Global Needs for Medical Care

Universal health coverage with smart care

- Improve Quality of Care
- Cost Saving

Innovative technology
- Genomics
- mHealth
- Advanced analytics and so on

Paradigm shift from
- Acute to chronic care
- Treatment to prevention
- One-size-fits-all to personalized

Improve Quality of Care
Cost Saving

Universal health coverage with smart care
Precision Medicine in the world

**U.S.A**
- Annual investment of USD 215 million (approx. KRW 237 billion) in Precision Medicine Initiative (February 2015)
- Establishment of cohorts, discovery and clinical application of cancer genomes, establishment of open platform for precision medicine, standards developed and carried out for interoperability

**UK**
- GBP 300 million invested in 100,000 Genomes Project (2014~17)
- Conducted by Genomics England to treat cancer, infectious diseases, rare diseases
- Analyzes the 100,000 genomes provided by 75,000 individuals who are registered at National Health Service (NHS)

**Japan**
- Approx. KRW 170 billion invested in project that aims to use genome medicine to overcome disease (2015~16)
- 3 biobanks for collecting and using genome data for research purposes
- Analyzes the genomes of children with undiagnosed diseases or diseases with unknown causes for treatment purposes, etc.

**China**
- Chinese Academy of Sciences announced plans for Chinese-style precision medicine, will be investing USD 9 billion (approx. KRW 10 trillion) over 15 years (March 2016)
- Conducts project that analyzes genomes and collects clinical data, estimated budget of over RMB 10 million~100 million (approx. KRW 18 billion) per project
Public-private biohealth council  
(president: vice-minister)

- Official (Grade 1) from related ministry or private expert

### General Bureau
- Joint assistant administrators: Industrial Analysis & Planning Team leader, director of Health Industry Planning Bureau

### Pharmaceutical Industry Bureau
- Joint assistant administrators: pharmaceutical industry TF team leader, director of Pharmaceutical Industry Support Bureau

### Precision Regenerative Medicine Bureau
- Joint assistant administrators: head of bioethical policy division, director of R&D Planning Bureau

### Medical Device Bureau
- Joint assistant administrators: health industry promotion team leader, Medical Device IT Support Team leader

### International Medicine Bureau
- Joint assistant administrators: Global Marketing Infrastructure Team leader, Global Marketing Industry Team leader

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**Precision Medicine Promotion Committee**

**Advisory Committee**

- Cohort
- Omics
- Mobile Health Care
- Treatment Data (medical institution)
- Health & Medical big data (public institution)
- Data Security standardization
- Law, System, Ethics
- Convergence-International cooperation
Infrastructure for the Precision Medicine in Korea
### Institutes retaining large amounts of health big data

<table>
<thead>
<tr>
<th>Institute</th>
<th>Database</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Health Insurance Corporation</td>
<td>• National Health Information DB • Sample Cohort DB</td>
<td>• 92.4 Billion Cases as Medical Treatment/ Checkup Results/ Patient Registration Information, etc between 2001 and 2010 • A Million Cases for Sample Cohort</td>
</tr>
<tr>
<td>National Health Insurance Review and Assessment Service</td>
<td>• Medical Information Support Center DB</td>
<td>• 20 Billion Cases per Year including Medical Care Benefit Claiming, Prescription &amp; Dispensation DB, Patient Treatment, etc</td>
</tr>
<tr>
<td>Centers for Disease Control and Prevention/ National Institute of Health</td>
<td>• Pathogen Resources DB Management System • Korea National Biobank Network</td>
<td>• Pathogen Resources Data (Yeasts, Germs, Viruses, etc Cohort/Disease-Based Human Bio-Resources of Around 380 Thousand People • 23 Thousand Genome Sample Data of Around 250 Thousand People</td>
</tr>
<tr>
<td>National Cancer Center</td>
<td>• National Cancer Early Detection Program System • Cancer Patient Medical Expenses Support Information System</td>
<td>• Health Checkup Target Information, Cancer Checkup Results Data • Cancer Patients Medical Expenses Support Specifications Data</td>
</tr>
<tr>
<td>Hospitals</td>
<td>• Electronic Medical Recording DB of Each Hospital</td>
<td>• Patients Visit/Hospitalization/Treatment Recording</td>
</tr>
<tr>
<td>Health Care-Related Institutes</td>
<td>• PHR (Personal Health Record) DB of Each Institute</td>
<td>• Life Log Data including Biological Information of Each Person</td>
</tr>
</tbody>
</table>
National Biobank Infrastructure

- Well-established infrastructure including the national biobank retaining bio-specimens of 670,000 people

**National Biobank**

- Diverse Epidemiology & Genome Data
  - National Biobank (Bio-Samples of 670,000 people)
  - Large Group/Disease Cohort (250,000 People)
  - Genome Sequencing Data (400 Koreans)

Superb research resources including large cohort/genome data
3-3. National Biobank Infrastructure (2)

Bok-Ghee Han Ph.D.
Director, Center for Genome Science
Korea National Institute of Health
Ministry of Health and Welfare, Korea
3-5. Health Care Information Exchange Platform Program in Korea

**IHE-certified medical information exchange system**

- Korea Ministry of Health & Welfare ('07~'10)
- International standards: health level (HL7), clinical document architecture (CDA)
- Participating hospitals: 37
- Participating patients: 11,237

**CRS realization guidelines and verification tool development**

- Korea Ministry of Health & Welfare ('12~'15)
- KHIDI & Seoul National University Bum-dang Hospital, etc
- Field Application of Standards to Certify Functions, Exchangeability, and Security of EMR Systems
SMART Care Project: Large-Scaled Nationwide Clinical Trial

- Measurement of Glucose level
- Measurement of Blood pressure
- Patients with type 2 diabetes

**Home unit**

**e- Diabetes Center unit**

**Hospital unit**

- Data storage
- Health gateway
- Automatic Uploading of measured data to data server
- Review of transferred data
- All recommendations to patients

- Data transfer to each hospital
- Consultation 2
- Consultation 3

- Nurse
- Physician

- LG electronics
- SK telecom
- SAMSUNG
- INSUNG
- BITcomputer
Innovative way of improving diabetes control in the general population

SMART Care Project: Results of SMART care

SMART care
New method for improving diabetes control in the general population

a. baseline HbA1c ≥ 8.0%

b. baseline HbA1c < 8.0%

c. Compliance (good or poor)
d. Compliance and baseline HbA1c ≥ 8.0%
e. Compliance and baseline HbA1c < 8.0%
### 4. Collaboration with China

#### The Internet Based Glucose Monitoring System

- **System control center**
  - Health coordinating center
  - Customer satisfaction center
- **Technical support**
  - Present-condition investigation
  - System planning
- **Localized system development**
  - Development of e-CRF
- **Provide clinical research protocol**
- **Local training**
- **Supervision of management**

- **Patient recruitment**
  - Run the clinical research
  - Data collection
- **Regular hospital visit every 3 months**
- **Face-to-face interview**
- **Laboratory follow up**
- **China-D web program**
  - [http://www.china-diabetes.com](http://www.china-diabetes.com)
- **Life style management**
- **E-learning**

- **Type 2 diabetes**
- **Measurement of glucose and blood pressure**
- **Uploading to server**
  1. personal profile
  2. Glucose level (SMBG)
  3. Drug information

<table>
<thead>
<tr>
<th></th>
<th>Control group</th>
<th>Intervention group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>6 months</td>
</tr>
<tr>
<td><strong>Weight (kg)</strong></td>
<td>68.5±12.1</td>
<td>68.3±11.9</td>
</tr>
<tr>
<td><strong>BMI (kg/m2)</strong></td>
<td>25.2±3.5</td>
<td>25.2±3.6</td>
</tr>
<tr>
<td><strong>Systolic BP (mmHg)</strong></td>
<td>133.0±14.8</td>
<td>131.1±10.8</td>
</tr>
<tr>
<td><strong>Diastolic BP (mmHg)</strong></td>
<td>81.5±11.1</td>
<td>79.8±6.7</td>
</tr>
<tr>
<td><strong>FBS (mmol/L)</strong></td>
<td>8.4±2.6</td>
<td>7.8±2.4</td>
</tr>
<tr>
<td><strong>PBG (mmol/L)</strong></td>
<td>12.9±4.0</td>
<td>12.0±3.0</td>
</tr>
<tr>
<td><strong>HbA1c (%)</strong></td>
<td>8.0±0.8</td>
<td>7.4±1.3</td>
</tr>
</tbody>
</table>
Content of Precision Medicine in Korea
Core Areas and Major Projects

**Core Areas**
- Establishment of infrastructure for research/industrialization of precision medicine
- Development of precision medicine services
- Systemic improvement, cultivation of personnel

**Major Projects**
1. Establishment of precision medicine cohorts
2. Establishment of data sharing platform for precision medicine
3. Establishment of data sharing institution for precision medicine
4. Alpha-Med development
5. Development of individually-tailored cancer prevention/treatment technology
6. Development of health management service per population group
7. Establishment of P-HIS
8. Enactment of special legislation on precision medicine
9. Cultivate and certify professional personnel
Precision medicine oncology

KOREA's -

Master model

Accelerated Application

Standardization

right Target

Equal Access & Quality

Recognition

KOREA's Precision Oncology Initiative
Korea’s Precision Oncology Initiative

“Hospital centered clinical Trial consortium”

Genom core
- Samsung
- Macrogen
- KF1 Consortium
- SNUH
- Partner's Care Me

Major hospitals
- SNUH
- KU Hospital
- Samsung
- Partners
- KF1

Data coordinating center
- Samsung
- Macrogen
- SNUH
- Partners
- KF1

“글로벌 암 정밀의료 프로그램 연계”
Scope

P-HIS

Cloud HIS
Cloud HIE platform

Data analysis platform
Analysis engine

PMI big data platform

Ultra Refined Snow-White P-Data

BiSPH

Clinical Data
Genomic Data
Life Log Data

standar
security
Certify

Korea
Global
4-3. Underlying Rational for PMI

Open Data, Open Source, Open Science

Collaboration

Sharing
Thank you

Kun-Ho Yoon