MIRAE ASSET
Building on principles

Medtech

Company Report
April 29, 2019

Genomictree

(228760 KQ)

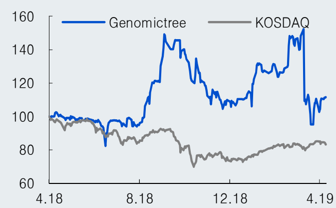
User manual (1)

Not Rated

Target Price (12M, W)	**-**
Share Price (04/26/19, W)	27,300
Expected Return	-

OP (19F, W100mn)	-15
Consensus OP (19F, W100mn)	-30
EPS Growth (19F, %)	-
Market EPS Growth (19F, %)	-16.8
P/E (19F, x)	-
Market P/E (19F, x)	11.9
KOSDAQ	750.43
Market Cap (W100mn)	5,566
Shares Outstanding (mn)	20
Free Float (%)	72.0
Foreign Ownership (%)	0.8
Beta (12M)	2.74
52-Week Low	20,550
52-Week High	38,000

(%)	**1M**	**6M**	**12M**
Absolute	-26.1	-9.1	9.2
Relative	-28.4	-16.8	26.6



Mirae Asset Daewoo Co., Ltd.

[Medtech/Healthcare Solutions]

Choong-hyun Kim, CFA
+822-3774-1740
choonghyun.kim@miraeasset.com

Share price trends and takeaways

Genomictree is a developer of early colorectal cancer screening tests. Following its move to the KOSDAQ, the company's stock has displayed relatively high volatility, mainly because the lock-up period for existing shareholders (around 27% of shares outstanding) was only one month. In this report, we present an investment idea for Genomictree, assuming that the company's biggest near-term risk—profit taking by existing shareholders—is kept to a minimum.

Investment idea based on case studies

In our view, Genomictree offers an attractive technology transfer idea. There are three conditions that need to be met for in-vitro diagnostics (IVD) revenue to significantly grow. 1) Is there a rationale for prescribing the IVD? 2) Is the IVD covered by insurers as an in-network service? 3) Does the IVD generate high ROI for the buyer? Our technology transfer idea for Genomictree is based on our belief that while the company may currently satisfy the third condition, it may struggle to meet the first two in the near future.

The key issue for a technology transfer idea is whether there is a buyer and whether a deal can be done in the foreseeable future.

A major trigger behind the rising value of Exact Sciences, to which Genomictree is often compared, was its joint marketing partnership with Pfizer. What's most noteworthy is the reason Pfizer decided to sign the deal with Exact Sciences: to prevent revenue from slowing due to the loss of patent protection. This is a common challenge for many big global pharmas, which are looking for ways to keep their revenue from slowing.

Against this backdrop, we note that Genomictree is virtually the only company to have clinical results similar to Exact Sciences' published in a peer-reviewed journal. In addition, the company's syndecan-2 (SDC2) biomarker allows for more economical testing compared to Exact Sciences' biomarkers. It is also worth noting that IVD clinical trials involve fewer risks than new drug clinical trials.

Furthermore, if the current confirmatory clinical trials on diagnostic kits for bladder and lung cancers prove successful, we think Genomictree could be recognized as a biomarker platform company. Recall that Hanmi Pharmaceutical's market value rose significantly after successfully out-licensing platform technologies to major global firms.

FY (Dec.)	**12/13**	**12/14**	**12/15**	**12/16**	**12/17**	**12/18**
Revenue (W100mn)	-	11	10	5	5	4
OP (W100mn)	–	-3	-8	-13	-20	-26
OP margin (%)	-	-27.3	-80.0	-260.0	-400.0	-650.0
NP (W100mn)	-	-16	-8	-21	-21	-25
EPS (W)	-	-144	-70	-162	-148	-158
ROE (%)	-	-57.6	-20.8	-49.4	-35.8	-25.6
P/E (x)	-	-	-	-	-	-
P/B (x)	-	-	-	17.8	13.1	39.6
Dividend yield (%)	-	-	-	0.0	0.0	0.0

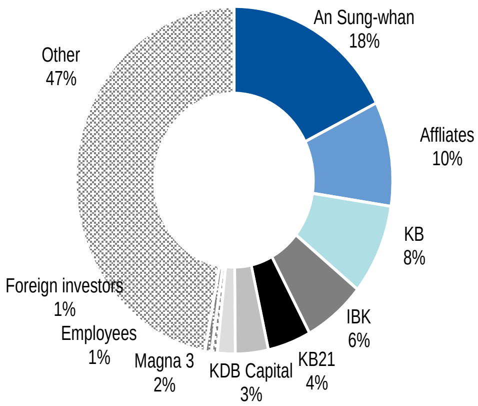
Note: All figures are based on consolidated K-IFRS; NP refers to net profit attributable to controlling interests
Source: Company data, Mirae Asset Daewoo Research estimates

Share price trends and takeaways

Genomictree is a developer of early colorectal cancer screening tests. Positive results from its two clinical studies have been heightening expectations on the firm. Following its move to the KOSDAQ (from the KONEX), the company's stock has displayed relatively high volatility, mainly because the lock-up period for existing shareholders (around 27% of shares outstanding; 24.3% at present) was only one month.

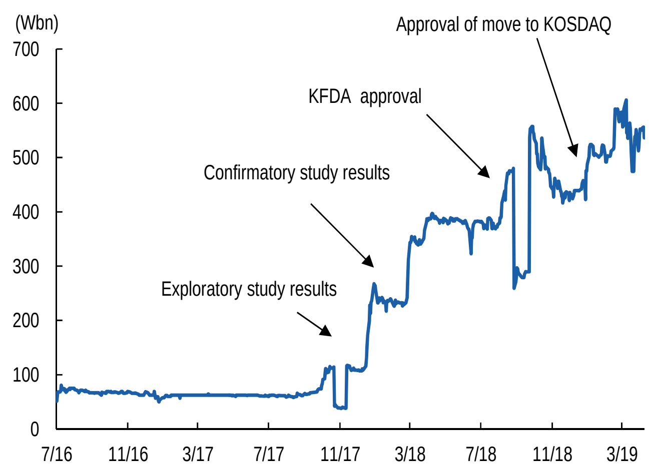
In light of the company's growth potential and attractive equity story, we see a slim chance of massive profit-taking following the expiry of a one-month lock-up. In this report, we present an investment idea for Genomictree, assuming that the company's biggest near-term risk—profit taking by existing shareholders—is kept to a minimum.

Figure 1. Ownership breakdown



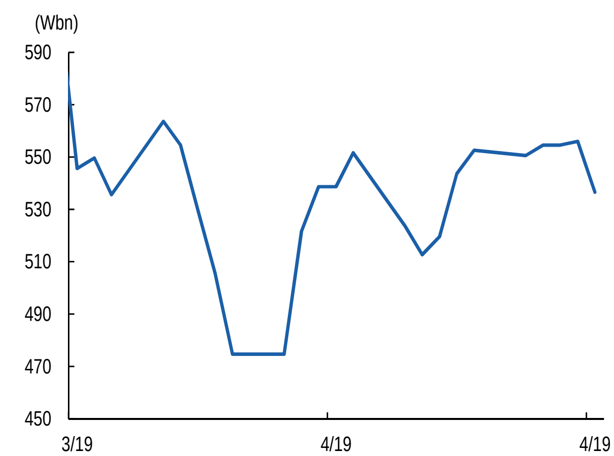
Source: Genomictree, Mirae Asset Daewoo Research

Figure 2. Market cap trend and key events



Source: FnGuide, Mirae Asset Daewoo Research

Figure 3. Market cap after listing on KOSDAQ



Source: FnGuide, Mirae Asset Daewoo Research

Why is Genomictree gaining attention?

1. Emergence of Exact Sciences, an early cancer detection pioneer

The biggest driver behind growing interest in Genomictree is the strong growth story of Exact Sciences, a pioneer in the early cancer detection kit market. After commercializing early diagnostic tests for colon cancer in 4Q14, Exact Sciences posted annual revenue of US$450mn within just four years. In 2018, the firm took the 10^{th} spot (by revenue) in the in-vitro diagnostics market, with its market cap surging to US$12bn. Recently, Genomictree has been gaining attention due to its potential to become Korea's version of Exact Sciences.

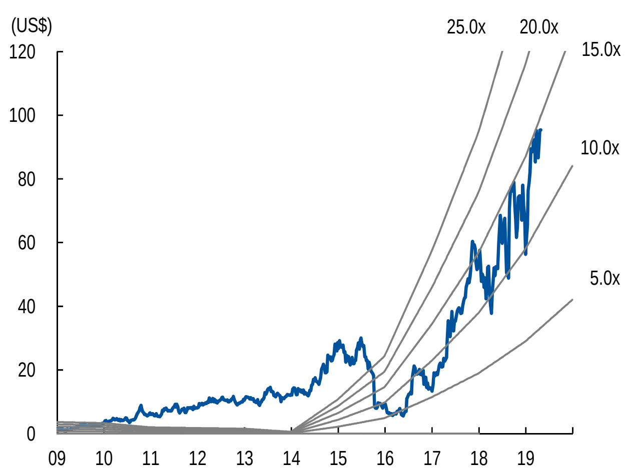
Exact Sciences is currently trading at a hefty premium versus healthcare peers, at a 12-month forward P/S of 14.4x. The valuation premium is mainly because the firm's flagship cancer diagnostic products are mainly for early detection, rather than confirmatory diagnosis. There are three reasons why screening tests for early cancer detection are expected to generate greater value than those for general/confirmatory diagnosis.

1) **Market size:** While diagnostic tests for confirmatory diagnosis typically target existing patients, target users of screening tests for early detection include those at risk of certain diseases. As such, the market for screening tests is much bigger. In general, adults aged 50 or older are recommended to undergo screening for colorectal cancer every three years.

2) **Insurers' needs**: The current overriding issue in the insurance industry is cost savings, amid rising loss ratios resulting from the higher prevalence of chronic diseases and cancers (stemming from population aging). The early detection of diseases should allow insurers to reduce total costs. Indeed, Exact Sciences' colorectal cancer screening kit gained both FDA approval and public insurance coverage (Centers for Medicare and Medicaid Services [CMS]) simultaneously, with its 10,000-subject clinical trial (DeeP-C) showing sensitivity of 92.3% and specificity of 86.6%.

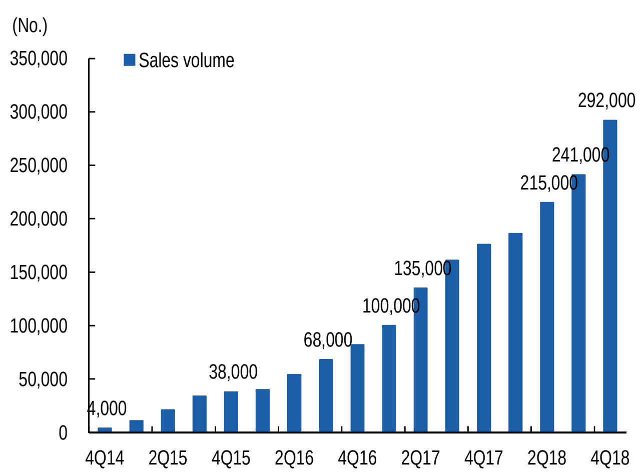
3) **First-in-class tool**: For cancer, tools for confirmatory diagnosis (e.g., biopsies) and imaging diagnostics cannot be used for early detection. Accordingly, any newly-developed early diagnostic kit can become a first-in-class tool in its relevant indication category. Indeed, the early detection kit for colorectal cancer (measuring epigenetic DNA methylation) developed by Exact Sciences became a first-in-class tool.

Figure 4. 12-month forward P/S band of Exact Sciences



Source: FnGuide, Mirae Asset Daewoo Research

Figure 5. Exact Sciences' Cologuard sales volume



Source: Exact Sciences, Mirae Asset Daewoo Research

2. Genomictree: Power of SDC2 and competitive edges vs. rival

With market leader Exact Sciences having already built a meaningful footprint in the market, all eyes are now on who will follow suit. Against this backdrop, Genomictree is garnering a great deal of attention for its clinical performance (comparable to that of Exact Sciences).

Biomarkers in the body are used for early detection of colorectal cancer; indeed, it is important to identify biomarkers that specifically respond to cancers. Genomictree's early detection kit, in particular, measures methylated SDC2 in stool DNA.

DNA methylation is a process by which methyl groups are added to the DNA molecule. Genomictree's method tests whether cancer-suppressing genes are methylated. If the genes are methylated, they are highly likely to develop into cancer cells.

Genomictree has carried out two clinical studies for the test. In the first exploratory study of 93 participants, sensitivity and specificity came in at 90% and 90.9%, respectively. The latest confirmatory study completed in March (based on 585 participants) recorded sensitivity of 90.2% and specificity of 90.2%. Meanwhile, Exact Sciences' DeeP-C trial demonstrated sensitivity of 92.3% and specificity of 86.6%.

In addition, Genomictree's tests are believed be more cost effective.

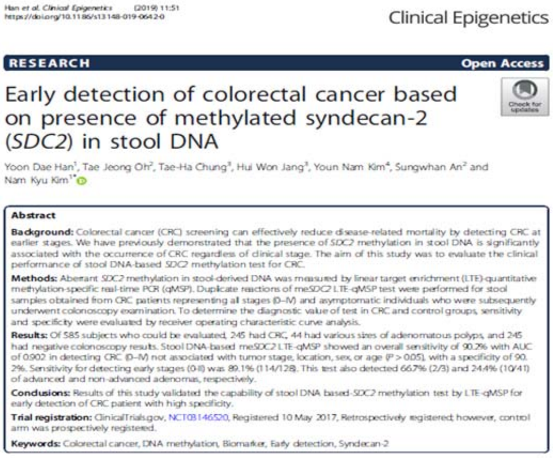
For early detection, Exact Sciences' product utilizes 10 biomarkers: seven gene mutations, two methylated biomarkers, and a fecal immunochemical test. Despite high sensitivity, specificity, and reproducibility, the test costs more (each test costs US$650) than Genomictree's for two reasons.

First, Exact Sciences uses biomarkers and biomarker testing technologies licensed from other companies.

Second, as Exact Sciences' method uses whole stool samples, it requires special facilities to store and protect the samples. In addition, the test takes about 26 hours to be completed.

Meanwhile, Genomictree tests the methylation of SDC2 biomarker in just one- or two-gram samples. Thus, its test costs less (each test should cost US$350 in the US) and takes a shorter period of time (eight hours).

Figure 6. Genomictree's clinical results published in a peer-reviewed journal



Han et al. Clinical Epigenetics (2019) 11:51
https://doi.org/10.1186/s13148-019-0642-0

Clinical Epigenetics

RESEARCH Open Access

Early detection of colorectal cancer based on presence of methylated syndecan-2 (*SDC2*) in stool DNA

Yoon Dae Han[1], Tae Jeong Oh[2], Tae-Ha Chung[3], Hui Won Jang[3], Youn Nam Kim[4], Sungwhan An[2] and Nam Kyu Kim[1*]

Abstract

Background: Colorectal cancer (CRC) screening can effectively reduce disease-related mortality by detecting CRC at earlier stages. We have previously demonstrated that the presence of *SDC2* methylation in stool DNA is significantly associated with the occurrence of CRC regardless of clinical stage. The aim of this study was to evaluate the clinical performance of stool DNA-based *SDC2* methylation test for CRC.

Methods: Aberrant *SDC2* methylation in stool-derived DNA was measured by linear target enrichment (LTE)-quantitative methylation-specific real-time PCR (qMSP). Duplicate reactions of me*SDC2* LTE-qMSP test were performed for stool samples obtained from CRC patients representing all stages (0–IV) and asymptomatic individuals who were subsequently underwent colonoscopy examination. To determine the diagnostic value of test in CRC and control groups, sensitivity and specificity were evaluated by receiver operating characteristic curve analysis.

Results: Of 585 subjects who could be evaluated, 245 had CRC, 44 had various sizes of adenomatous polyps, and 245 had negative colonoscopy results. Stool DNA-based me*SDC2* LTE-qMSP showed an overall sensitivity of 90.2% with AUC of 0.902 in detecting CRC (0–IV) not associated with tumor stage, location, sex, or age (P > 0.05), with a specificity of 90.2%. Sensitivity for detecting early stages (0-II) was 89.1% (114/128). This test also detected 66.7% (2/3) and 24.4% (10/41) of advanced and non-advanced adenomas, respectively.

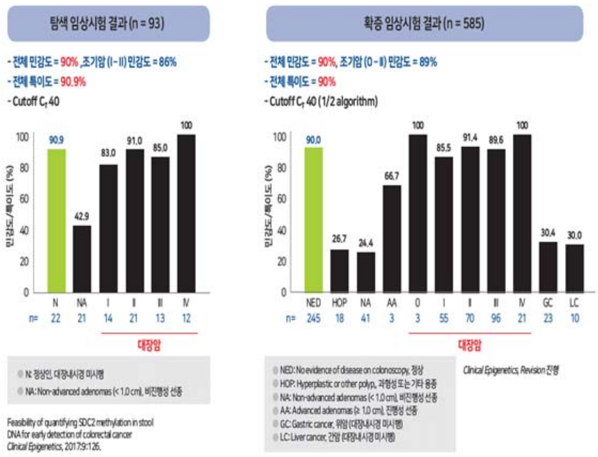
Conclusions: Results of this study validated the capability of stool DNA based-*SDC2* methylation test by LTE-qMSP for early detection of CRC patient with high specificity.

Trial registration: ClinicalTrials.gov, NCT03146520, Registered 10 May 2017, Retrospectively registered; however, control arm was prospectively registered.

Keywords: Colorectal cancer, DNA methylation, Biomarker, Early detection, Syndecan-2

Source: Clinical Epigenetics, Mirae Asset Daewoo Research

Figure 7. Genomictree's clinical study results



Source: Genomictree, Mirae Asset Daewoo Research

Case studies

1. Exact Sciences: Key drivers for medical product sales growth

Exact Sciences' revenue has grown at a CAGR of 198.6% since 2014. In our view, there are three conditions that need to be met for medical equipment and test sales to grow significantly.

1) Is there a rationale for prescription? Exact Sciences' test was recommended by the American Cancer Society (ACS) in November 2014 and by the United States Preventive Services Task Force (USPSTF) in June 2016. Meanwhile, the ACS lowered the age at which screening for colorectal cancer is recommended from 45 from 50.

2) Does the test provider have in-network contracts with insurers? Being an in-network provider is important for a medical company's drug and medical product sales. As Exact Sciences has signed in-network contracts with five major private insurers in the US, 94% of patients who have taken the company's test have paid no co-payment.

Meanwhile, in the US, medical services are covered by private insurers as well as public healthcare programs. Based on DeeP-C test results, Exact Sciences' test was included in CMS coverage. Although beneficiaries of CMS programs total just 5mn, the agency's coverage list should have a great impact on private insurers' coverage decisions. In addition, the company's test received a high score in the Healthcare Effectiveness Data and Information Set (HEDIS), which serves as the major benchmark for private insurers' reimbursement policies.

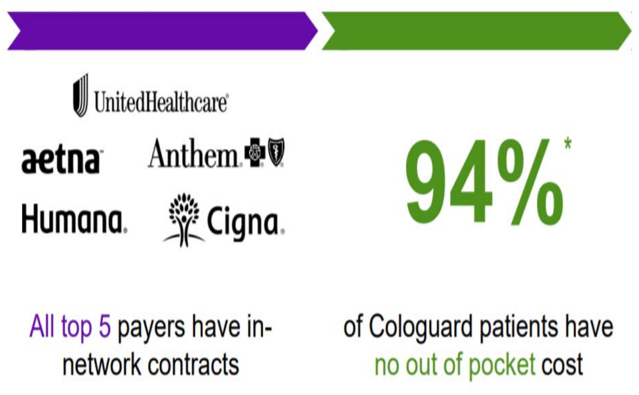
3) Does the test generate high ROI for the buyer? In a B2B business model, a product that improves the buyer's ROI should be able to attract more customers. While Exact Sciences' test costs US$650 for the patient/insurer, its wholesale price is estimated at US$480 (based on sales volume). Thus, theoretically, a hospital could see a margin of US$170 per test.

In addition, the test's purpose is screening, not confirmation. Accordingly, it could generate additional demand, including confirmatory tests and additional tests for other cancers.

Figure 8. Exact Sciences' test included in treatment guidelines

Source: Exact Sciences, Mirae Asset Daewoo Research

Figure 9. In-network contracts sharply reduce patients' cost burdens



Source: Exact Sciences, Mirae Asset Daewoo Research

2. Exact Sciences' joint marketing partnership with Pfizer

Among the three factors for success mentioned above, Genomictree is likely to satisfy the third factor but may struggle to meet the former two in the near future. Given domestic market conditions, it will likely take more time for Genomictree to deliver the explosive earnings growth that Exact Sciences has delivered. Against this backdrop, the domestic firm offers an attractive technology transfer idea, in our view.

The key issue for a technology transfer idea is whether there is a buyer and whether a deal can be struck in the foreseeable future. Given the absence of major technology transfers by domestic IVD firms to global pharmas, visibility on a potential deal appears murky for now. However, we believe that Exact Sciences' joint marketing partnership with Pfizer in 2018 is worth examining.

Until 1H18, Exact Sciences' market cap stood at only US$4-6bn. In 2H18, however, its market cap surged to around US$10bn, thanks to its joint marketing partnership with Pfizer. What's most noteworthy is the reason Pfizer decided to sign the deal with Exact Sciences: to prevent revenue from slowing following the loss of patent protection for its best-selling drug Lyrica (annual revenue of US$4-4.5bn) in 2019. Once a patent for an original drug expires, the launch of generics leads to a sharp decline in original drug sales. In 4Q18, Pfizer also announced that it would expand its joint marketing targets beyond gastroenterology to obstetrics/gynecology.

With blockbuster drugs losing patent protection and the development of potential blockbusters becoming more difficult, slowing growth is a common challenge for many big pharmas. Therefore, there is a strong need for big pharmas to minimize the voids left by drugs going off patent. Against this backdrop, we note that Genomictree is virtually the only company to have clinical results comparable to Exact Sciences' published in a peer-reviewed journal. In addition, the company's SDC2 biomarker allows for more economical testing compared to Exact Sciences' biomarkers.

A technological transfer to a multinational pharma will require local clinical trials. However, IVD trials involve fewer risks than new drug clinical trials, as they have only one phase. In addition, the likelihood of failure for local IVD trials is relatively low, as they are designed to simply confirm domestically validated biomarkers.

Figure 10. Exact Sciences' joint marketing partnership with Pfizer in 2018

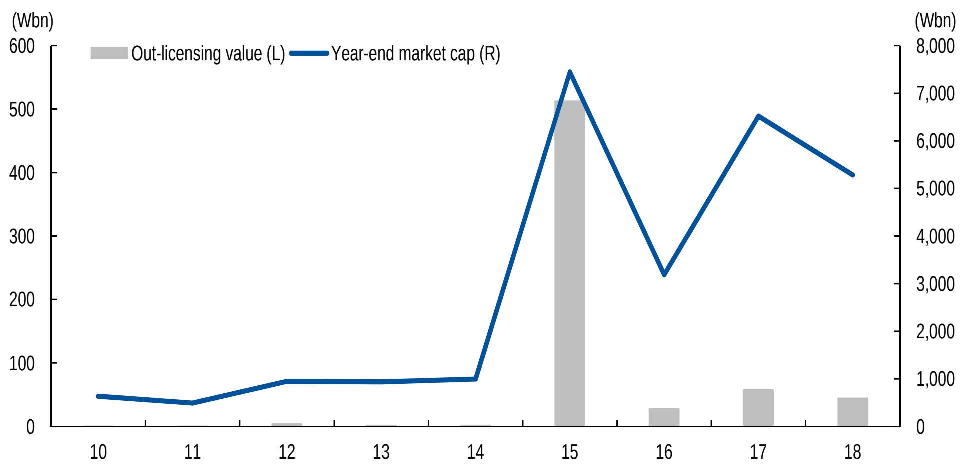
Source: Exact Sciences, Mirae Asset Daewoo Research

3. Hanmi Pharmaceutical: Potential for Genomictree to be recognized as a biomarker platform company

Besides a technology transfer, another way for Genomictree to raise its enterprise value would be to prove its superior platform technology. Of note, the company is currently conducting confirmatory clinical trials on diagnostic kits for bladder and lung cancers. These kits have smaller markets than colorectal cancer screening tests (with no pharma having delivered rapid earnings growth based on such kits). However, if the current confirmatory clinical trials on diagnostic kits for bladder and lung cancers prove successful, we think Genomictree could be recognized as a biomarker platform company, as the company has identified biomarkers for its colorectal, bladder, and lung cancers screening tests via its own identification platform.

We note that Hanmi Pharmaceutical's market value rose significantly after successfully out-licensing platform technologies to major global firms.

Figure 111. Hanmi Pharmaceutical's out-licensing vs. market cap



Source: Hanmi Pharmaceutical, Mirae Asset Daewoo Research

Risks

For Genomictree, asset value accounts for the lion's share of its enterprise value. As such, we believe that investors should consider the following risks:

1) Failure of US clinical trials: The company's penetration into the US market hinges on the success of its US clinical trials, which will involve more than 10,000 patients—significantly higher than for domestic trials, which were successfully completed with 600 patients. Furthermore, even if US clinical trials are successful, they could yield lower sensitivity and specificity.

2) Out-licensing delays/failure: Even if US clinical trials are successful, an out-licensing deal could prove elusive.

3) Weak share performance of Exact Sciences: If shares of Exact Sciences, which is considered a proxy for Genomictree, retreat, Genomictree could also show weak share performance.

Genomictree (228760 KQ/Not Rated)

Comprehensive Income Statement (Summarized)

(W100mn)	12/15	12/16	12/17	12/18
Revenue	**10**	**5**	**5**	**4**
Cost of Sales	**7**	**5**	**5**	**4**
Gross Profit	**3**	**0**	**0**	**0**
SG&A Expenses	**12**	**14**	**20**	**25**
Operating Profit (Adj)	**-8**	**-13**	**-20**	**-26**
Operating Profit	**-8**	**-13**	**-20**	**-26**
Non-Operating Profit	**0**	**-8**	**-1**	**1**
Net Financial Income	0	0	0	1
Net Gain from Inv in Associates	0	0	0	0
Pretax Profit	-8	-21	-21	-25
Income Tax	0	0	0	0
Profit from Continuing Operations	-8	-21	-21	-25
Profit from Discontinued Operations	0	0	0	0
Net Profit	-8	-21	-21	-25
Controlling Interests	-8	-21	-21	-25
Non-Controlling Interests	0	0	0	0
Total Comprehensive Profit	**0**	**-21**	**-22**	**-26**
Controlling Interests	0	-21	-22	-26
Non-Controlling Interests	0	0	0	0
EBITDA	-6	-12	-19	-24
FCF (Free Cash Flow)	-7	-7	-22	-48
EBITDA Margin (%)	-60.0	-240.0	-380.0	-600.0
Operating Profit Margin (%)	-80.0	-260.0	-400.0	-650.0
Net Profit Margin (%)	-80.0	-420.0	-420.0	-625.0

Statement of Financial Condition (Summarized)

(W100mn)	12/15	12/16	12/17	12/18
Current Assets	**36**	**23**	**67**	**76**
Cash and Cash Equivalents	1	13	39	74
AR & Other Receivables	4	0	0	1
Inventories	0	0	0	0
Other Current Assets	31	10	28	1
Non-Current Assets	**30**	**32**	**37**	**64**
Investments in Associates	0	0	0	0
Property, Plant and Equipment	24	25	28	54
Intangible Assets	4	6	8	10
Total Assets	**66**	**55**	**104**	**140**
Current Liabilities	**6**	**9**	**8**	**11**
AP & Other Payables	0	3	2	3
Short-Term Financial Liabilities	5	5	5	5
Other Current Liabilities	1	1	1	3
Non-Current Liabilities	**11**	**11**	**13**	**18**
Long-Term Financial Liabilities	0	0	0	4
Other Non-Current Liabilities	11	11	13	14
Total Liabilities	**17**	**20**	**21**	**29**
Controlling Interests	**48**	**35**	**83**	**111**
Capital Stock	12	12	39	80
Capital Surplus	66	72	114	127
Retained Earnings	-29	-48	-70	-96
Non-Controlling Interests	**0**	**0**	**0**	**0**
Stockholders' Equity	**48**	**35**	**83**	**111**

Cash Flows (Summarized)

(W100mn)	12/15	12/16	12/17	12/18
Cash Flows from Op Activities	-6	-7	-18	-21
Net Profit	-8	-21	-21	-25
Non-Cash Income and Expense	2	10	3	2
Depreciation	1	1	1	1
Amortization	0	1	1	1
Others	1	8	1	0
Chg in Working Capital	-1	4	-1	1
Chg in AR & Other Receivables	0	3	0	0
Chg in Inventories	0	0	0	0
Chg in AP & Other Payables	0	0	-1	1
Income Tax Paid	**0**	**0**	**0**	**0**
Cash Flows from Inv Activities	-31	20	-26	-2
Chg in PP&E	-1	0	-3	-27
Chg in Intangible Assets	-2	-2	-4	-1
Chg in Financial Assets	-28	22	-19	26
Others	**0**	**0**	**0**	**0**
Cash Flows from Fin Activities	16	0	70	58
Chg in Financial Liabilities	-4	0	0	4
Chg in Equity	29	6	70	54
Dividends Paid	0	0	0	0
Others	**-9**	**-6**	**0**	**0**
Increase (Decrease) in Cash	-21	12	26	35
Beginning Balance	22	1	13	39
Ending Balance	**1**	**13**	**39**	**74**

Forecasts/Valuations (Summarized)

	12/15	12/16	12/17	12/18
P/E (x)	-	-	-	-
P/CF (x)	-	-	-	-
P/B (x)	-	17.8	13.1	39.6
EV/EBITDA (x)	-	-	-	-
EPS (W)	-70	-162	-148	-158
CFPS (W)	-51	-87	-124	-144
BPS (W)	423	253	535	695
DPS (W)	0	0	0	0
Payout ratio (%)	0.0	0.0	0.0	0.0
Dividend Yield (%)	-	0.0	0.0	0.0
Revenue Growth (%)	-9.1	-50.0	0.0	-20.0
EBITDA Growth (%)	-	-	-	-
Operating Profit Growth (%)	-	-	-	-
EPS Growth (%)	-	-	-	-
Accounts Receivable Turnover (x)	3.0	2.7	18.1	39.7
Inventory Turnover (x)	0.0	0.0	0.0	0.0
Accounts Payable Turnover (x)	30.6	45.4	48.2	12.6
ROA (%)	-13.8	-34.1	-26.6	-20.4
ROE (%)	-20.8	-49.4	-35.8	-25.6
ROIC (%)	-26.3	-39.9	-61.2	-53.8
Liability to Equity Ratio (%)	36.1	57.3	25.2	25.9
Current Ratio (%)	593.7	244.7	795.3	719.7
Net Debt to Equity Ratio (%)	-48.6	-42.4	-71.2	-58.6
Interest Coverage Ratio (x)	-22.5	-76.9	-122.2	-24,053.8

Source: Company data, Mirae Asset Daewoo Research estimates

APPENDIX 1

Important Disclosures & Disclaimers

Equity Ratings Distribution & Investment Banking Services

	Buy	Trading Buy	Hold	Sell
Equity Ratings Distribution	83.52%	8.24%	8.24%	0.00%
Investment Banking Services	82.61%	4.35%	13.04%	0.00%

* Based on recommendations in the last 12-months (as of March 31, 2019)

Disclosures

As of the publication date, Mirae Asset Daewoo Co., Ltd. and/or its affiliates do not have any special interest with the subject company and do not own 1% or more of the subject company's shares outstanding.

Analyst Certification

The research analysts who prepared this report (the "Analysts") are registered with the Korea Financial Investment Association and are subject to Korean securities regulations. They are neither registered as research analysts in any other jurisdiction nor subject to the laws or regulations thereof. Each Analyst responsible for the preparation of this report certifies that (i) all views expressed in this report accurately reflect the personal views of the Analyst about any and all of the issuers and securities named in this report and (ii) no part of the compensation of the Analyst was, is, or will be directly or indirectly related to the specific recommendations or views contained in this report. Mirae Asset Daewoo Co., Ltd. ("Mirae Asset Daewoo") policy prohibits its Analysts and members of their households from owning securities of any company in the Analyst's area of coverage, and the Analysts do not serve as an officer, director or advisory board member of the subject companies. Except as otherwise specified herein, the Analysts have not received any compensation or any other benefits from the subject companies in the past 12 months and have not been promised the same in connection with this report. Like all employees of Mirae Asset Daewoo, the Analysts receive compensation that is determined by overall firm profitability, which includes revenues from, among other business units, the institutional equities, investment banking, proprietary trading and private client division. At the time of publication of this report, the Analysts do not know or have reason to know of any actual, material conflict of interest of the Analyst or Mirae Asset Daewoo except as otherwise stated herein.

Disclaimers

This report was prepared by Mirae Asset Daewoo, a broker-dealer registered in the Republic of Korea and a member of the Korea Exchange. Information and opinions contained herein have been compiled in good faith and from sources believed to be reliable, but such information has not been independently verified and Mirae Asset Daewoo makes no guarantee, representation or warranty, express or implied, as to the fairness, accuracy, completeness or correctness of the information and opinions contained herein or of any translation into English from the Korean language. In case of an English translation of a report prepared in the Korean language, the original Korean language report may have been made available to investors in advance of this report.

The intended recipients of this report are sophisticated institutional investors who have substantial knowledge of the local business environment, its common practices, laws and accounting principles and no person whose receipt or use of this report would violate any laws or regulations or subject Mirae Asset Daewoo or any of its affiliates to registration or licensing requirements in any jurisdiction shall receive or make any use hereof.

This report is for general information purposes only and it is not and shall not be construed as an offer or a solicitation of an offer to effect transactions in any securities or other financial instruments. The report does not constitute investment advice to any person and such person shall not be treated as a client of Mirae Asset Daewoo by virtue of receiving this report. This report does not take into account the particular investment objectives, financial situations, or needs of individual clients. The report is not to be relied upon in substitution for the exercise of independent judgment. Information and opinions contained herein are as of the date hereof and are subject to change without notice. The price and value of the investments referred to in this report and the income from them may depreciate or appreciate, and investors may incur losses on investments. Past performance is not a guide to future performance. Future returns are not guaranteed, and a loss of original capital may occur. Mirae Asset Daewoo, its affiliates and their directors, officers, employees and agents do not accept any liability for any loss arising out of the use hereof.

Mirae Asset Daewoo may have issued other reports that are inconsistent with, and reach different conclusions from, the opinions presented in this report. The reports may reflect different assumptions, views and analytical methods of the analysts who prepared them. Mirae Asset Daewoo may make investment decisions that are inconsistent with the opinions and views expressed in this research report. Mirae Asset Daewoo, its affiliates and their directors, officers, employees and agents may have long or short positions in any of the subject securities at any time and may make a purchase or sale, or offer to make a purchase or sale, of any such securities or other financial instruments from time to time in the open market or otherwise, in each case either as principals or agents. Mirae Asset Daewoo and its affiliates may have had, or may be expecting to enter into, business relationships with the subject companies to provide investment banking, market-making or other financial services as are permitted under applicable laws and regulations.

Distribution

United Kingdom: This report is being distributed by Mirae Asset Securities (UK) Ltd. in the United Kingdom only to (i) investment professionals falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (the "Order"), and (ii) high net worth companies and other persons to whom it may lawfully be communicated, falling within Article 49(2)(A) to (E) of the Order (all such persons together being referred to as "Relevant Persons"). This report is directed only at Relevant Persons. Any person who is not a Relevant Person should not act or rely on this report or any of its contents.

United States: Mirae Asset Daewoo is not a registered broker-dealer in the United States and, therefore, is not subject to U.S. rules regarding the preparation of research reports and the independence of research analysts. This report is distributed in the U.S. by Mirae Asset Securities (USA) Inc., a member of FINRA/SIPC, to "major U.S. institutional investors" in reliance on the exemption from registration provided by Rule 15a-6(b)(4) under the U.S. Securities Exchange Act of 1934, as amended. All U.S. persons that receive this document by their acceptance hereof represent and warrant that they are a major U.S. institutional investor and have not received this report under any express or implied understanding that they will direct commission income to Mirae Asset Daewoo or its affiliates. Any U.S. recipient of this document wishing to effect a transaction in any securities discussed herein should contact and place orders with Mirae Asset Securities (USA) Inc. Mirae Asset Securities (USA) Inc. accepts responsibility for the contents of this report in the U.S., subject to the terms hereof, to the extent that it is delivered to a U.S. person other than a major U.S. institutional investor. Under no circumstances should any recipient of this research report effect any transaction to buy or sell securities or related financial instruments through Mirae Asset Daewoo. The securities described in this report may not have been registered under the U.S. Securities Act of 1933, as amended, and, in such case, may not be offered or sold in the U.S. or to U.S. persons absent registration or an applicable exemption from the registration requirements.

Hong Kong: This report is distributed in Hong Kong by Mirae Asset Securities (HK) Limited, which is regulated by the Hong Kong Securities and Futures Commission. The contents of this report have not been reviewed by any regulatory authority in Hong Kong. This report is for distribution only to professional investors within the meaning of Part I of Schedule 1 to the Securities and Futures Ordinance of Hong Kong (Cap. 571, Laws of Hong Kong) and any rules made thereunder and may not be redistributed in whole or in part in Hong Kong to any person.
All Other Jurisdictions: Customers in all other countries who wish to effect a transaction in any securities referenced in this report should contact Mirae Asset Daewoo or its affiliates only if distribution to or use by such customer of this report would not violate applicable laws and regulations and not subject Mirae Asset Daewoo and its affiliates to any registration or licensing requirement within such jurisdiction.

Mirae Asset Daewoo International Network

Mirae Asset Daewoo Co., Ltd. (Seoul)
Global Equity Sales Team
Mirae Asset Center 1 Building
26 Eulji-ro 5-gil, Jung-gu, Seoul 04539
Korea

Tel: 82-2-3774-2124

Mirae Asset Securities (HK) Ltd.
Suites 1109-1114, 11th Floor
Two International Finance Centre
8 Finance Street, Central
Hong Kong
China
Tel: 852-2845-6332

Mirae Asset Securities (UK) Ltd.
41st Floor, Tower 42
25 Old Broad Street,
London EC2N 1HQ
United Kingdom

Tel: 44-20-7982-8000

Mirae Asset Securities (USA) Inc.
810 Seventh Avenue, 37th Floor
New York, NY 10019
USA

Tel: 1-212-407-1000

Mirae Asset Wealth Management (USA) Inc.
555 S. Flower Street, Suite 4410,
Los Angeles, California 90071
USA

Tel: 1-213-262-3807

Mirae Asset Wealth Management (Brazil) CCTVM
Rua Funchal, 418, 18th Floor, E-Tower Building Vila Olimpia
Sao Paulo - SP
04551-060
Brasil
Tel: 55-11-2789-2100

PT. Mirae Asset Sekuritas Indonesia
Equity Tower Building Lt. 50
Sudirman Central Business District
Jl. Jend. Sudirman, Kav. 52-53 Jakarta Selatan 12190
Indonesia
Tel: 62-21-515-3281

Mirae Asset Securities (Singapore) Pte. Ltd.
6 Battery Road, #11-01
Singapore 049909
Republic of Singapore

Tel: 65-6671-9845

Mirae Asset Securities (Vietnam) LLC
7F, Saigon Royal Building
91 Pasteur St.
District 1, Ben Nghe Ward, Ho Chi Minh City
Vietnam

Tel: 84-8-3911-0633 (ext.110)

Mirae Asset Securities Mongolia UTsK LLC
#406, Blue Sky Tower, Peace Avenue 17
1 Khoroo, Sukhbaatar District
Ulaanbaatar 14240
Mongolia

Tel: 976-7011-0806

Mirae Asset Investment Advisory (Beijing) Co., Ltd
2401B, 24th Floor, East Tower, Twin Towers
B12 Jianguomenwai Avenue, Chaoyang District
Beijing 100022
China

Tel: 86-10-6567-9699

Beijing Representative Office
2401A, 24th Floor, East Tower, Twin Towers
B12 Jianguomenwai Avenue, Chaoyang District
Beijing 100022
China

Tel: 86-10-6567-9699 (ext. 3300)

Shanghai Representative Office
38T31, 38F, Shanghai World Financial Center
100 Century Avenue, Pudong New Area Shanghai 200120
China

Tel: 86-21-5013-6392

Ho Chi Minh Representative Office
7F, Saigon Royal Building
91 Pasteur St.
District 1, Ben Nghe Ward, Ho Chi Minh City
Vietnam

Tel: 84-8-3910-7715