5mn
2014	Hanmi Pharm	Actavis (US)	Hyalrheuma (arthritis treatment)	- Export contract. Exclusive sales in the US for 12 years
2014	Seoul Pharma	Center Laboratories (Taiwan)	Vults (erectile dysfunction drug)	- Supply contract

2014	Hanmi Pharm	Luye Pharma (China)	Poziotinib (targeted cancer therapy)	- License contract - Upfront and milestone: W20bn
2014	Dong-A ST	FarmaSino Pharmaceuticals (China)	Gonadopin NF (infertility drug)	- Supply for 10 years (upon sales product launch); - Exclusive sales right in China for FarmaSino
2014	Dong-A ST	Eurofarma Laboratórios (Brazil)	Evogliptin (diabetes drug)	- License-out - Upfront and milestone
2014	LG Life Sciences	Mochida Pharmaceutical (Japan)	Humira biosimilar (rheumatoid arthritis)	- Business alliance - Finished product supply upon commercialization
2014	LG Life Sciences	Weijian Pharma Group (China)	Follitrope (infertility treatment)	- Exclusive sales contract - Initial royalty payment plus milestone; Supply of finished products
2014	CLPharm	Tokai Capsule (Japan)	Tadalafil film (erectile dysfunction drug)	- Export contract; Development costs incurred
2014	Il-Yang Pharm	R-Pharm (Russia)	Supect (leukemia treatment)	- Export contract - Upfront (US\$3mn), plus milestone (US\$10mn) - Raw material supply for five years (US\$21mn)
2015	Daewoong Pharm	Autotelic (US)	Olostar (high blood pressure, hyperlipidemia drug)	- Export contract; Supply to reach W300bn for 10 years (upon product launch)
2015	BCWorld Pharm	Saudi Arabia SPC (Saudi Arabia)	17 items	- Finished product supply and technology transfer
2015	Huons	Beijing Interlims (China)	Filler (wrinkle reduction)	- Export contract
2015	Hanmi Pharm	Eli Lilly (US)	HM71224 (immune disease)	- License contract - Upfront (US\$50mn) plus milestone (US\$690mn)
2015	Daewoong Pharm	Seltek (Turkey)	NABOTA (wrinkle reduction)	- Export contract - W20bn for five years (based on local sales price)
2015	Dong-A ST	Eurofarma Laboratórios (Brazil)	Evogliptin (diabetes drug)	- Additional license-out contract - Added 17 South American countries

Source: KDRA, media reports, KDB Daewoo Securities Research

Table 7. Pipeline status check (1)

Company	Division	Code/project/brand	Major indication	Phase
Celltrion	Biosimilar	Remsima	Rheumatoid arthritis	Launched in Korea, Europe, Canada, Japan, and elsewhere Submitted NDA in the US
		CT-P06	Breast cancer	Secured MFDS approval
		CT-P10	Non-Hodgkin's lymphoma	Global phase 3
	Biologics	CT-P27	Influenza	Global phase 2a completed
Hanmi Pharmaceutical	Biologics	HM12470	Diabetes	Phase 1
		HM12525A	Diabetes & obesity	Phase 1
		HM11260C	Diabetes & obesity	Phase 2
		HM10460A	Neutropenia	Phase 2
		HM10560A	Growth hormone	Phase 2
	Chemical	HM71224	Rheumatoid arthritis	Phase 1
		HM95573	Solid cancer	Phase 1
		KX2-391	Solid cancer	Phase 1
		Oratecan	Solid cancer	Phase 1
		Poziotinib	Lung cancer	Phase 2
		Oraxol	Gastric cancer	Phase 2
Yuhan	Biologics	HM61713	Lung cancer	Phase 2
		ALG-1001	Retinal disease	Phase 2
Yuhan	Chemical	YH4808	Reflux esophagitis	Phase 2
		YH12852	IBS	Phase 1
	Green Cross	Vaccine	GC1107	Tetanus, diphtheria
MG1109			Avian influenza	Phase 3
GC3110A			Influenza vaccine	Phase 3
GC1109			Anthrax bacterium	Phase 2
GC3106A			Influenza vaccine	Phase 1
MG1111			Chickenpox	Phase 1
Biologics		IVIG SN	PID	Phase 3 (US)
		GreenGene F	Hemophilia type A	Phase 3 (US)

		Hunterase	Hunter syndrome	Secured MFDS approval; US clinical trials in progress
		Neulapeg	neutropenia	Approval
		GC1102	Hepatitis recurrence + chronic hepatitis	Phase 2
		MGAH22	Breast cancer	Phase 2
		GC1118A	Colorectal cancer	Phase 1
	Chemical	GC2107	anticoagulant	Phase 1
	Herbal	GC6101A	Gastritis	Phase 2
Viomed	Biologics	VM202	Critical limb ischemia	Phase 2 completed
			Diabetic neuropathy	Phase 3
			Ischemic heart disease	Preparing to Phase 2
Amyotrophic lateral sclerosis	Phase 1			
		VM501	Thrombocytopenia	Phase 3
		VM206	Breast cancer	Phase 1 completed
SK Chemical	Biologics	NBP601	Hemophilia	Phase 3
	Vaccine	Sky cell flue	Influenza Quadrivalent vaccine	Launch Phase 3
Komipharm	Chemical	KML001	Lung cancer, prostate cancer, biliary tract cancer, liver cancer, lymphoma	Phase 2
			Solid cancer	Phase 1 completed
		PAX-1	Cancer pain	Phase 2

Source: Company data, KDB Daewoo Securities Research

**Table 8. Pipeline status check (2)**

Company	Division	Code/project/brand	Major indication	Phase
Dong-A ST	Biologics	DA-3801	Infertility	Submitted NDA to MFDS (Korea)
		DA-3803	Infertility	Preparing NDA submission to MFDS (Korea)
		DA-3030	Diabetic neuropathy	Phase 1 completed (Korea)
		DA-3031	Neutropenia	Submitted NDA to MFDS (Korea)
		DA-3051	Multiple sclerosis	Preparing phase 3 (Brazil)
		DMB-3111	Breast cancer	Phase 1 (Japan)
	Chemical	DA-8159 (Zydena)	Erectile dysfunction Prostatism	Submitted NDA to the US FDA Phase 2 completed in the US; Phase 2 in progress in Japan and Korea
		DA-7218 (Sivextro)	Pulmonary arterial hypertension Pneumonia	Launched in the US; Approved in Europe and Korea Global phase 3
		DA-1229	Diabetes type 2	Phase 3 completed(Korea), IND approval(China)
		DA-6034	Gastritis Dry eye syndrome	Phase 3 completed (Korea) Phase 2 completed (Korea)
	Herbal	DA-9701 (Motilitone)	Functional dyspepsia	Launched in Korea; Preparing phase 2 in the US
		DA-9801	Diabetic neuropathy	Phase 2 completed in both Korea and the US
	LG Life Sciences	Vaccine	Eupenta	Diphtheria/tetanus/pertussis/hepatitis B/Hib
Biologics		Eutropin Pen-type	Growth hormone deficiency	Submitted NDA
		Follitrope (Global)	Infertility	Phase 3
		BEPO albumin (Global)	Anemia	Phase 1
		Synovian	Osteoarthritis	Phase 3
Biosimilar		LBEC0101	Rheumatoid arthritis	Phase 3
		LBAL	Rheumatoid arthritis	Phase 1
Chemical		Zemiglo	Insulin combination therapy	Phase 3
		LC280126	Myocardial infarction	Phase 2
Complex	ZemiMet	Type 2 diabetes	Phase 3	
	ZemiStatin	Diabetes/hyperlipidemia	Phase 3	
	ZemiSU	Type 2 diabetes	Phase 1	

Bukwang Pharmaceutical	Chemical	Apatinib	Solid cancer	Phase 2
		MLR-1023	Type 2 diabetes	Phase 2
	Contera Pharma (Subsidiary)	JM-010	Parkinsonism motor disturbance	Phase 2
Daewoong Pharmaceutical	Chemical	DWP05195	Neurodegenerative pain	Phase 2
		DWP09031	Alzheimer's dementia	Phase 1
		DWP10292	Non-alcoholic fatty liver disease	Phase 1
	Biologics	Easyef (Nepidermin)	Stomatitis	Phase 3
		NOVOSIS(rhBMP-2) Nabota	Spine fusion Upper muscle strain after apoplexy	Phase 2 Phase 3
Chong Kun Dang	Chemical	CKD-732	HIAO, severe obesity	Phase 2
			Prader-Willi Syndrome	Phase 3
		CKD-516	Solid cancer	Phase 1
		CKD-581	Lymphoma	Phase 1
	Biologics	CKD-519	Hyperlipidemia	Phase 1
		CKD-11101	Anemia	Phase 3
HLB	Subsidiary (LSKB 28.0%)	YN968D1 (Apatinib mesylate)	Solid cancer	Phase 2 (US)
			Gastric cancer	Approved in China

Source: Company data, KDB Daewoo Securities Research

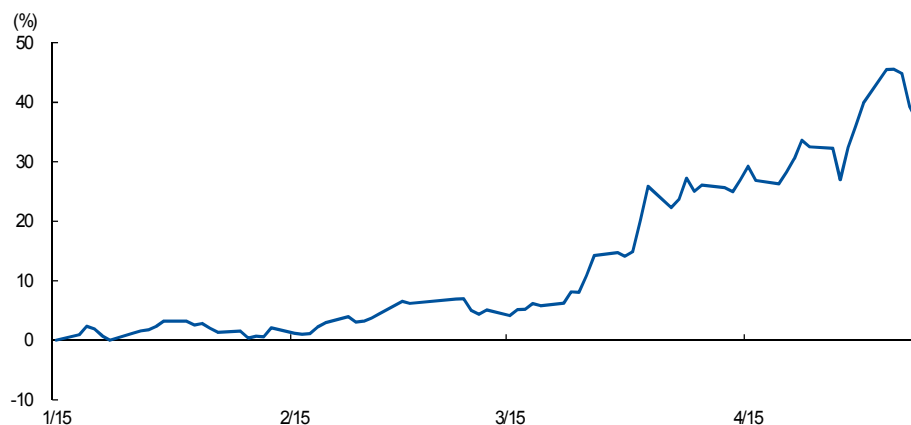
**Table 9. Pipeline status check (3)**

Company	Division	Code/project/brand	Major indication	Phase
Il-Yang Pharmaceutical	Chemical	Ilaprazole (No1tec)	Antiulcer	Launched
		Radotinib (Supect)	Leukemia	Launched
	Vaccine	Il-Yang flu vaccine	Influenza Quadrivalent vaccine	Launched Phase 1/2a
GemVax	Biologics	RIAVAX IV	Pancreatic cancer	Received conditional MFDS approval (Korea)
		GV1001	Prostate cancer	Phase 3
			Non-small cell lung cancer	Phase 2
			Melanoma Prostatism	Phase 2 Phase 2
Genexine	Bio better	GX-E2	Anemia	Phase 2
		GX-H9	Growth hormone deficiency	Phase 2
		GX-G3	Leukopenia	Phase 1 completed
	Biologics	GX-188E	Cervical cancer	Phase 2
		GX-110E	HBV chronic infection	Preparing Phase 2
Kolon Life Science	Biologics	TG-C	Degenerative arthritis (IV)	Phase 2 completed
		TG-C(S)	Degenerative arthritis (MIS)	Phase 2
JW Pharma	Chemical	CWP291	Acute myeloid leukemia	Phase 1
		URC102	Gout	Phase 2
CTC Bio	Super generic	Sildenafil OSF	Erectile dysfunction	Approved
		Tadalafil OSF	Erectile dysfunction	Approved
		Desmopressin OSF	Nocturia	Phase 1
		Sildenafil + Clomipramine complex	Erectile dysfunction + prospermia	Phase 2
		Purgative for colonoscopy	Purgative for colonoscopy	IND approval
		Entecavir OSF	Hepatitis	IND approval
CrystalGenomics	Chemical	Acelex	Arthritis	Approved
		CG400549	Antibiotic for super bacteria	Phase 2
		CG200745	Myelodysplastic syndromes (MDS)	Phase 1
		CG026806	Blood cancer	Pre-clinical
JW Shinyak	Chemical	Thrupas ODT	prostatism	Phase 1
	Biologics	CreaVax RCC	kidney cancer	Phase 3 completed

		CreaVax HCC	Liver cancer	Phase 3	
		CreaVax RA	Rheumatoid arthritis	Phase 2	
		Actemra SC	Rheumatoid arthritis	Approval	
Alteogen	Biologics	Enbrel biosimilar	Autoimmune disease	Pre-clinical phase completed	
		Herceptin biosimilar	Breast cancer/gastric cancer	Pre-clinical phase completed	
		hGH-NexP	Growth hormone deficiency	Phase 1	
	Other	Milk booster	Cow milk booster	Phase 3	
Mezzion	Chemical	Udenafil	Erectile dysfunction	Submitted NDA to the US FDA	
			Prostatism		Phase 2
			Erectile dysfunction + prostatism		Phase 2
			Pulmonary hypertension		Phase 2
Medifron	Chemical	TRPV1 antagonist	Neuropathic pain	Pre-clinical	
		A $\beta$ aggregation inhibitor	Alzheimer's dementia	Phase 1 (Korea)	
		RAGE antagonist	Alzheimer's dementia	Pre-clinical	
	Other	AD diagnostic kits		Submitted MMAEU to the EMA (EU)	

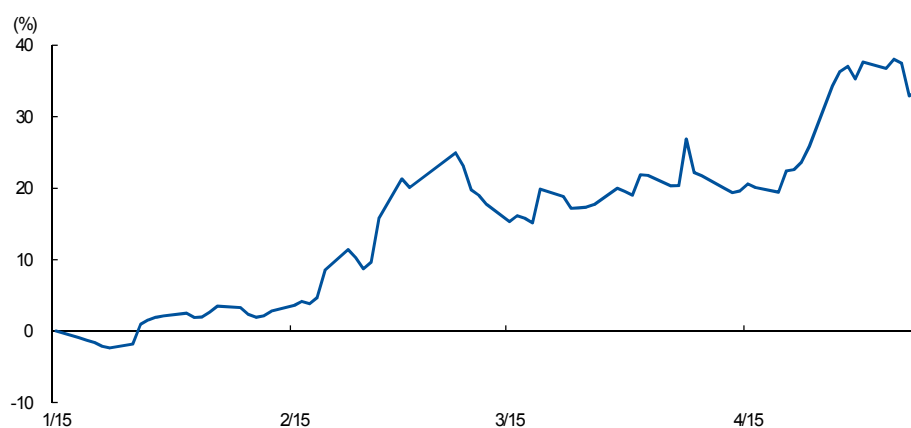
Source: Company data, KDB Daewoo Securities Research

**Figure 4. KOSPI Pharmaceuticals Index's performance relative to KOSPI**



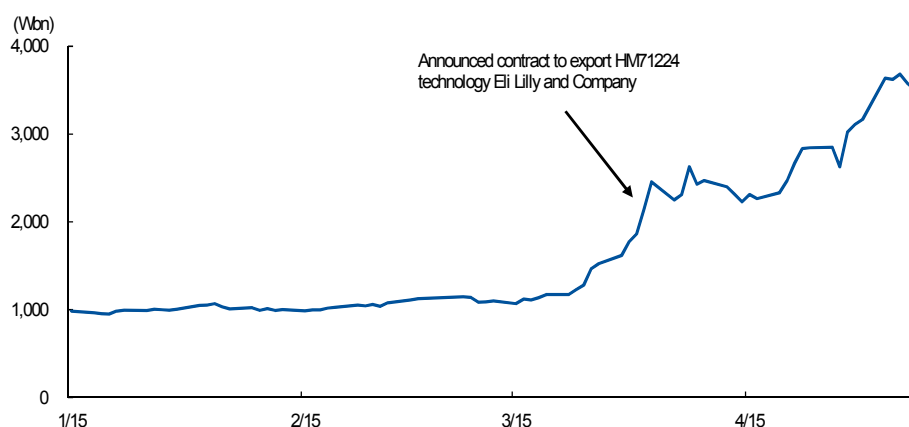
Source: KDB Daewoo Securities Research

**Figure 5. KOSDAQ Pharmaceuticals Index's performance relative to KOSDAQ**



Source: KDB Daewoo Securities Research

**Figure 6. Hanmi Pharmaceutical's market cap trend**



Source: KDB Daewoo Securities Research

**Table 10. BTK protein inhibitor global development status**

Drugs	Original maker	Major indication	Status	Notes
Ibrutinib	Celera Genomics Group.	Mantle cell lymphoma	Launch	-Celera Genomics signed an out-licensing agreement with Janssen (upfront US\$150mn, total US\$975mn) -Janssen co-developing with AstraZeneca and BMS -Pharmacyclics acquired Celera Genomics -AbbVie acquired Pharmacyclics (total deal size: US\$21bn)
		Waldenstrom's macroglobulinemia	Pre-registration	
		Chronic lymphocytic leukemia	Launch	
		Hairy cell leukemia	II	
		Follicular lymphoma	II	
		Diffuse large B cell lymphoma	III	
		Graft-versus-host disease	I	
		B-cell lymphoma	I	
		Breast cancer	Preclinical	
		Non-Hodgkin's lymphoma	III	
		MALT lymphoma	II	
Multiple myeloma	II			
BGB 3111	BeiGene	Cancer	I	
ACP 196	Ascerta Pharma	Waldenstrom's macroglobulinemia	I	
		Chronic lymphocytic leukemia	I	
Agammaglobulinemia tyrosine kinase inhibitors: Aurigene	Aurigene Discovery Technologies	Autoimmune disorders	I	
		Inflammation	Preclinical	
<b>HM 71224</b>	<b>Hanmi Pharmaceutical</b>	<b>Rheumatoid arthritis</b>	<b>I</b>	<b>-Hanmi Pharmaceutical signed an out-licensing agreement with Eli Lilly (upfront US\$50mn, total US\$690mn)</b>
PRN 1008	Principia Biopharma	Autoimmune disorders	I	
Bruton's tyrosine kinase inhibitors: Pharmacyclics	Pharmacyclics	Rheumatoid arthritis	I	-Pharmacyclics acquired Celera Genomics -AbbVie acquired Pharmacyclics (total deal size: US\$21bn)
		Rheumatoid arthritis	Preclinical	
		Autoimmune disorders	Preclinical	
		Inflammation	Preclinical	
		Hypersensitivity	Preclinical	
CC 292	Avila Therapeutics	Rheumatoid arthritis	II	-Celgene acquired Avila Therapeutics (upfront US\$350mn, total US\$925mn)
		Multiple myeloma	Preclinical	
		Non-Hodgkin's lymphoma	I	
		Cancer	I	
		Chronic lymphocytic leukemia	I	
Research program: BTK inhibitors – Celgene	Avila Therapeutics	Cancer	Preclinical	-Celgene acquired Avila Therapeutics
		Autoimmune disorders	Preclinical	
ONO 4059	Ono Pharmaceutical	B-cell lymphoma	I	-Ono Pharmaceutical signed an out-licensing agreement with Gilead

Source: Bloomberg, KDB Daewoo Securities Research

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# APPENDIX 1

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