Theragen Etex Bio Institute Introduction
Company

Overview
Performance
Business Areas
Partnerships
Organization

Services
Theragen Etex Group Overview

Theragen Etex is a comprehensive pharmaceutical and bio group involved in prognostic and diagnostic based on gene analysis, prevention, new drug development, pharmaceuticals, distribution of medicine, medical big data, etc.

CEO
Jin-up Ko

Founded
March 16, 1987

Number of employees
300 (R&D 34%)
Theragen Etex Bio Institute Overview

Theragen Etex Bio Institute provides a customized medical solution for customers from research to diagnosis based on gene analysis.

<table>
<thead>
<tr>
<th>CEO</th>
<th>Samuel Hwang</th>
</tr>
</thead>
<tbody>
<tr>
<td>Founded</td>
<td>September 16, 2009</td>
</tr>
<tr>
<td>Number of employees</td>
<td>105 (R&amp;D 37.9%)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Business area</th>
<th>Gene analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homepage</td>
<td>bio.theragenetex.com</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Location</th>
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<tbody>
<tr>
<td>Gwanggyo Techno Valley (Suwon-si, Gyeonggi-do, Korea)</td>
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</tbody>
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Major History

Preparation Period

2009  Korea’s first human genetic map completion (the world’s fourth)
2010  The world’s first released female genome (Rosalynn Gill) decoding and analysis
      The world’s first tiger genome decoding and analysis (completed in 2011)
      The world’s first native soybean (Glycine soja) analysis
      Korea’s first Korean Personal Genome Project (KPGP) launching
      Asia’s first personal gene analysis service (HelloGene) commercialization
2013  The world’s first -cloned dog genome (Snuppy) analysis
      Korea’s first Korean gastric cancer gene decoding
2014  The world’s first minke whale genome decryption completion
      (published research results in the journal Nature Genetics)
      Conducted personal genetic analysis service clinical research
2016  Commercialized DTC genetic testing service (GeneStyle Direct)

Foundation Period

1987  Founded Changho Pharmaceuticals
1997  Founded LeadPharm
2004  Listed on KOSDAQ
2009  Founded Bio institute
2010  Merger of Theragen (Essel-Tech) and
      Etex Pharmaceuticals (Etex Korea),
      Changed name to Theragen Etex

Growth Period

2017  Korea’s first NGS clinical testing room approved by the
      Ministry of Food and Drug Safety
      Founded joint venture (CPM) in Japan
2018  Selected as a government-sponsored project for “Bio Big
      Data” by the Ministry of Trade, Industry and Energy
      Awarded the prime minister’s new growth management
      award
      Awarded by the Minister of Science and ICT for contribution
      to the Fourth Industrial Revolution
2019  Korea’s first commercialization of customized genome
      analysis chip for company use only
## Major Strengths

**Equipped with gene analysis and personalized new drug development capability, key technologies in the “precision medicine” era**

<table>
<thead>
<tr>
<th>Key capabilities in the “precision medicine” era</th>
<th>World-class gene analysis technology</th>
<th>Optimization of pipelines for gene big data analysis</th>
<th>The genetic analysis of cancer, new anticancer drug development</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the Fourth Industrial Revolution era, the focus of the future medical paradigm is customized “precision medicine.”</td>
<td>Completion of human genome map (Korea’s first, the world’s fourth), and the completion of female human, tiger and minke whale genome maps (the world’s first)</td>
<td>Providing systematic and stable services via automated bio informatics analysis pipelines</td>
<td>Equipped with capabilities for cancer gene mutation and disease mechanism analysis and bio marker discovery for new drug development</td>
</tr>
<tr>
<td>Equipped with gene analysis and personalized new drug development capability, key technologies of “precision medicine.”</td>
<td>Leading the market with a high level of technology such as the commercialization of personal gene analysis (Asia’s first)</td>
<td>Equipped with high-tech sequencer that enables large-volume big data analyses, platform and independently developed management system</td>
<td>Equipped with pipelines via subsidiaries for new drugs such as new anticancer drugs and oral Lou Gehrig medicine</td>
</tr>
</tbody>
</table>
Major Performance

Leads the genome industry with outstanding research results and a high level of technology

01. Completion of human genome map first in Korea
   - The world’s fourth and Korea’s first completion of human genome map in 2008
   - The Asia’s first commercialization of disease outbreak risk forecasting services based on personal gene analysis in 2010

02. Export of genome technology to Japan
   - Export of an independently developed Laboratory Information Management System (LIMS) for genes and liquid biopsy analysis technology to Japan
   - Global recognition for a 3.1 billion won-sized software and analysis capability in 2017

03. Clinical tests for genome-based new drugs
   - Support for clinical tests of new drugs such as new anticancer drug (Vactosertib) and oral Lou Gehrig medicine (TEJ-1704) based on genome analysis
   - Discovery of new drug bio marker based on genome analysis technology

04. Many government-sponsored projects and papers
   - Conducted 13 government-sponsored projects including key technology development projects in the bio industry by the Ministry of Trade, Industry and Energy
   - Published 98 international academic papers in Science, Nature Genetics, Nature Communications, etc.
Major Approvals and Awards

Recognized for the outstanding technologies and a high level of business performance by major institutions in Korea and abroad

Korea’s first NGS clinical testing room approved

Prime minister's new growth management award

Technology approvals by global companies

The highest grade in testing accuracy
## Major Government-sponsored Projects

**Recognized for the technologies by conducting 31 government-sponsored projects in the genome field**

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Sponsor</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation of family genome information and face change gene analysis for identity inference</td>
<td>Ministry of Science and ICT</td>
<td>October 23, 2018 ~ July 22, 2023</td>
</tr>
<tr>
<td>Development of genetic technology for customized cosmetics using big data</td>
<td>Ministry of Trade, Industry and Energy</td>
<td>October 1, 2018 ~ December 31, 2020</td>
</tr>
<tr>
<td>Development of health risk forecasting and management service based on user participation type big data</td>
<td>Ministry of Trade, Industry and Energy</td>
<td>September 1, 2018 ~ May 31, 2022</td>
</tr>
<tr>
<td>Intensive training course for bio big data and professionals</td>
<td>Ministry of Science and ICT</td>
<td>August 1, 2018 ~ February 28, 2019</td>
</tr>
<tr>
<td>Discovery of genetic risk factors regarding basic alcohol intake and chronic disease</td>
<td>Center for Disease Control and Prevention</td>
<td>March 10, 2018 ~ June 9, 2019</td>
</tr>
<tr>
<td>Research on the establishment of quantitative analysis methodologies regarding cultivation-adaptation undifferentiated pluripotent stem cells</td>
<td>National Institute of Food and Drug Safety Evaluation</td>
<td>February 1, 2017 ~ November 30, 2018</td>
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Business Areas

Provides a wide range of services including customized diagnosis solutions, NGS clinics and big data business

**Research services**
- NGS TotalOmics
- Array Genotyping
- Bioinformatics analysis

**Diagnostic test (THERAGEN DX)**
- OncomicsDx
- Oncochaser
- GenoMom

**Healthcare**
- HelloGene
- GeneStyle
- GeneBanking

**Big data (DeepOmics)**
- Omics data analysis
- New drug development / Bio marker discovery
- Big data consulting
As of 2019, Theragen Etex Bio Institute is closely cooperating with around 650 medical institutions for the common development and fulfillment of roles.
Strategic Partnerships (Abroad)

Theragen Etex Bio Institute is cooperating with genome researchers and companies from around 80 countries.

**Overseas corporations**

**Japan joint venture CPM**
KANAGAWA SCIENCE PARK R&D D11F 3-2-1, SAKADO, TAKATSU-KU, KAWASAKI CITY, KANAGAWA, JAPAN

**China BEIJING THERAGEN ETEX DEYI TECH CO., LTD.**
Room 215-1, C JINFENGHE, NO.8 XINJIEKOUWAIDAJIE, XICHENG DISTRICT, BEIJING CHINA

**Hong Kong local corporation**
Fung Sang Trading Bldg. 54 Bonham Strand West Sheung Wan Hong Kong

**Export contracts**

**Asia:** 11 countries including China, India, Singapore, Japan

**North America:** USA, Canada (two countries)

**South America:** Three countries including Argentina and Brazil

**Europe:** 15 countries including England, Germany and Russia

**Africa:** Two countries including South Africa

**Oceania:** Two countries including Australia
Organization Chart

Top talents with remarkable reputations and performances from the fields of biology, medicine, and information technology are leading the company.

Management

Samuel Hwang
CEO
Former member of Special Committee of Healthcare for the Fourth Industrial Revolution
Former Cisco Asia manager

Seon-jin Hwang
Division Head
Family medicine specialist
Former Asan Medical Center / Samsung Medical Center

Jin-up Ko
Group President
Founder of Theragen Etex group
Director of Personal Genomics Institute
CEO of LeadPharm

Seong-jin Kim
CEO of MedPacto
Prof. of Seoul National University Graduate School of Convergence Science and Technology
Advanced Institute of Convergence Technology
Precision Medicine Center Head
Former USA NIH tenured chief researcher

Management Support

- Strategy and Planning
- Finance/Accounting
- Communication/Marketing
- HR, General Affairs
- IT System

Sales

- NGS
- PGS
- Big Data

R&D

- Bioinformatics
- Genome Analysis/Experiment
- Clinical Solution
- Microbiom
Company

Services

Service Portfolio

1) Research Service
2) Diagnostic Test (THERAGEN DX)
3) Healthcare
   ① HelloGene
   ② GeneStyle
   ③ GeneBanking
4) Big Data (DeepOmics)

Vision and Future Plans
Service Portfolio

Provide a wide range of services including customized diagnostic solutions, NGS clinics and medical big data business

Research service
- NGS TotalOmics
- Array Genotyping
- Bio Informatics

Diagnostic test (THERAGEN DX)
- Oncomics DX
- Oncochaser
- GenoMom

Healthcare
- HelloGene
- GeneStyle
- GeneBanking

Big data (DeepOmics)
- Omics data analysis
- New drug development / Bio marker discovery
- Big data consulting
Main Service (1) Research Support

This next-generation genome research support service provides solutions for all kinds of genome sequence decoding and analysis.

**NGS TotalOmics**
- Whole Genome Sequencing
- Whole Exome Sequencing
- Transcriptome Sequencing
- Single Cell Sequencing
- Targeted Sequencing
- Metagenome Sequencing

**SNP Micro Array**
- Theragen PMRA Chip
- Global PMRA Chip
- Genome analysis chip for Koreans

**Bioinformatics**
- Basic analysis
- Advanced analysis

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**Service Features**
- Many experiences of the world’s and Korea’s first research and great know-how
- Provided the TotalOmics service for the first time in Korea
- Can provide an optimized service for researchers
- Know-how in bioinformatics accumulated
- Automated data analysis using GiSys
Main Service (2) Diagnostic Test (THERAGEN DX)

THERAGEN DX is an effective clinical research service that allows the detection of genetic mutations in a short time at a reasonable cost using the latest genome decoding technology.

- **Oncomics DX**
  - **Cancer Panel**
    - Checks the genetic mutation of cancer tissues and provides genes related to the targeted therapy

- **OncoChaser**
  - **Liquid Biopsy**
    - Noninvasive cancer monitoring and diagnosis

- **Genomom**
  - **Non-invasive Prenatal Testing (NIPT)**
    - Noninvasive congenital anomaly test before childbirth

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**Service Features**

- Korea's first development of cancer panel in 2011
- Korea's first NGS clinical lab certified
- Can detect even under 0.01% limit of detection
- Korea's first acquisition of a patent regarding NIPT service
HelloGene is a personal disease predictive gene analysis service. It allows the prevention of disease, early diagnosis and customized prescription.

**Basic concept**

- Genetic factor (unchangeable)
  - Environmental factor (can be improved)
  - A combination of genetic factors and environmental factors

- Exercise, stop drinking and smoking, improve eating habit, regular health check
- Obesity, excessive drinking, smoking, insufficient exercise, stress

- Maintain health and improve the quality of life
- Outbreak of disease

**HelloGene product composition**

- **Cancer**
  - Stomach cancer, lung cancer, colon cancer, liver cancer, thyroid cancer, kidney cancer, pancreatic cancer
    - [Male Cancer]
      - Prostate cancer, testicular cancer, bladder cancer, esophageal cancer
    - [Female cancer]
      - Breast cancer, cervical cancer, endometrial cancer, ovarian cancer

- **General illness**
  - Chronic hepatitis B, nonalcoholic fatty liver disease, Crohn's disease, ulcerative colitis, type 2 diabetes, obesity, hyperlipidemia, systemic lupus erythematosus, psoriasis, atopic dermatitis, periodontal disease, allergic rhinitis, chronic obstructive pulmonary disease, asthma, glaucoma, macular degeneration, uveitis, Rheumatoid arthritis, osteoarthritis, osteoporosis, stroke, dementia, coronary artery disease, atrial myocardial infarction, hypertension, cerebral aneurysm (+female: polycystic ovary syndrome)

- **Platinum Light** [38 diseases] **Platinum** [48 diseases] **Noble** [92 diseases]

**Service Features**

- Asia’s first personal disease prediction service
- The only clinical test in Korea that involves 16 university hospitals
- Provides services for around 650 domestic medical institutions
- Has 400 or more test items, the largest number in Korea
- Possession of infrastructure that allows large-scale experiments
GeneStyle analyzes genetic information that affects health and beauty and provides personally optimized solutions.

**GeneStyle basic product composition**

**Inner healthcare**
- GeneStyle Direct: Comprehensive analysis including diet / skin / hair loss
- Detect genetic characteristics that affect health and provide an optimized healthcare solution.

**Outfit beauty care**
- Detect genetic characteristics that affect outfit and provide an optimized beauty care solution.

**GeneStyle Premium intensive analysis product**

**GeneStyle Skin**
- Intensive skin analysis

**GeneStyle Hair Loss**
- Intensive Hair loss analysis

**GeneStyle MediFit**
- Intensive diet analysis

**GeneStyle Nutrition**
- Intensive nutrition analysis

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**Service Features**

- Provides health guide in cooperation with medical institutions
- Recommendation of personally customized healthy food and cosmetics ingredients
- Safe and convenient sample collection using the Gene Kit
- Customized solutions based on genome big data
- Can conduct other tests without additional sample collection

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GeneBanking stores personal genome data and continues to provide customized services according to the data.

### Basic concept
- **Extract and analyze genes**
- **Store genome data**
- **Use various genetic test services freely by storing only once**

### GeneBanking product composition

<table>
<thead>
<tr>
<th>Service</th>
<th>GeneBanking Total</th>
<th>GeneBanking Light</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genetic information to be checked</td>
<td>3 billion</td>
<td>0.9 million</td>
</tr>
<tr>
<td>Gene extraction and analysis</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Gene storage</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Disease prediction</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Customized management</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Use of new service</td>
<td>○</td>
<td>△</td>
</tr>
<tr>
<td>Use in case you have cancer</td>
<td>○</td>
<td>X</td>
</tr>
</tbody>
</table>

### Service Features
- Secures whole genome data by testing only once
- Lifetime health management by storing personal sequencing data
- Provides service for disease prediction, prevention, management and treatment
- Can conduct precision diagnosis and treatment in case of disease outbreak
- Realization of AI healthcare using big data
DeepOmics provides big data and AI solutions in the healthcare, medicine, pharmaceutical fields based on genome analysis know-how accumulated over many years.

- **AI-based multiomics big data analysis**
- **Big data analysis for new drug development and biomarker discovery and evaluation**
- **Big data consulting for medicine and healthcare**

### Service Features

- **AI-based genome data analysis**
- **The only genome big data-based new drug clinic in Korea**
- **Big data analysis with the integration of images, medical information and omics**
- **Big data analysis and consulting professionals**
- **Established large-scale omics big data**
Vision and Future Plans

Contribute to human well-being and health promotion with genome-based customized medicine

1st stage / 2010~2017
Strengthen basic capabilities

2nd stage / 2018~2022
Grow to be a global company

3rd stage / 2022~2030
Lead the healthcare paradigm

Key Activities
- Disease diagnosis with genome analysis
- Medical big data analysis solution
- Personally customized anticancer therapy
- Discovery of new B2B business models
- Genome customized solutions

Capabilities
World-Class Science + World-Class Business
THANK YOU FOR YOUR ATTENTION