

posed for studies, the ELSI concern was placed at the top and a final report was officially released in November, 2007.

On the other hand, the Department of Health (DOH) also started its Pilot Research Plan in March, 2007 [106]. Again, Academia SINICA won the bid out of the public competition. In this 4-year term research plan, taking international development experiences into consideration, the goals set for the research are variable and extensive, including the substantiation of Biobank's scientific values, the examination of possible ELSI restraints, the design of required public communication and ethical/legal governance frameworks, the evaluation of future operation mechanism and their legal foundations, and, furthermore, the feasible industrial vision and benefit sharing. After completing its focal study on ELSI issues, the plan is heading into the second year work, which aims to develop an ethically sound procedure for tissue sample collection. Subject to the newly released 'Ethical Governance Framework' (draft), this plan converges with the former Feasibility Study and tries to lay a scientific and ethical foundation for further Taiwan Biobank development jointly.

Among all the review processes, in addition to the continually raised ELSI concerns, the methodology of recruitment has been kept questioned, too. Indeed, the application of voluntary enrollment by the Taiwan Biobank would certainly incur the questions regarding recruitment bias. However, it is arguable that while the risk of bias in voluntary participation may be higher than other random choice approaches, the sufficient amount of participants would be even more critical to the success of a biobank development. Indeed, the biobank by itself is not created for a single research purpose only. Rather, it aims to support the future variable type of studies. Therefore, the willingness of participant's enrollment and continuing support will be taken as the premise for the success of the project. Without this, the spirit of random choice may be in vain.

In other words, it might be reasonable for a case-controlled study to recruit on a random choice basis, as the researcher does not need to worry about the future application of these collected data. On the other hand, the biobank shall maintain the tissue and extracted information for further research purposes. The 'voluntariness' of a participant's general consent and long stay become critical. Anticipating the higher refusal ratio in participation in the biobanking recruit-

ment, it becomes logical to proceed with the voluntary enrollment mode. Otherwise, the refusal ratio will definitely deteriorate the value of random choice.

Besides, it has been the basic principle of a cohort study that the tracking and analysis shall be conducted subject to the base materials collected since the very beginning, including the risk factors and biosample information. Therefore, there should be no doubt concerning the sample selection. However, it does prompt the question of whether these collected samples are adequate as a representation. Trying to overcome the problem, the research methodology has been enhanced to expand the coverage of weighting data for analysis, including the population, age, gender and so on. In addition, it is believable that the expansion of recruitment scope, distribution of the information to the society by large and the promotion of an effective public communication/consultation platform can be helpful in relieving the problem.

Funding

The whole plan is funded by the Taiwan government. For the Feasibility Study, a total budget of approximately US\$680,000 was sponsored by the National Science Council. On the other hand, the Pilot Research is backed up by the DOH, with appropriated 4-year term funding of approximately US\$14,000,000. For the first- and the second-year budget, the allocated fund has been approximately US\$4,700,000. In the future, the operation cost of institutionalization will be further determined according to new legislation.

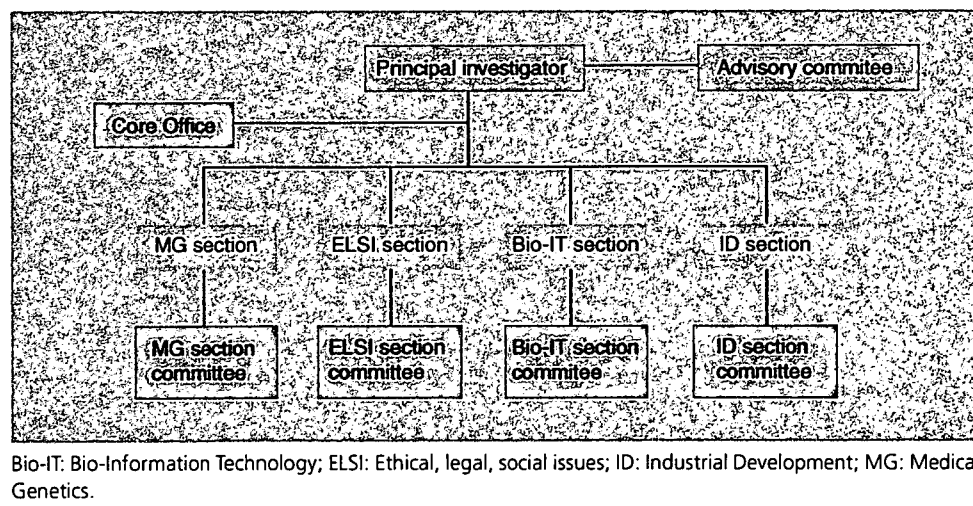
Methodology & participating

The Feasibility Study is, by nature, preliminary research. It cares more about the legitimacy of tissue sample collection and the storage process. On the other hand, the aim of the Pilot Research has been more comprehensive, trying to articulate a complete picture for Taiwan Biobank development. The Pilot Research Plan is made up of four sections:

- Medical Genetics (MG)
- ELSI
- Bio-Information Technology
- Industrial Development

The MG section is undertaken by the Institute of Biomedical Sciences, Academia SINICA, which refers to the methodology of the UK Biobank in research design. The Taiwan Biobank

Figure 1. Organization chart of the Taiwan Biobank.



research organization chart is illustrated in Figure 1.

As far as SINICA is concerned, the contemporary research experiences are mainly case-control studies in essence. The methodology tends to focus on the examination of previous experiences and can easily ignore the influence of the latent factors. Thus, errors may occur in the research findings. Now, the prospective cohort study proposed in conjunction with the Biobank development, aiming at the future multifactor studies, may provide evolving results retrievable in a lasting period of time. This is hoped to be helpful for future predictive and/or individualized medicine R&D.

However, this kind of research design can hardly provide a comprehensive investigative discovery without collecting enough samples for examination, and on a retrievable basis, which is costly and burdensome. This can partially explain why a well-planned biobank is necessary.

After carrying out a comparative study among different countries' approaches, the UK experience has been taken with preference by the MG section. Following the same logic, the recruitment plan was created as listed in the Participant Recruitment Plan of Figure 2.

Following this design, as mentioned above, the Taiwan Biobank plans to recruit up to 200,000 healthy participants aged between 30 and 70 years within the next 10 years. The project investigator of the SINICA will collect 33 ml venous blood and other samples mentioned above from participants at associated community hospitals, through the trained and

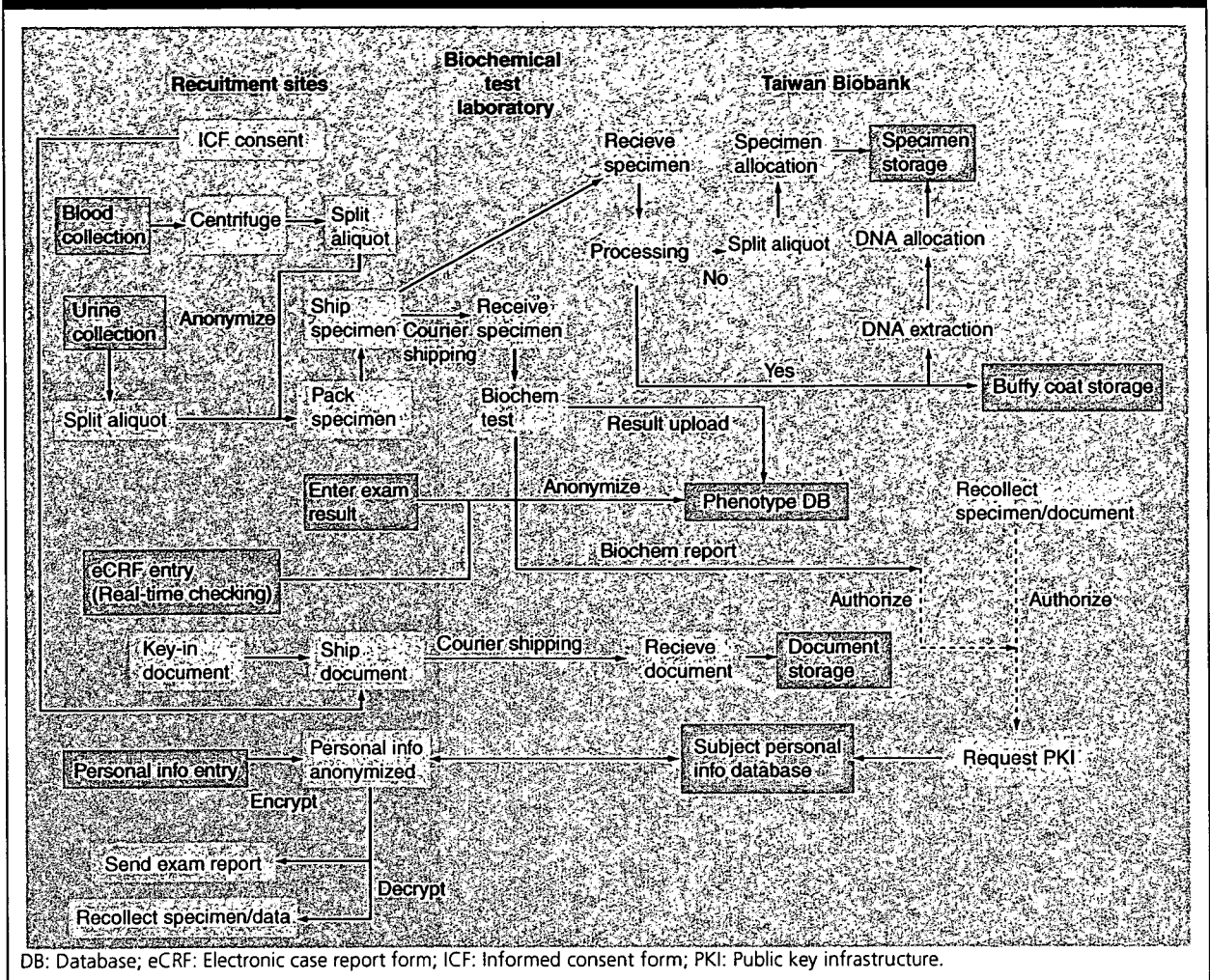
selected study nurse, and subject to the ELSI governance framework approved by the Institutional Review Board (IRB). The collected samples and whatever information extracted from these will be, in compliance with the certified procedure provided by the ELSI section and contemporary research regulation regarding human tissue collection, stored in a secured facility or databank in trust of the general public and subject to a comprehensive legal and ethical governance framework created by law.

The ELSI section is undertaken by The Foundation of Medical Professionals Alliance, joined by the Graduate Institute of Philosophy, National Central University; Bioethics & Law Center, National Tsing Hua University; and the Social Empowerment Alliance. The ELSI section is responsible for various tasks concerning ELSI, including the articulation of the complete framework of ethical and legal governance, drafting and preparing the related documents and study of the corresponding legislation. Besides, one of the most important works for this section is the promotion of the public communication and trust.

The perfection of ELSI is considered to be the prerequisite of Taiwan Biobank development, the specific content of which will be further explained in detail later.

The Bio-Information Technology section is ran by the Institute for Information Industry. It is the mandate of the section to design an information system in compliance with the regulatory norms promulgated by the ELSI group and compatible with the specifications requested by the MG section.

Figure 2. Participant recruitment plan.



The Industrial Development section is undertaken by The Development Center for Biotechnology. It will mark out the items for which it is possible to be industrialized and commercialized, then will propose intellectual property (IP) protection principles and deployment mechanisms for such items, while staying in tune with regulations set by the ELSI section. The Industrial Development section will also illustrate and evaluate possible and appropriate mechanisms for long-term management of the Taiwan Biobank. These efforts in turn would encourage collaboration among international and local corporations, and would support future growth and development in industries.

Attribution of R&D results & spin-off

In principle, the context concerning the R&D results attribution and spin-off can be narrated mainly from two perspectives: the attribution

of profits derived from Biobank utilization, and the commercialization and/or industrialization of the Biobank by itself. The core issue in this regard, is the entitlement of each stakeholder to claim on these results.

Now, the Taiwan Biobank research team tends to take the position that participants can not claim any property right over the samples collected, or on the information derived thereof. It is also the policy of the Biobank that any further research findings based on the analysis of the data provided by participants shall be defined as the public resource of public goods by way of multidata integration. The research findings of business value that derived from the application of the database after the examination shall belong to the organization conducting the R&D, and no participating subject may claim on any personal rights and interests.

It is provided by the latest drafted 'Taiwan Biobank Ethic Governance Framework' that any interests derived from this plan will be attributed in accordance with the following rules:

- In principle, the rights and interests derived from research findings gained from the application of the database shall belong to researchers. However, the researchers have to provide the benefit sharing opportunity to the Taiwan Biobank and the public as well;
- To avoid illegal temptation, participants will not receive any money or equivalent payment in other forms other than the allowance for transportation costs, no matter whether the samples or data stored in the Taiwan Biobank will be used for profit or not. Nevertheless, participants can benefit indirectly by being notified of the research findings;
- Researchers applying for access to the database are required to publish their research results so as to benefit the public.

In regard to the regulation of the possible industrialized application, some rules are also created. If the samples and/or personal data provided by participants will be used in various biomedicine-related research in the future, it becomes questionable if the traditional principle of informed consent applied on the single project basis can be fairly implemented in the one-for-all case like this, and long before the real research applications occur. Taking into account the reality that participants, when newly enrolled, cannot be fully informed of all the possible research content that their personal data might be used for pending the recruit process, the Taiwan Biobank provides a supplemental review mechanism on permission granting to research institutes, on an *ad hoc* basis, for the request of access to the samples and data collected from participants, provided participants have agreed in advance and so has the interior ethical supervision system.

Innovative industries

In 2005, the following industries were illustrated by the DOH of Taiwan in its policy statement as the possible innovative businesses that may benefit from the Biobank development, so as to justify the promotion of the biobanking project.

Commissioned R&D services industry

It is anticipated that the Taiwan Biobank is able to create an increasing amount of medical research-related information, which might be

important to the modern clinical trial practices. Therefore, while very few research institutes are able to compile such a large-scale gene database, it becomes conceivable that the Biobank might turn out to be a mainframe mechanism in fulfilling the demand for commissioned R&D services in this regard. Actually, this kind of economic supply mode is not new in the biomedicine industry. The commissioned clinical trial services provided by medical institutes, as the services provider, to biotechnology company, as the demand side, has been existing in Taiwan for years. Backed up by the capacities of Taiwan Biobank, the business modes can be performed in a different legal format, including the cooperative, outsourcing and/or other hybrid services modes.

Biomarkers industry

A biomarker has been defined as 'a biochemical feature or facet that can be used to measure the progress of disease or the effects of treatment' [107]. Traditionally, the biomarker identification has mostly been a one-at-a-time approach. Now, the development in new molecular biologic techniques makes the finding of relevant markers rapidly without detailed insight into mechanisms of disease possible. The large-scale genetic information database created by the Taiwan Biobank has been expected to provide biomarker-related industries an efficient access to support their biomarker discovery services.

Pharmacogenomic industries

It was noted that: "Rather than relying on the outward manifestation of disease ... pharmacogenomic medicine examines and treats the genotype. Think of the genotype as the inward manifestation of disease – the DNA itself is addressed first and matched with the way the disease presents in the patient – the phenotypic presentation" [108]. It holds promise that drugs might one day be tailor-made for individuals and adapted to each person's own genetic make-up. Environment, diet, age, lifestyle and state of health can all influence a person's response to medicines, but understanding an individual's genetic makeup is thought to be the key to creating personalized drugs with greater efficacy and safety [109]. Obviously, a population-wide Taiwan Biobank has been designed to create a database composed of all the required information to support efficient pharmacogenomic research. It has been estimated that, up to the year 2008, the economic value in the pharma-

cogenomic industry will be increased up to US\$1665 billion. In addition, it is also anticipated that several other healthcare and medical industries may directly or indirectly benefit from the Biobank development also.

Economic value and/or other benefits

When considering the economic value of promoting the Taiwan Biobank, it becomes necessary to become familiar with the vision laid behind the promotion of the 'Island of Biomedicine' project. As addressed by Executive Yuan of Taiwan, to promote Taiwan as the Asia-Pacific clinical research center, to pursue synergy through the integration between information technology industry and biomedicine, and to create a Biobank for the Chinese community have been the goals set for the project.

For the Asia-Pacific clinical research center, there have been 18 quality medical centers whose operations already match the required standard promulgated by the International Conference on Harmonization of Technical requirements for Registration of Pharmaceuticals for Human Use-Good Clinical Practice (ICH-GCP) rules. Hence, pending the period 2002–2004, more than 200 clinical trials commissioned by major international pharmaceutical corporations were successfully completed in these centers. Next, in lieu of Taiwan's strong presence in the information technology field, the promotion of the integration between bioscience and information technology will significantly benefit Taiwan. This ideology has been partially realized by IBM's establishment of a Bioinformatics Research Center in Taiwan. Then, further geared up with the population-based bioinformatics database accessible from the Biobank, it was one of the major official claims that Taiwan is able to accomplish her goal in developing solid R&D services with international competitiveness in the biomedicine area. This is especially true in terms of Chinese community implication.

Indeed, Taiwan's ethnic compositions are mainly Chinese originated. It is conceivable that Taiwan's biobanking efforts can somewhat be taken as the conduit between the western world and Chinese community for further public health and gene medicine-related research. Trying to facilitate the accomplishment of this strategic goal, the DOH of Taiwan is now calling for another essential research bid, "The Planning Project of Integrated Data Center for Bio-medical Informatics". Essentially speaking, this daring plan may be made possible for Taiwan's unique national health insurance system of more than 10

years. It is anticipated that with the integration of bioinformation compiled by Biobank and medical information accessible from the national health insurance system, together with genealogy, environment, cancer and mortality data, Taiwan may fulfil its goal to promote itself a nation of biomedicine services, provided that the ELSI work can be fairly implemented in advance and further R&D resources substantially added.

ELSI & public trust building

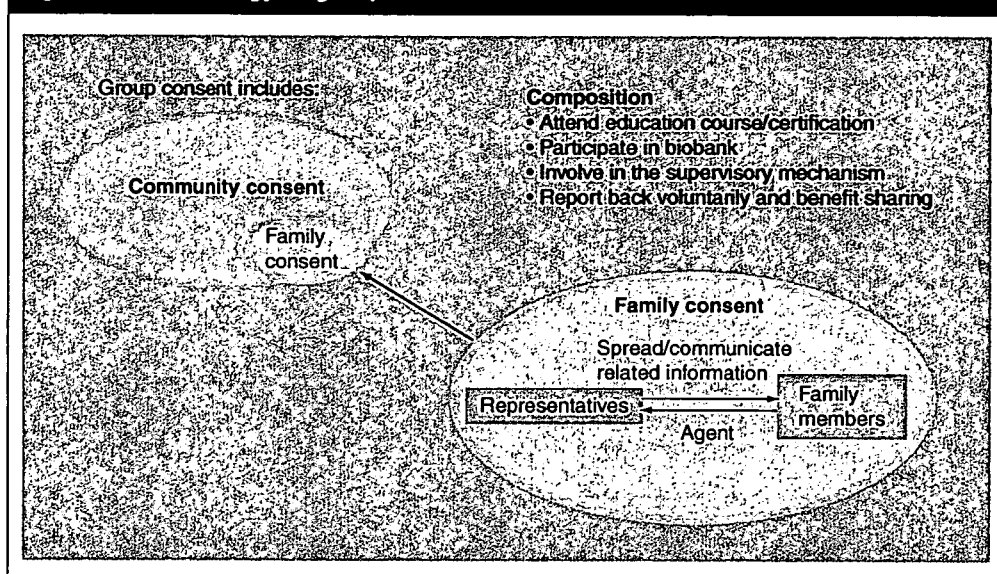
Until now, the ELSI issues remain the most difficult part of the research. While it has been always burdensome to develop an accountable ELSI governance framework within 1–2 years, the long-standing lacking of trust between researcher and subject and/or physician and patient in Taiwan have even more seriously deteriorated the slim public trust. In the past one and a half years, the project has been mistakenly challenged for unethical practices several times. However, all the accusations were, in fact, nothing to do with this project.

So far, the Ethical Governance Framework of the Taiwan Biobank has been reviewed and waits to be officially notified. The draft bill of the Taiwan Biobank Act has been submitted to the DOH for refinement. In addition, the Feasibility Study also indicated to us a good tendency of participant's support in the existing survey. However, the public communication, which may enable the public trust, and a workable consent mechanism that may harmonize the respect of individual autonomy and the need to pursue variable and uncertain future applications, remains to be seen.

It is our belief that the ELSI work should not just be the focus. To the scientist, they should be convinced that traditional ethical norms to be observed in public health-related research of specific purposes may not fully support the Biobank practices, which will leave room for future applications. Therefore, subtle and consistent communication shall be promoted so as to create the trust between two disciplines: science and ELSI. On the other hand, to the general public, how best to present the project in a meaningful and balanced way has been the most difficult job. For instance, the Biobank-related research materials have been continually disclosed on the web: the research results have been turned into the articles. In addition, TV programs, international conferences, symposiums and public forums have been occasionally held to promote the transparency.

However, any single incident of ethic violation in relation to a human body research can easily

Figure 3. The ideology of group consent.



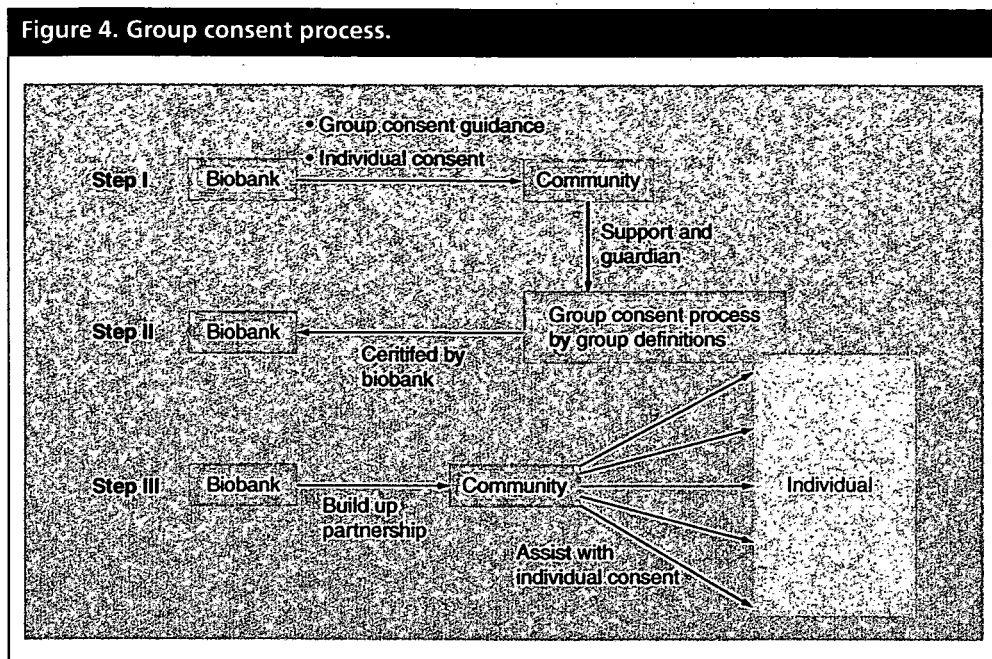
break this trust and lowers the supports. This is especially true in cases where aboriginal people are concerned. In Taiwan, the aboriginal people, a comparatively minority group in Taiwanese society, has been consistently picked up as the target group for a variety of research purposes. Not until recently, the protection of aboriginal people's right was included in the Constitution, the issues tend to be ignored or covered up. What is even worse is that they are very often not treated or respected fairly. With all the social and/or culture backgrounds taken into consideration, it becomes understandable how slim the public trust of the Taiwanese people to this kind of government project that is so concerned with human rights is. In turn, the trust building should be taken with priority and preference among all the ELSI work.

The ELSI and MG sections are generally able to work closely together. Most of the ELSI efforts have been left to the trust building; including the enhancement of a new ethical standard for biotechnology development, the elevation of human dignity, and the protection of human rights from violation in the development of science and technology. Also, how to conduct a meaningful communication to the public has been identified as the most difficult part of the ELSI work when pursuing the goal mentioned above. Lots of the efforts, then, are placed on an innovative consultation and informed consent mechanism, so as to earn the public trust.

As mentioned previously, the Taiwan Biobank differs from other research collecting statistics and samples from participants for a single purpose, in that it is established to have versatile applications. Thus, how best to inform participants fairly before the future usage of the Biobank can be completely realized is difficult. It is also believable that only an appropriate informed consent can justify the establishment of the Taiwan Biobank, as well as its beneficial utilization hereafter. In turn, establishing how best to conciliate between the 'specific' and 'general' consents is necessary.

The contemporary Ethical Governance Framework (draft) stated that, in the future, any project applying for access to the Biobank shall go through a dual review process: a scientific review for the project's soundness, and another review process that is conducted in compliance with the independent ethical governance system. Subject to this requirement, it was provided in a related consent form that the participant's fundamental right to 'specific consent' shall be respected with priority and preference as normal. The practice of 'general consent' can only be allowed in case of biobanking and only to the extent that said context of the Ethical Governance Framework has been included as a precondition to the effectiveness of the exceptional 'group consent'. It is designed to find a balance between the welfare brought about by the scientific advancement and the protection of human rights, and to put the connotation of the scientific citizen rights and obligation on trial.

Figure 4. Group consent process.



What is more, to maintain the fairness of this procedure, the Biobank and the future operation entity of the Biobank shall promulgate the protocol of database access for variable research purposes. It is also the fundamental principle that participants are embodied with the right to withdraw anytime unconditionally.

In addition, because of DNA's characteristics of inheritance and long-lasting features, it is of particular importance for the population-based gene research, like the Taiwan Biobank, to strengthen the effectiveness of public communication in the Taiwanese society, which attaches great importance to family. For this purpose, the Taiwan Biobank proposed to design an enhanced consent mechanism in which 'individual' consent lays a foundation with 'family or community' as a supplement, so that the oriental humanism spirit can be reflected and, thus, disputes could be decreased and/or avoided and the possible stigmatization effect of population-based gene research can be minimized. This ideology is illustrated in Figure 3.

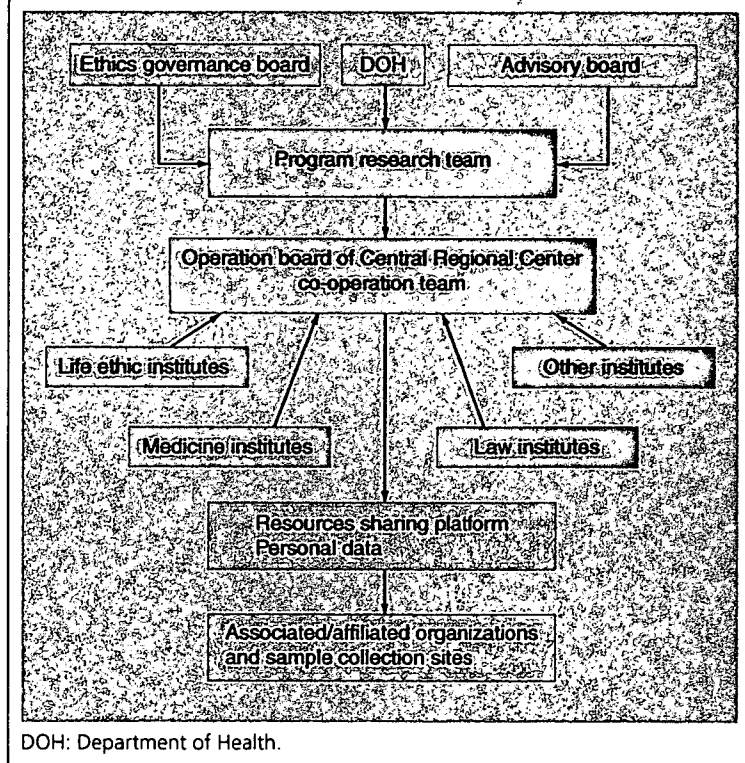
In conclusion, the most difficult part of the biobanking efforts in Taiwan has been the public trust building. While it does prove difficult to turn the conceptual ELSI rules into practices, it is even more difficult to create a communication system that can really earn the public trust. A significant amount of the ELSI work, then, was poured into the system formulation. First, the project was narrated differentially, subject to the ELSI section's approval, in the poster, invitation letter, partici-

pant's manual, informed consent form and other related materials. Furthermore, recruiting efforts will be embarked from the community events (i.e., festivals). Guided by the community leader, the researcher or trained study nurse will give the community a brief explanation about the ideology of biobanking and leave the reference materials there for their in-depth study. At this pre-enrollment stage, the community leader plays a crucial role in bridging the trust between researchers and the community members.

With this communication design, other stakeholders can participate pending participant's pre-consent process, provided that the participant's individual consent principle shall not be violated, so as to enlarge the possible arena for public communication and, thus, to strengthen the consent's effectiveness also (please refer to Figure 4 below for the group consent process). Should there be any other shortcomings remaining in the recruitment and sample collection procedures after the consent, the Biobank will, subject to participant's willingness pre-expressed in the consent form, contact participants to redeem the shortcomings. Also, the participants may choose to withdraw at their free will at any time.

Along with this face-to-face contact preparation, bearing the limited experts and little public information available in mind, how to facilitate the sample collection process is another critical challenge. Normally, on average, it takes more than 2 h to complete a single collection practice. Therefore, trying to reach the goal of the collec-

Figure 5. Illustrative organization chart of a regional consultation mechanism.



tion of 200,000 samples on time, such a regional consultation mechanism becomes necessary and is represented in Figure 5.

Several foundational works have been pursued in conformity, with the ideology of promoting a regional-based consultation mechanism, including:

- To create a face-to-face public communication mechanism
- To enable the research community with the capability of public communication
- To enable a sufficient amount of people who can participate in the project through a conscious communication with the researcher
- To establish the regional-based public consultation system
- To conduct the public poll on a normal basis
- To promote the required infrastructure development for the public communication

On the other hand, all these works will be performed mainly following the bottom-up strategy. The context can be highlighted as the following:

- Through county and municipality hygiene systems, along with the local community clin-

ics, the Biobank will promote the system deeply connected with local communities. Accordingly, common understanding can be promoted to elevate the health condition of the public. Besides, it is also helpful for the community to set up each one's community consent auxiliary system for the biobank participation;

- Trying to decrease the possible information asymmetry between the experts (researchers) and the general public (participants), Taiwan Biobank will encourage the creation of the Club of Taiwan Biobank, which will be promoted and organized on the community basis, provided that individual participants' rights and interests are guaranteed;
- It is also believable that the coordination among expertise of disciplines becomes fundamental to an effective consultation mechanism. Recently, seven aligned universities and/or medical schools of Taiwan, including Taipei Medical University, China Medical University, Kaohsiung Medical University, National Cheng Kung University, Chang Jung Christian University, Chang Gung University, and Tzu Chi University were invited to plan on promoting a Taiwan Ethic Net on the regional basis. The partnership among these seven institutes will be beneficial for the required consultation works, and also the constitution of the corresponding measures of modified consent system and for the exertion of its function of supervision.

Future perspective

Taiwan is actively promoting itself as an Asian 'gene medical research institute' so as to leverage the advantageous information industry into the biotechnology arena and to make an excellent biomedical island out of Taiwan. The Taiwan Biobank is one of the key elements to fulfil the goals. However, this concept, based on the life information within race, arouses serious doubts about the degradation of human dignity.

Therefore, it was noticed by the research team that the UN Educational, Scientific and Cultural Organization has emphasized the necessity of the research institute to inform the public of the relevant information collected, and consult with the public over possible disputes. Following this, the 'International Declaration on Human Genetic Data' was put forward in 2003, within which, the UN Educational, Scientific and Cultural Organization pointed towards the gene research that "nations should work hard to pro-

more the ethic education and training in various ways at different levels, and to promote the propaganda and publicizing plan concerning the human gene data” [4]. It also stated that during gene research, comprehensive education and communication is of particular necessity.

This spirit is also accomplished by the Human Genome Organization, which indicated that one appropriate way is to gain the consent of individual or other social groups before the planning of the gene research and to maintain continuous communication thereafter. Only in this way can the public trust towards the establishment of biobanks be gained, with the suspicion of deteriorating human rights removed.

At present, the Taiwan Biobank also follows these ideologies to promote its related research. Encryption up to the international safety stand-

ard has been adopted, with all the collected data being stored under anonyms, and appropriate exterior supervision system has also been applied. Besides, it is expected that informed consent with Taiwan characteristics, which is in line with the ethic norms, can be formed on the basis of adequate public trust and communication, as well as perfect consultation mechanism.

Financial & competing interests disclosure

The authors have no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending or royalties.

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Executive summary

- The main purpose of the Taiwan Biobank establishment is to meet the design requirement of traceable researches concerning local common chronic diseases.
- The project has gone through a long period of review process, including scientific and ethical, legal and social issues examinations of the National Science Council and Department of Health, before its initiation.
- The Project is mainly funded by the government. The appropriated budget has been expected to be approximately US\$14,680,000 in the 4-year term.
- The Taiwanese are a homogenous people, with the significance of LD being weaker. The Taiwan Biobank, therefore, will benefit the exploration of a gene's correlation with disease and the targeting.
- The voluntary-based participation in observing the principle of altruism becomes unavoidable to a successful large-scale biobanking effort for future applications.
- The Taiwan Biobank is a project aimed to facilitate the promotion of commissioned R&D, biomarker and pharmacogenomic industries.
- The Taiwan Biobank is a project with the aim of promoting Taiwan as an 'Island of Biomedicine'.
- Ethical, legal and social issues are the premises, and a special regional consultation and group consent mechanism was designed in promoting the public trust.

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22 March 2008
Kyoto Workshop of
Basic Law of Bioethics Project

**Biobanking for genome analysis and
Challenges for
the Japanese Research Community**

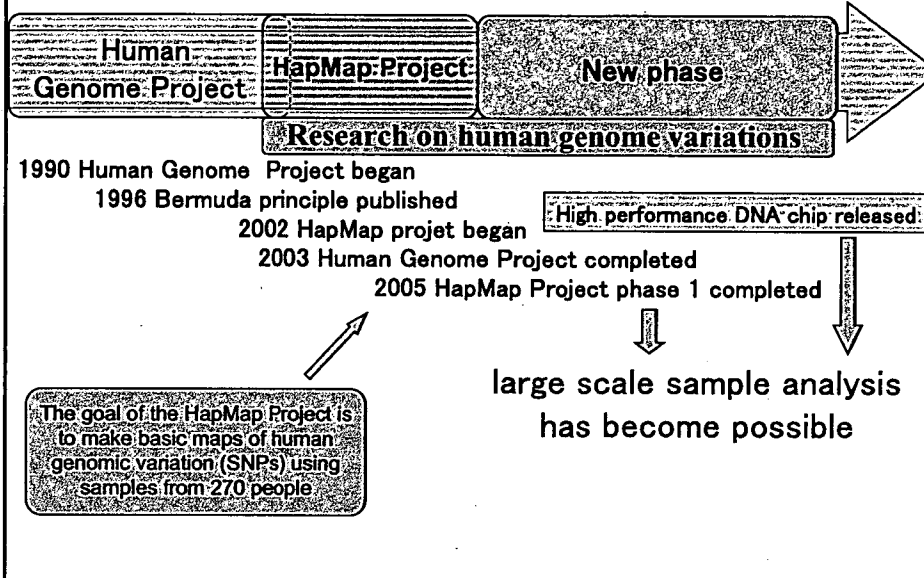
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Today's topics

- 1. Current state of human genome research (in the global context)**
 - 1) A new era with large population biobanks has come
 - 2) Importance of data sharing
(current practice in UK and USA)
- 2. Current state of Japanese biobanks**
 - Biobank Japan
 - Other examples
- 3. Challenges for Japanese research community**
 - 1) Guidelines for human genome research
 - 2) data sharing
 - 3) informed consent and public engagement

New era for human genome research



Accessibility | Privacy | Contacts | Site map

biobank
 Powered by the Health of Future Generations

Recruitment Update: 9pm
 Thursday 20 March 2008
 87,052

UK Biobank: Improving the health of future generations

Welcome to the UK Biobank website.

UK Biobank will be a unique resource for research into genetic and environmental factors that impact on human health and disease, to improve the health of future generations.

If you have been invited to participate in UK Biobank or would like to know more, visit the Participant Information pages.

Functions
 The UK Biobank is hosted by the Wellcome Trust, British Heart Foundation, Cancer Research UK, Genome Research, and the UK Health Research Council.

UK Biobank aims to study how the health of 500,000 people, currently aged 40-69, from all around the UK is affected by their lifestyle, environment and genes.

Biobank is looking to recruit 64,000 participants by the end of 2007, 220,000 by mid-2008 and 380,000 by mid-2009, culminating in just over 500,000 participants by mid-2010. (Stated in the web site in the late 2006)

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GWAS and data sharing

- GWAS is an abbreviation of **Genome Wide Association Studies**. (Researchers compare genotype data and phenotype data. Genotyping is performed over entire genome)
- GWAS is a main approach to identify common genetic factors that influence health and disease.



In U.K. and U.S.A, researchers have been sharing data including individual genotype and phenotype data with other researchers.

Examples of GWAS databases

Name of database	Organization	備考
dbGaP (a database of Genotypes and Phenotypes)	米NIH	NIHの運営で付われてたGWASデータを共有する。必ずしも全てのGWASプロジェクトデータが収録されるわけではない。既に数千人規模のサンプルが収録されている。
Wellcome Trust Case Control Consortium (WTCCC)	英Wellcome Trust	英国の遺伝学者が自らのデータを統合したデータベース。約2万人のサンプルが収録されている。
Candidate Gene Association Resource (CARE)	米National Heart Lung and Blood Institute (NIH) (NIHの下部組織)	NIHがサポートする9種類のコホート研究のGWASデータが収録される。その数は5万以上になる予定である。
Korean Association Resource (KARE)	韓国NIH Korea	今年の8月に発表された。10000人以上のサンプルを解析する予定。

- ・本格的に運用されているのは、WTCCCとNIHのdbGaPである。
- ・dbGaPには現在NIHで進行中の多くのプロジェクトのデータが今後も追加される。

GWAS databases - WTCCC and dbGaP

■ **Wellcome Trust Case Control Consortium (WTCCC)** is managed by Wellcome Trust in U.K.

1. Collaboration of 24 leading human geneticists.
2. Analyzing 17,000 samples together and published a paper in the name of WTCCC last June.
3. They released their research data on their database.

■ **database of Genotype and Phenotype (dbGaP)** is managed by NIH in U.S.A.

1. NIH have been funding more than 10 GWAS projects.
2. Researchers can get access to GWAS data in dbGaP.

What are the advantages and risks of data sharing?

- The data sharing has many advantages for GWAS.
 - Many researchers can analyze the large scale samples
 - Help to validate the reproducibility
- The disadvantage of GWAS data sharing is that the data sharing may increase the risk to invade the privacy of participants. (through re-identification etc.)

Two level data access system is currently used in human genome databases.

Risks for the privacy of participants.
(through re-identification etc.)



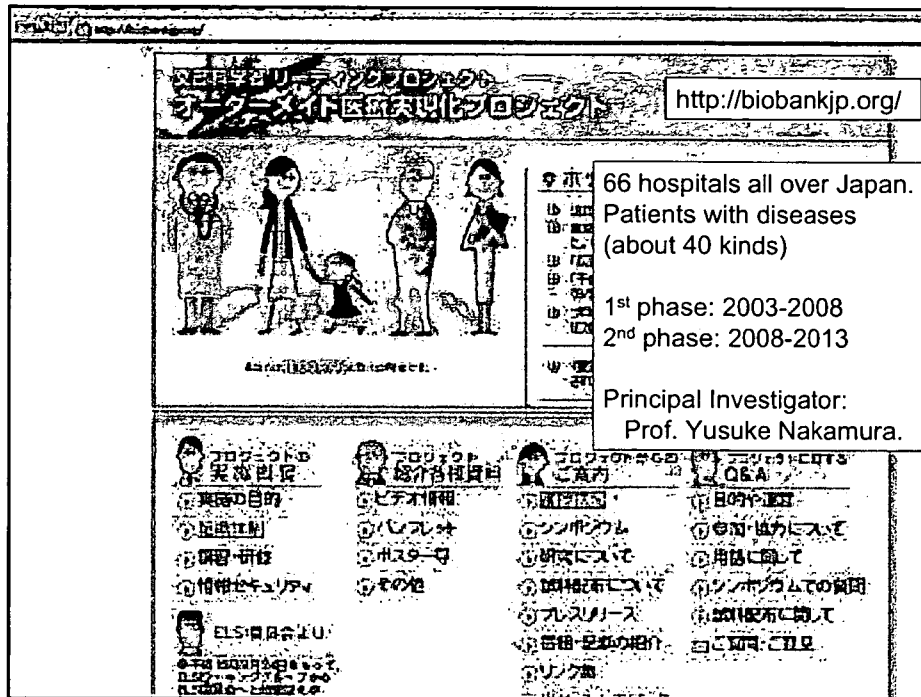
■ To avoid social and ethical problems, dbGaP and WTCCC split their research data into open-access data and controlled-access data (that includes individual genotype and phenotype data).

■ Controlled-access data are distributed to only qualified researchers. (after a review by the Data Access Committee)

They established detailed mechanisms to ensure that controlled-access data is properly used.

Japanese situation: (biobanks for human genome research)

1. Many cohort studies, but very few include genome analysis.
For example, Japan Public Health Center-Based Study (since 1990) by National Cancer Center has been collecting blood samples from about 100,000 people; but has not started genome analysis yet.
2. Some are carrying out genome analysis.
 - 1) Case-control studies → more life style information in the 2nd phase.
Biobank Japan: Tokyo Univ., Riken, and many hospitals.
(One of the largest DNA biobanks in the world)
Samples from 200,000 patients have been collected. (280,000 cases)
First phase GWAS genotyping has finished in most diseases.
 - 2) Prospective cohort studies involving genome analysis:
Hisayama town in Kyushu. Since 1961. About 6000 participants.
About 3500 DNA samples were collected in 2002-2003.
 - 3) Some new studies are planned.
"Nagahama-project" by Kyoto Univ. Med. School and Nagahama-city, Shiga-prefecture (near Kyoto). Aiming at 10,000 participants.



Sample use and data sharing

1. Biobank Japan. (since 2003)

They started to distribute samples outside researchers in January 2005.
 As of Feb. 2008, only 12 projects accessed the biobank samples.
 No data sharing system is established. (though it is planned in the second phase)

2. Other projects

It seems that not many are considering providing samples to other projects. Data sharing is generally not considered, either.

3. There is no charter member project in P3G (global network of population genomics research).



Most projects are working independently and not considering extensive sharing of samples and data, not to mention making multi-center networks.

Challenges for Japan

- **Japanese guideline is not properly prepared for the data sharing (First issued in 2001, and revised in 2004)**
 - The guideline (ヒトゲノム・遺伝子解析研究に関するガイドライン, 略称 三省指針) **does not distinguish between the samples such as blood, cells and DNA, and data such as genotypes and clinical information.**
 - It does not mention **situations in which data from participants are submitted to large scale databases.**
- **Biobank Japan**
 - There is no description about data sharing in the Informed Consent form



It is difficult to proceed to data sharing with already collected samples.
Revision of the governmental guideline may be needed.
But, we do not know how the general public feel about extensive data sharing.

Today's topics

1. **Current state of human genome research**
 - 1) A new era with large population biobanks has come
 - 2) Importance of data sharing
(current practice in UK and USA)
2. **Current state of Japanese biobanks**
 - Biobank Japan
 - Other examples
3. **Challenges for Japanese research community**
 - 1) Guidelines for human genome research
 - 2) data sharing
 - 3) informed consent and public engagement



At least, we need to have more discussions about how we establish and utilize biobanks for genome research among researchers, policy-makers and the general public.

ゲノム関連トピックス
(2006～2008年)

T06.110

東京高裁平18・2・1判決：内縁夫死亡後の凍結精子による体外受精で出生した子の認知請求を認めず

内縁の夫の病死後、冷凍保存しておいた精子で体外受精して生まれた女兒が、内縁の夫の子としての死後認知を求めた訴訟の控訴審で、精子提供者の同意は、体外受精のたびに得る必要があり、同意がなければ法律上の親子関係は成立せず、同意のもと生前に4回体外受精を試みているからといって死後の同意までは認められず、また、死者の精子で新しい生命を誕生させるのは、倫理面で大きな問題があり、現段階でこれを受容する社会的な共通認識はなく、法秩序の中核部分である親子関係は、公益的な性質もあり、当事者や関係者だけの自由な処分は許されず、自然な生殖と著しく乖離しており、認知は社会的にも不相当であるとして、請求を棄却した1審判決を支持し、原告の控訴を棄却する判決を言い渡した。判決は、医療機関が精子の凍結保存や体外受精の際、十分な説明や精子提供者の意思確認をしていなかったとして、本件のような事態が繰り返されないようにするためには、医療機関の役割も重要と付言した。

→家庭裁判月報58巻8号74頁

<これまでの経過>

T05.799 東京地裁平17・9・29判決：内縁夫死亡後の凍結精子による体外受精で出生した子の認知請求を認めず

<その後の経過>

T06.622 最高裁平18・9・8決定：冷凍保存した精子での体外受精・出産で父子関係を否定

[キーワード] 法制 紛争 人間 社会 科学技術

T06.212

「遺伝子関連発明のライセンス供与に関するガイドライン」勧告を採択／OECD
経済協力開発機構（OECD）は、2月23日の理事会において、「遺伝子関連発明のライセンス供与に関するガイドライン（Guidelines for the Licensing of Genetic Inventions）」を採択した。このガイドラインは勧告として採択されたもので、加盟国を法的に拘束するものではないが、医療分野で使用される遺伝子関連発明のライセンスに関して一定の指針を示すもので、ライセンス供与一般や研究の自由などについて規定している。

→GUIDELINES FOR THE LICENSING OF GENETIC INVENTIONS

<http://www.oecd.org/dataoecd/39/38/36198812.pdf>

「遺伝子関連発明のライセンス供与に関するOECDガイドライン」（日本語訳）

<http://www.jba.or.jp/oshirase/oecdguideline060323.htm>