Biobank Construction after the Earthquake and Tsunami Disaster in Japan

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The Great East Japan Earthquake and Tsunami, March 11, 2011

Earthquake: Mw 9.0
Tsunami: Max 40 m High
Killed or Missing People: 18,539
Disaster Related Death: 3,076
Destroyed Houses: 398,770

Sendai, 2011

Natori, 2013

The Victims have not Returned to Their Normal Lives.
Current and Future Health Problems in the Devastated Area

Psychosocial Problems
- Family Death
- Loss or Change Jobs
- Changes in Household Economy
- Debts
- Changes in Home Environment
- Moving from Affected Areas

Life Style Changes
- Withdrawal from Society
- Living Alone in Temporary Housing
- Lack of Exercise
- Nutritional Imbalance

Increase of
- Life-Style Diseases?
- Psychiatric Diseases?
- Cognition Disorders?
- Cancers?
- Orthopedic Problems?

- Children’s Diseases?
- Developmental Problems?
Prospective Cohort Study in Tsunami-Devastated Area

- Disaster-Related Risk of Diseases
- Health Problems after Disaster
- Facilitate Personalized Medicine and Healthcare

Pacific Coast Areas of

Iwate Prefecture
30,000 people

Miyagi Prefecture
120,000 people
(Including Three Generation Cohort Study)

Three Generation Cohort
(Miyagi)

Grandparents
15,000

Mother
20,000

Father
10,000

Sibling
5,000
(Saliva)

Newborn
20,000

Iwate Medical Univ.

Tohoku Univ.

Fukushima Pref. Studies Related to Nuclear Medicine
Governance of Biobank
In Tohoku Medical Megabank Organization

National Working Groups
for Ethical and Legal Issues, for Genome-Cohort Study,
for Genome-Omix Research, for Regional Medical Service

Tohoku University
Iwate Medical University

Steering Committee
ELSI Committee
Access Committee
Institutional Review Board

Biobank
Anonymized Data Storage

Data / Samples
Broad Consent
Withdrawal

Participants

Data / Samples

Research Results

Return Results

Researchers (Profit/ Non-Profit)
Sample and Health Information Collection

**Total Blood 34ml+Urine**

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 ml of Blood</td>
<td>Biochemical Test, Blood Test, HbA1c</td>
</tr>
<tr>
<td>7 ml (EDTA)</td>
<td>Plasma/Buffy Coat (for DNA Extraction)</td>
</tr>
<tr>
<td>9 ml (Plain)</td>
<td>Serum</td>
</tr>
<tr>
<td>5 ml (Heparin)</td>
<td>Mononuclear Cells</td>
</tr>
<tr>
<td>Urine</td>
<td></td>
</tr>
</tbody>
</table>

Physiological Exam., MRI (20,000 people)

**Questionnaire** (Japanese-Cohort Standard)

- Age, Sex, Area, Job, Diet, Sleep, Exercise, Alcohol, Smoking, History, Prescription, Gynecologic Problems, Mental Health Psychosocial Factors

**Disaster-Related Questions** (Damage, Life-Style Change)
The Biobank Receives Samples within 36 Hours from Collection.
Sample Preparation and Storage

**Register**

- **Blood (EDTA)**
- **Blood (Plain)**
- **Urine**
- **Blood (Heparin) (Cord Blood)**

**Preparation (with Robotics)**

- EDTA Plasma: 4 Tubes
- Buffy Coat: 2 Tubes

**DNA Extraction (Buffy Coat of 5 ml Blood)**

- **OD280/260 = 1.82 ± 0.09**
- **9.2 ± 4.2 *10^6 / 5ml**

**Storage**

- -80°C
- +4°C
- -80°C
- -80°C

**Laboratory Information Management System (LIMS)**

- **EBV-LCL (100 people)**
- **Activated T-Cell (80 people)**
Storage Samples in the First Year

<table>
<thead>
<tr>
<th>Category</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>30,000</td>
</tr>
<tr>
<td>(3G Cohort</td>
<td>5,000)</td>
</tr>
<tr>
<td>Storage 2D Tubes</td>
<td>450,000</td>
</tr>
<tr>
<td>DNA</td>
<td>17,000</td>
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<tr>
<td>(May, 2014)</td>
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</table>
## Tohoku Medical Megabank Projects

<table>
<thead>
<tr>
<th>Healthy Volunteer</th>
<th>Specimen Data</th>
<th>Analysis</th>
<th>Storage ICT</th>
<th>Expected Results</th>
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<tbody>
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<td><strong>Regional Population Cohort Study</strong></td>
<td>Plasma Serum</td>
<td>Whole Genome Analysis</td>
<td>Robotics DNA Purification Sample Preparation Storage</td>
<td>Life Science</td>
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<td></td>
<td>Mononuclear Cells (Peripheral and Cord Blood)</td>
<td>Transcriptome Epigenome</td>
<td>LIMS (Laboratory Information Management System)</td>
<td>Biomarker</td>
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<tr>
<td></td>
<td>Urine</td>
<td>Proteome Metabolome</td>
<td>Medical Information System</td>
<td>Personalized Medicine/Healthcare</td>
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<tr>
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<td>DNA (Blood, Saliva)</td>
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<td>Public Health</td>
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<tr>
<td></td>
<td>Questionnaire Health Check Data Follow Up</td>
<td></td>
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</tbody>
</table>

**In the Region Affected by the Disaster**

**For the Health of Stricken People To Prepare for Next Disaster**

Thank You for Your Kind Attention