

Biobank Networks In Asia

Dr Robert Hewitt, MB BS, PhD

Director, NUH-NUS Tissue Repository, Singapore*

President, International Society for Biological and Environmental Repositories

* NUH is the National University Hospital

NUS is the National University of Singapore



Forum for International Biobanking Organisations
(FIBO)

Talk Summary

1. Establishing a tumour bank in Singapore
2. Some universal problems encountered
3. Biobanking meeting in Singapore
4. Some Asian biobank networks
5. Recent networking developments



**International Society for
Biological & Environmental Repositories**

An international society for biobanking

Founded in 1999

500+ members

www.isber.org

Benefits That ISBER Provides

- Meetings that bring you the latest updates from leaders in the biobanking field
- The opportunity to meet people involved in a wide spectrum of biobanking activities, from countries all over the world
- An established international network of people, who provide a source of support and collaboration in between meetings.

How ISBER Works

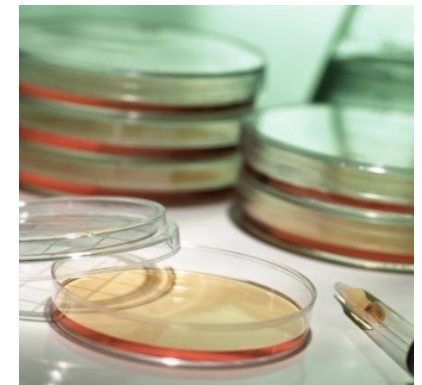
- (1) Meetings bring different groups together
- (2) Meetings encourage interaction
- (3) Meetings focus on cross-cutting issues
- (4) Committees and working groups function all year around

(1) Meetings Bring Different Groups Together

(a) Bring together representatives of different biobank types

- Disease-based biobanks/ tissue banks
- Population biobanks
- Culture collections
- Environmental biobanks
- Museum biobanks

- Biobanks of human, animal, plant and microbial samples



(b) Bring together different nationalities



(c) Bring together vendors and customers



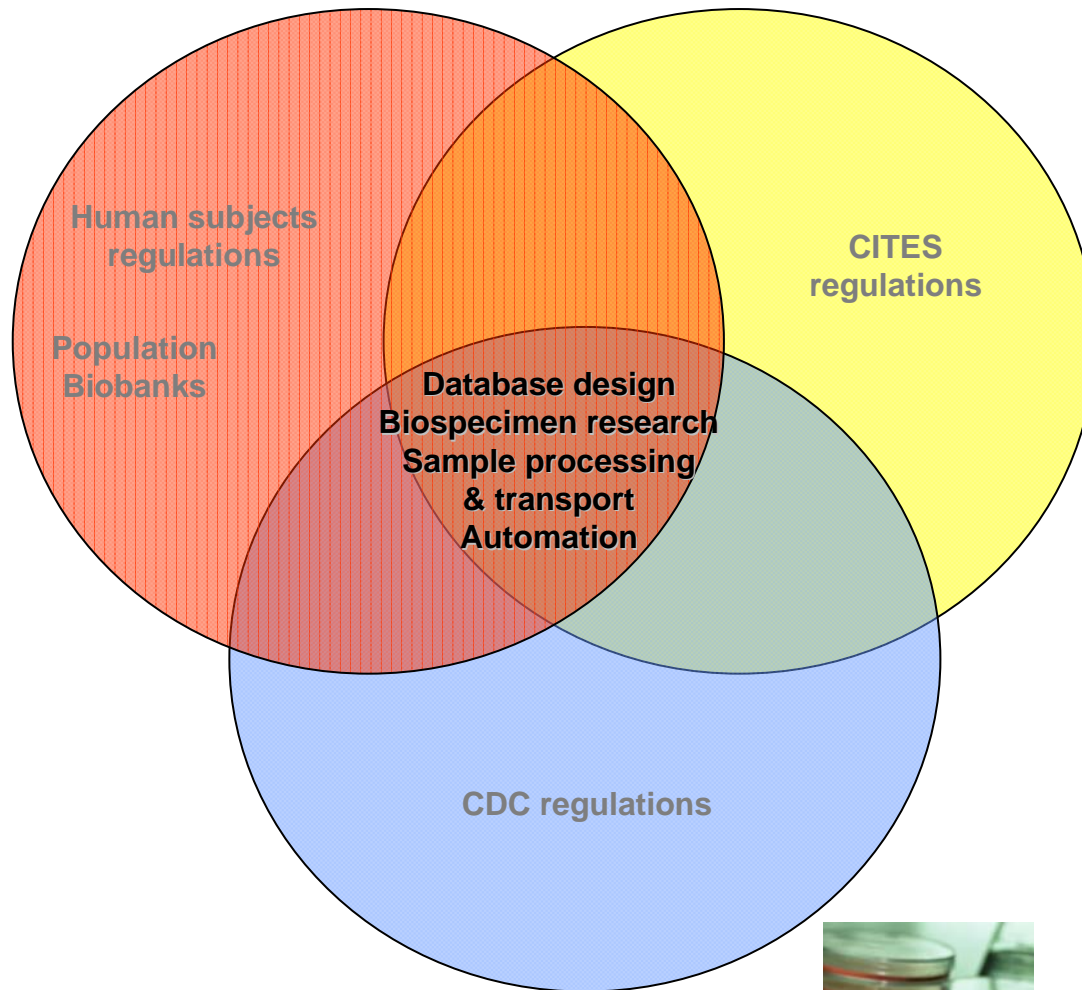
(2) Meetings Encourage Interaction

1. Lectures
2. Panel Discussions
3. Workshops
4. Posters
5. 'Lightning Round' Poster Discussion Session
6. Exhibits
7. Working breakfasts
8. Roundtable Lunches
9. Social Events



(3) Meetings Focus on Cross-Cutting Issues

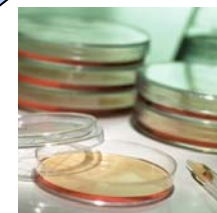
Human Repositories



Plant & Animal Repositories



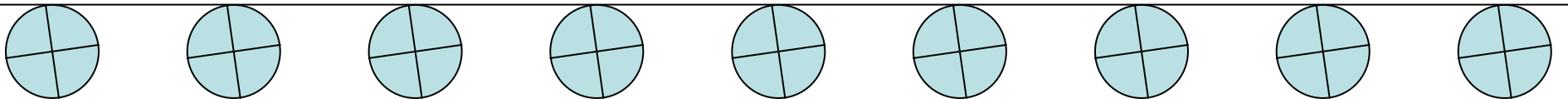
Microbial Repositories



(4) Committees & Working Groups Function All Year Around

Examples of Working Groups:

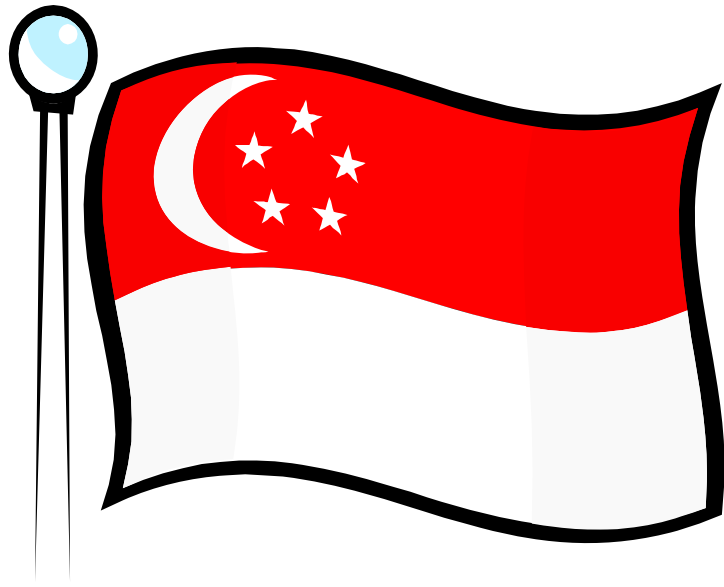
- *Rights to & Control of Human Tissue Samples*
- *Informed Consent Procedures for the Collection of Biospecimens*
- *Automated Repositories*
- *Biorepository Funding & Promotion*
- *Biospecimen Science*



www.isber.org



Coming To Singapore



NUH-NUS Tissue Repository

Mission Statement:

To provide NUH and NUS researchers with **high quality, well documented** samples, in a **safe, efficient, and ethical** manner.*

* NUH is the National University Hospital

NUS is the National University of Singapore

High Quality Samples

Dr Rajeev Singh (Pathologist)

- Histological quality control
- Liason with clinicians
- Supervision of technologists



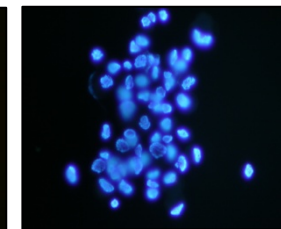
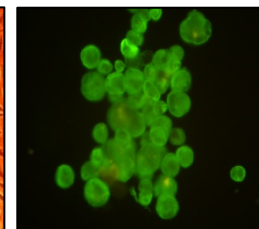
Dr Eng Chon Boon (Mol. Biologist)

- Molecular quality control
- Liason with researchers
- Supervision of research assistants



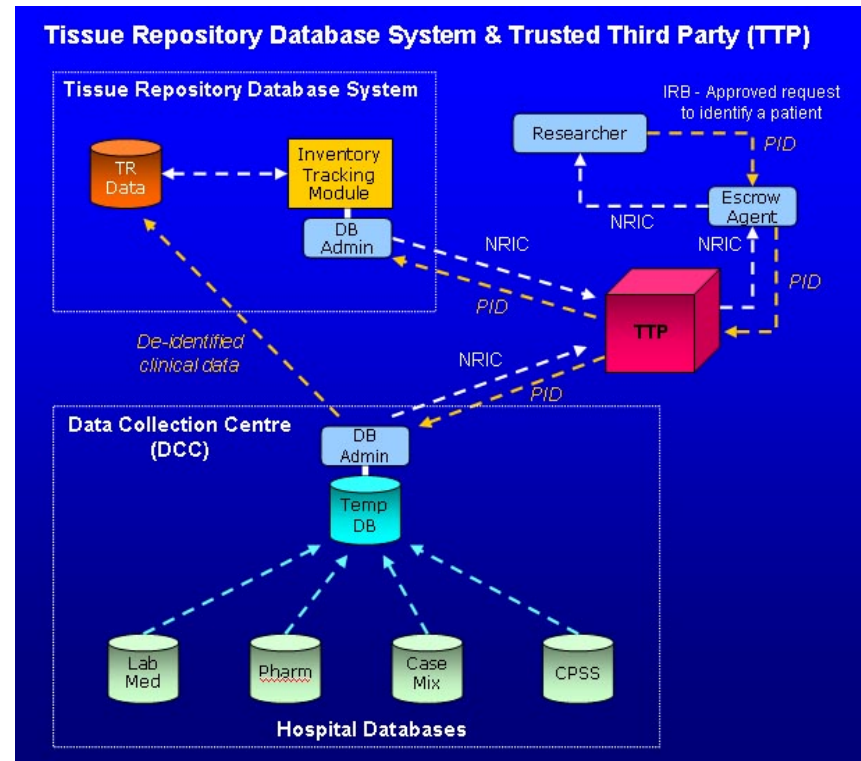
All samples bar coded and stored in liquid nitrogen vapor phase, with temperature monitoring and remote alarm system. Requesters are provided with samples in many formats including cryostat sections, DNA, RNA, protein extracts and cell cultures.

Primary cultures established by Kelly Lim and Fiona Wong from breast (23 cases), colorectal (17), renal (6), ovary (4) and endometrial cancers (3). All cultures stored at early passage for future use.



Well Documented Samples

- TR database system (**TRDS**) was developed in-house by Tan Kee Peck using *Microsoft.net*
- TRDS is based on the CCRD *Oracle* platform, it is Web accesible and integrated with hospital database systems
- TRDS has multiple security features, including *Trusted Third Party (TTP) Data Escrow System* to de-identify data
- Hospital-based Cancer Registry (HCR) database also developed in-house using Microsoft .NET technology. Similar design architecture and security features to TRDS.



Safety: Gold Award in 2008



TR team won the Gold Award in the NUS Safety & Health Improvement Projects (SHIP) Scheme in March 2008.

For a project entitled: *“Reduction of exposure to infectious agents present in human tissues”*

Team members (L to R): Shi Shaoliang, Hee Chiou Huey, Dr Eng Chon Boon (team leader), Fiona Wong, Kelly Lim and Aw Yi Bing (front).

Ethical Practice

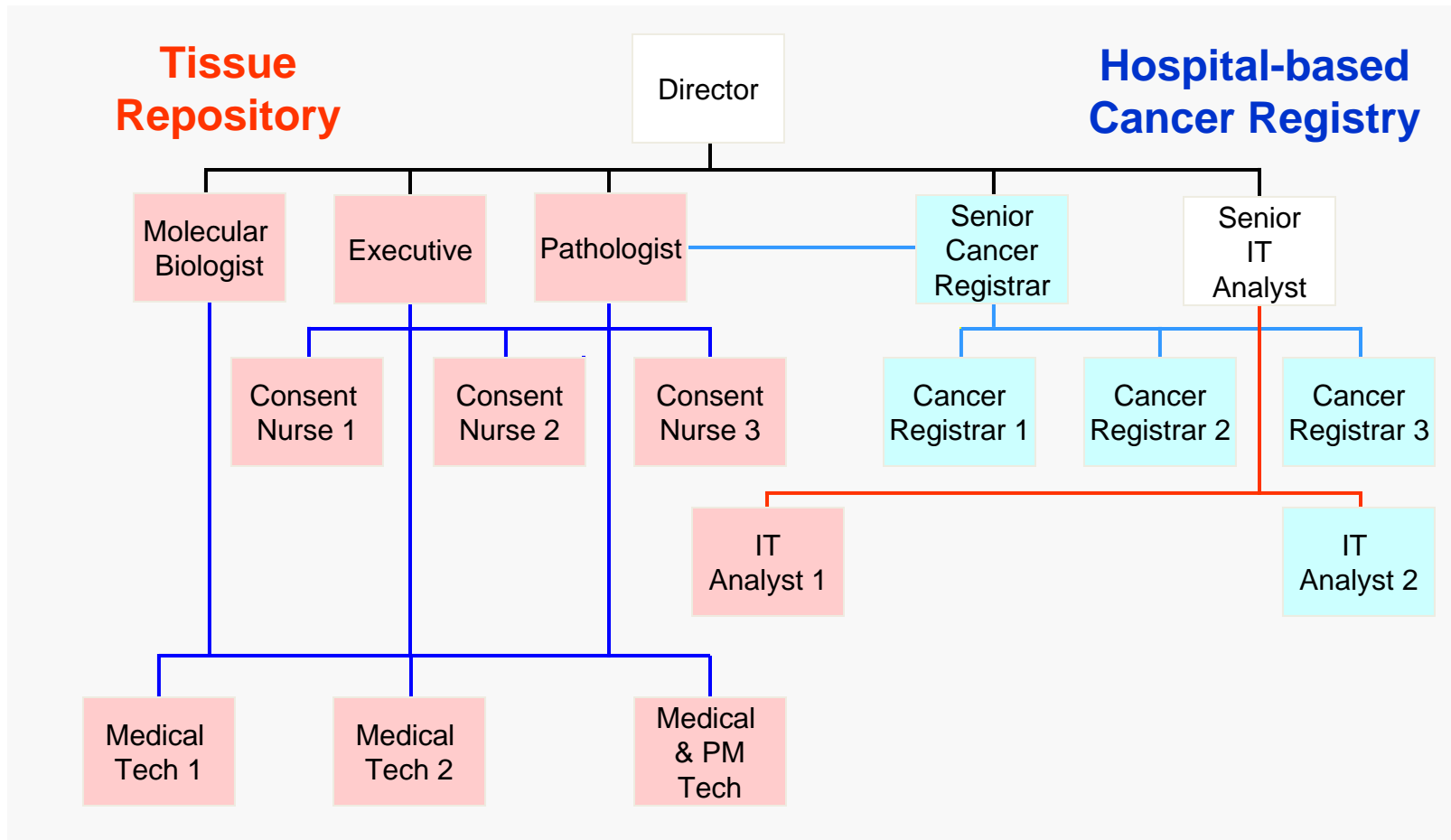
- TR operates according to the Singapore Bioethics Advisory Council (BAC) guidelines on tissue-based research.
- Informed consent has been obtained on all samples collected prospectively since April 2005.
- Informed consent is taken by TR staff (consent nurses) who counsel each patient.
- Informed consent is obtained from over 90% of patients.
- Samples are only released for projects in which use of the samples has received IRB approval

Related activities:

- TR organised a symposium on ethical issues in 2005.
- TR established the 'Register of Research Tissue Banks' at NUH, in line with BAC's recommendations.



Organisational Chart

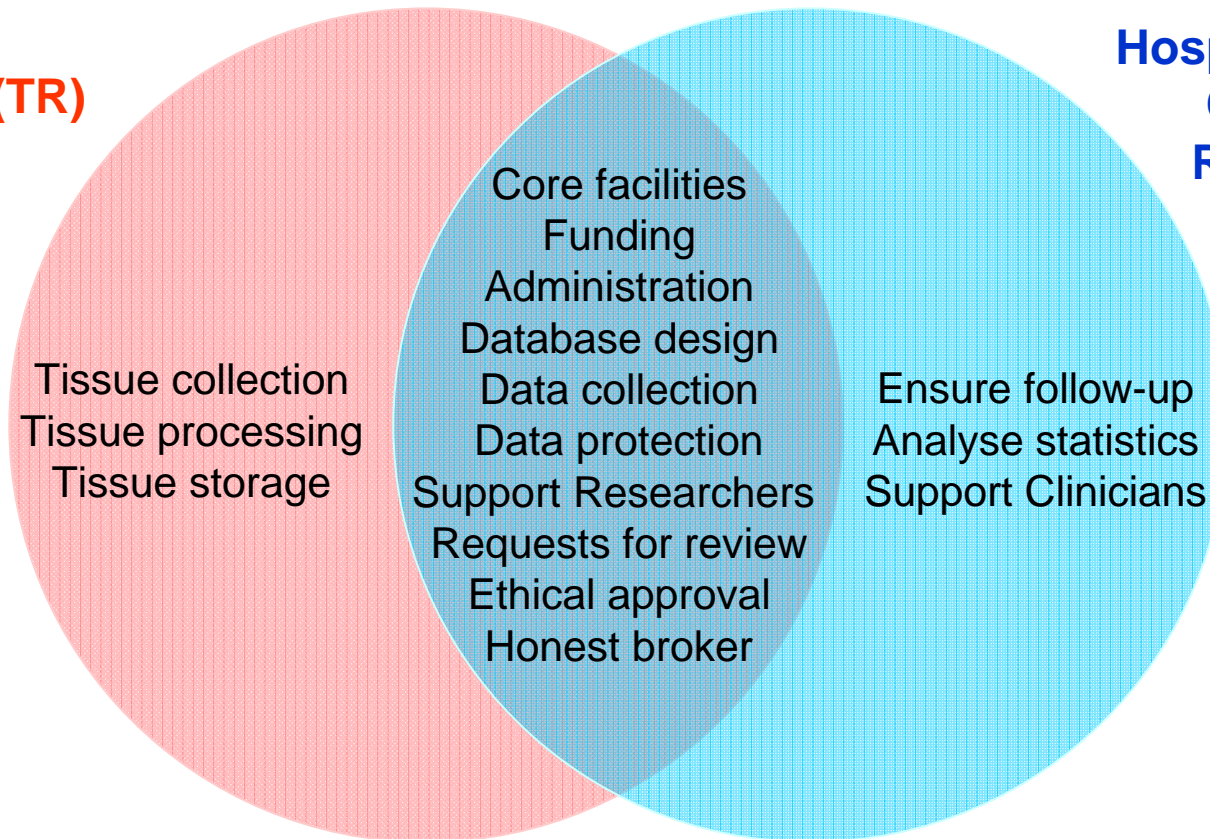


= TR Funded Staff

= HCR Funded Staff

Synergy Between Biobank & Cancer Registry

**Tissue
Repository (TR)**



**Hospital-based
Cancer
Registry
(HCR)**

Hospital-based Cancer Registry

Purpose: To collect clinical data on every cancer patient diagnosed and treated at NUHS.

This benefits Clinical & Translational Research, Health Services Research, Clinical Audit, and Patient Care (helps ensure proper follow-up of cancer patients).



Hong Hong Wentong Mon Thiri

Hospital-based Cancer Registry

Standards: Following datasets and standards of practice set by the American College of Surgeons Commission on Cancer (CoC) and the North American Association of Central Cancer Registries (NAACCR). Detailed clinical information is collected, including demographics, diagnosis, treatment and outcome (244 data elements per patient). HCR database is harmonised with TR database.



<http://www.facs.org/cancer/coc>



Hospital-based Cancer Registry

Training: Brought NAACCR-endorsed cancer registrar training course to Singapore in March 2008. “Principles of Oncology for Cancer Registry Professionals”. Course tutors: April Fritz and Louanne Corrance. 30 staff from across Singapore were trained.



Many Problems in Biobanking are Universal

- Lack of status
- Lack of support
- Lack of sharing
- Lack of harmonisation
- Lack of communication
- Lack of high quality collections

The Importance of Quality



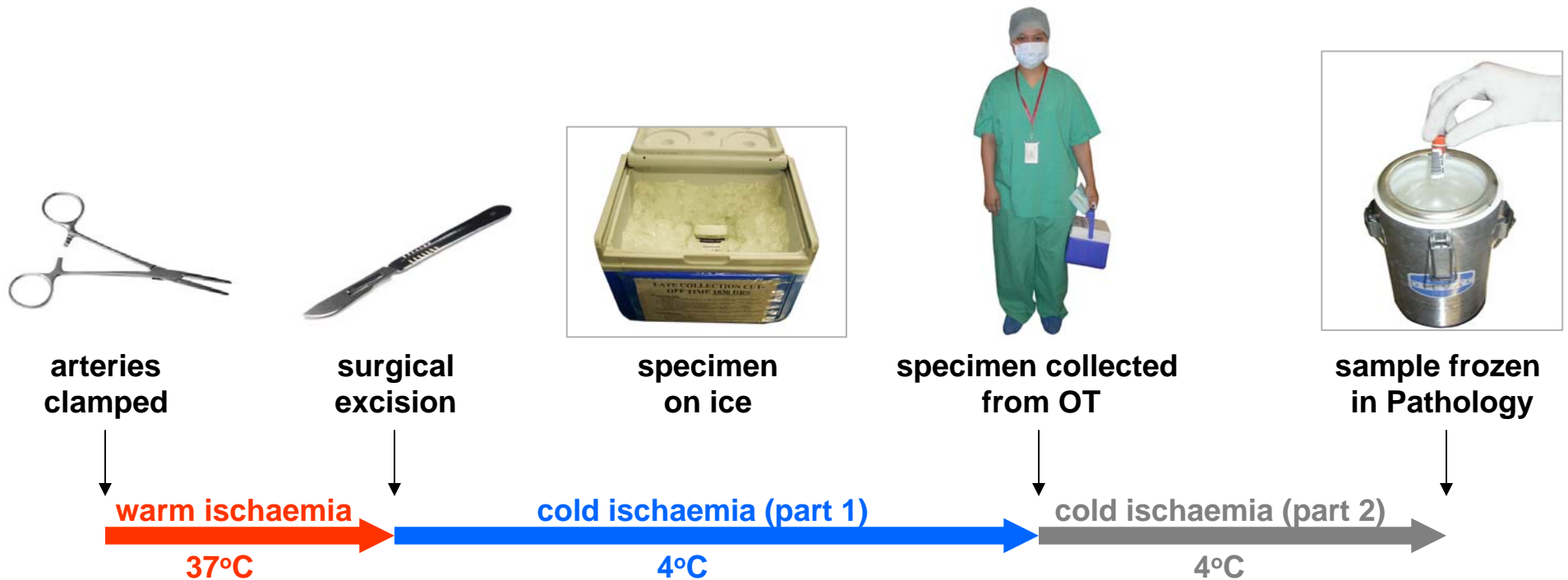
garbage
in



garbage
out

Building a high quality collection
of tissue is a BIG CHALLENGE

Quality Requires Institutional Commitment



Ischaemia Times

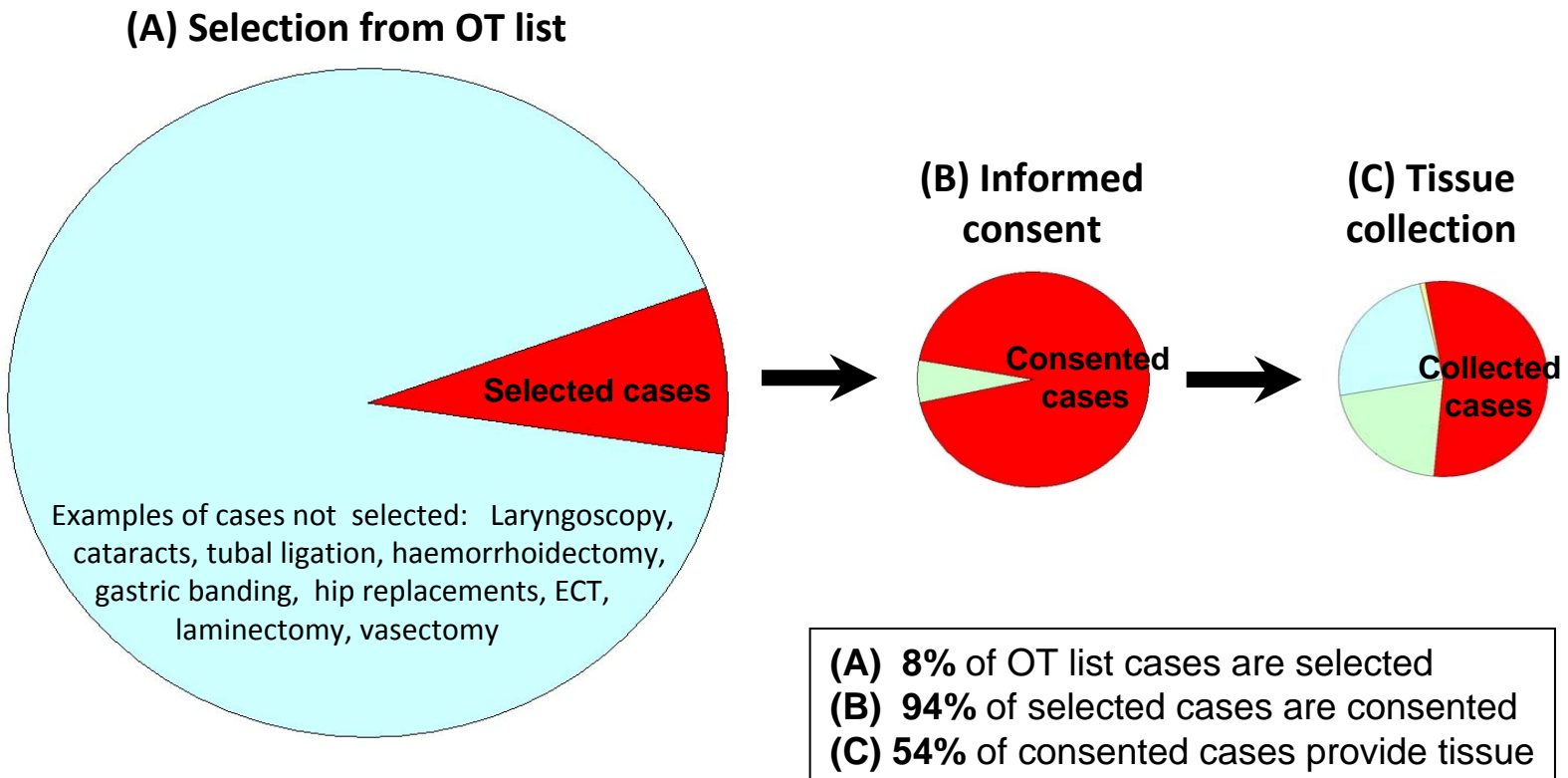
A Few Questions

- What is your consent efficiency?
- What is your collection efficiency?
- What is your collection rate?
- How many staff do you have?
- Can you justify so many staff?

Collection Efficiency & Collection Rates

- Institutional expectations need to be realistic
- We must explain that much of our work is “invisible”

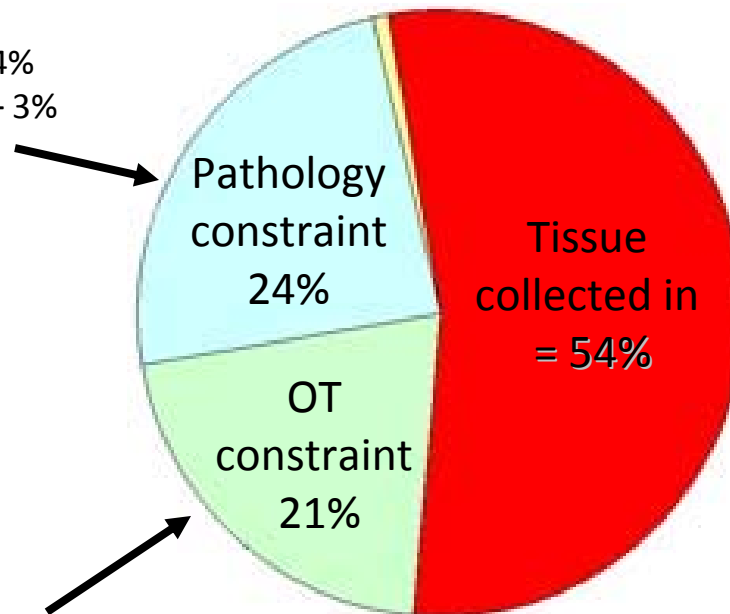
Collection Efficiency & Collection Rates



Collection Efficiency & Collection Rates

(C) Tissue collection

- Specimen too small – 13%
- Sampling will cause distortion – 4%
- Tumour not grossly identifiable – 3%
- No pathologist available – 3%
- Tissue necrotic/bony – 1%



- Operation past 5pm/7pm – 4%
- Resection not done – 4%
- Operation postponed or cancelled – 4%
- Specimen sent for frozen section – 2%
- Specimen fixed in formalin – 2%
- Surgeon refused – 2%
- Patient had infectious disease – 1%

How Should We View The Samples?

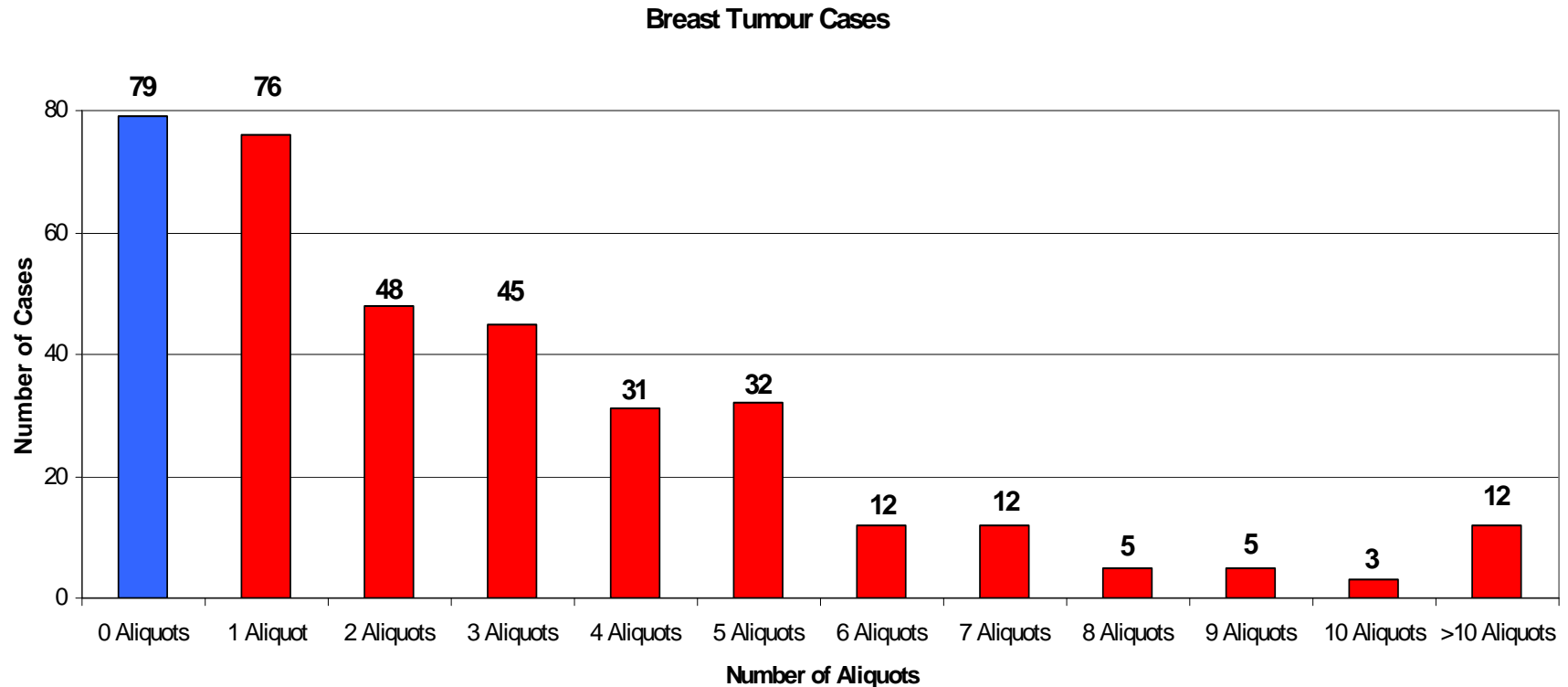
Either



Or



Availability of **Breast** Cancer Tissue Aliquots

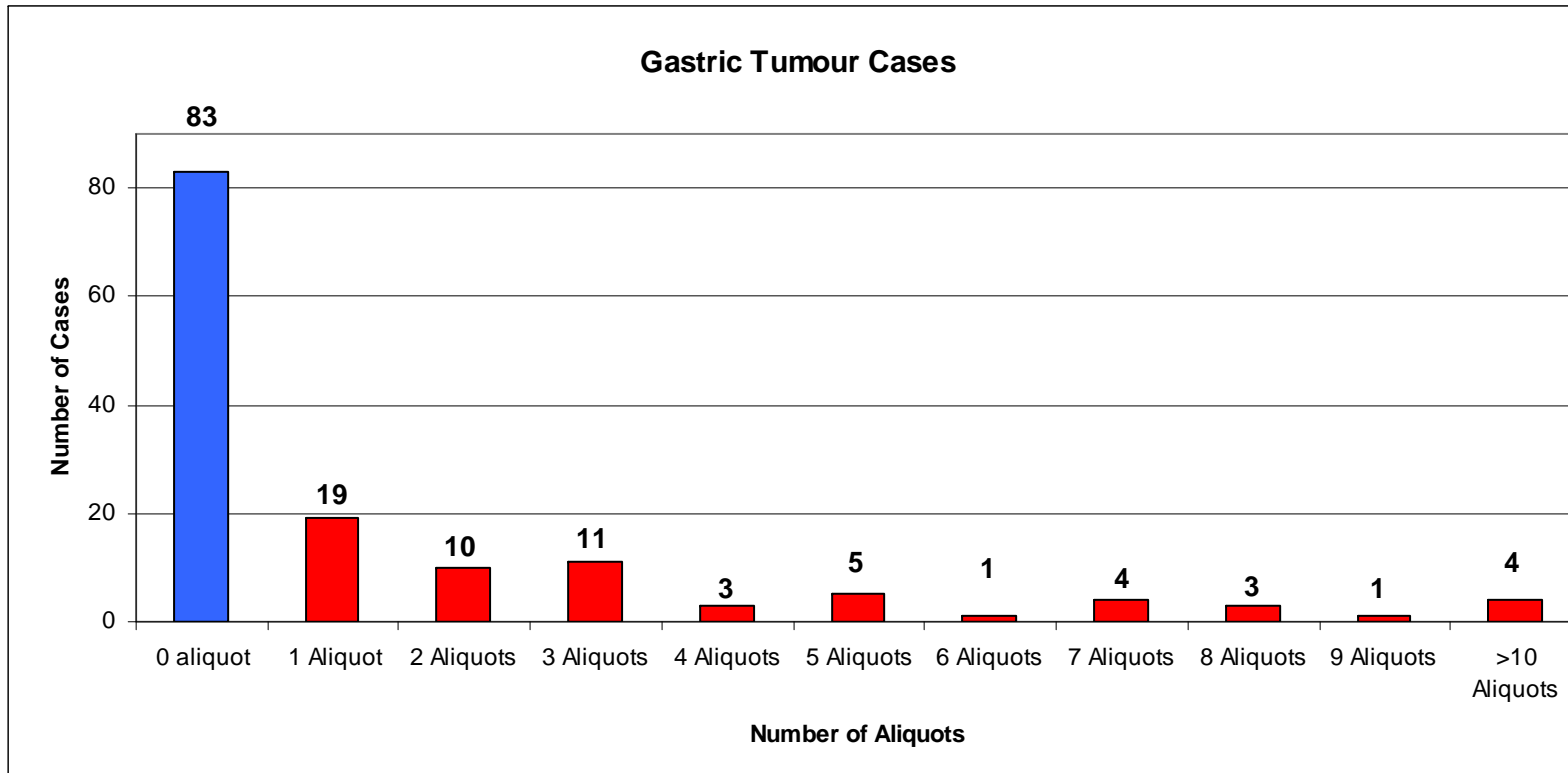


Summary

Breast cancer tissue has been collected from 360 cases

- For 79 (22%) of these cases, no material is left.
- For 76 (21%) only one aliquot is left.
- For 205 (57%) we have more than one aliquot left.

Availability of **Gastric** Cancer Tissue Aliquots

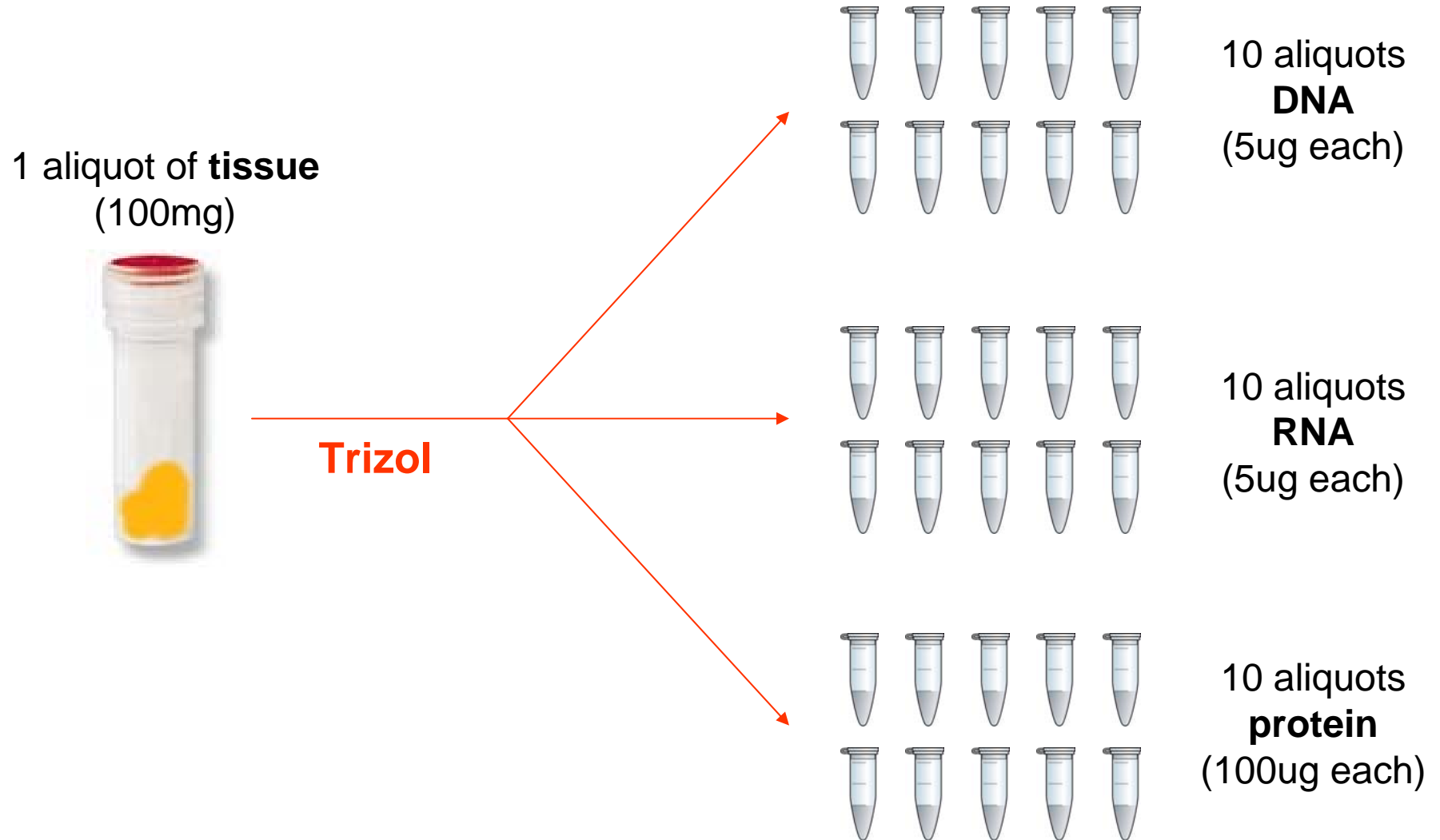


Summary

Gastric cancer tissue has been collected from 144 cases.

- For 83 (57%) of these cases, no material is left.
- For 19 (13%), only one aliquot is left.
- For 42 (29%), we have more than one aliquot left.

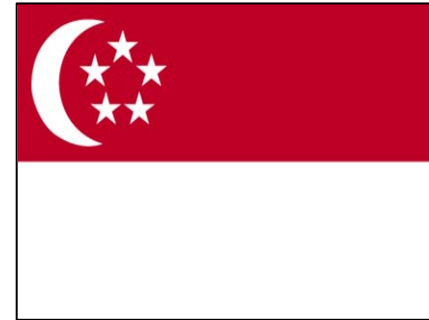
The Greater Efficiency Of Dispensing Molecular Extracts



The Need To Network To Increase Sample Size

Tumour Bank Network	Model	Scope
CHTN (USA) http://www-chn.ims.nci.nih.gov/	Federated	Cancer
Tubafrost (European) http://www.tubafrost.org/	Federated	Cancer
KConfab (Australia) http://www.kconfab.org/	Centralised	Breast & Ov.Ca.
Chernobyl Thyroid Tissue Bank (Russian Federation) http://www.chernobyltissuebank.com/	Federated	Thyroid Cancer
CNIO (Spain) http://www.cnio.es/ing/programas/progTumor01.asp	Federated	Cancer
ABN (Australia) http://www.abrn.net/	Federated	Cancer
Wales Cancer Bank http://www.walescancerbank.com/	Federated	Cancer
Victorian Cancer Research Tissue Bank (Australia) http://www.petermac-research.org.au/news.php?doc_id=7&	Federated	Cancer
Australian Prostate Cancer BioResource http://www.apccbioresource.org.au/	Federated	Prostate Cancer
Prostate Cancer Research Consortium (Ireland) http://www.fhrc.org/science/international_biomarker/teams/prostate-dmmc.html	Federated	Prostate Cancer

2007 ISBER Meeting in Singapore



Pictures courtesy of Singapore Tourism Board

Promoting The Meeting

English

International Society for Biological and Environmental Repositories
ISBER 2007
Annual Meeting & Exhibits
International Biobanking Standards
May 30 - June 2, 2007
Furama RiverFront Hotel
Singapore

- Repositories:
 - Animal specimen
 - Environmental
 - Human specimen
 - Museum
 - Plant/seed
- Biobanking in Asia and Australasia
- Biospecimen research
- Quality assurance and control
- Cryogenics and cell preservation
- Repository automation technologies
- Repository informatics
- Legal and ethical issues

Mandarin

International Society for Biological and Environmental Repositories
ISBER 2007
年会暨展览会
国际生物库标准
2007年5月30日 - 6月2日
新加坡富丽华河畔大酒店

- 资料库:
 - 动物标本
 - 环境
 - 人体标本
 - 博物馆
 - 植物/种子
- 亚洲和澳大利亚生物库
- 生物标本研究
- 质量保证与控制
- 低温学与细胞保存
- 资料库自动化技术
- 资料库信息学
- 法律和道德问题

会议以英语进行

Japanese

国際生物・環境レポジトリ学会
2007年度 ISBER
年次大会 & 展示会
国際バイオバンキング標準
2007年5月30日 - 6月2日
シンガポール
フラマ リバーフロント ホテル

- レポジトリ:
 - 動物試料
 - 環境
 - ヒト試料
 - 博物館
 - 植物/種子
- アジアとオーストラリアにおけるバイオバンキング
- バイオ試料研究
- 品質保証 & 管理
- 低温学 & 細胞保存
- レポジトリ自動化技術
- レポジトリ・インフォマティクス
- 法的・倫理的問題

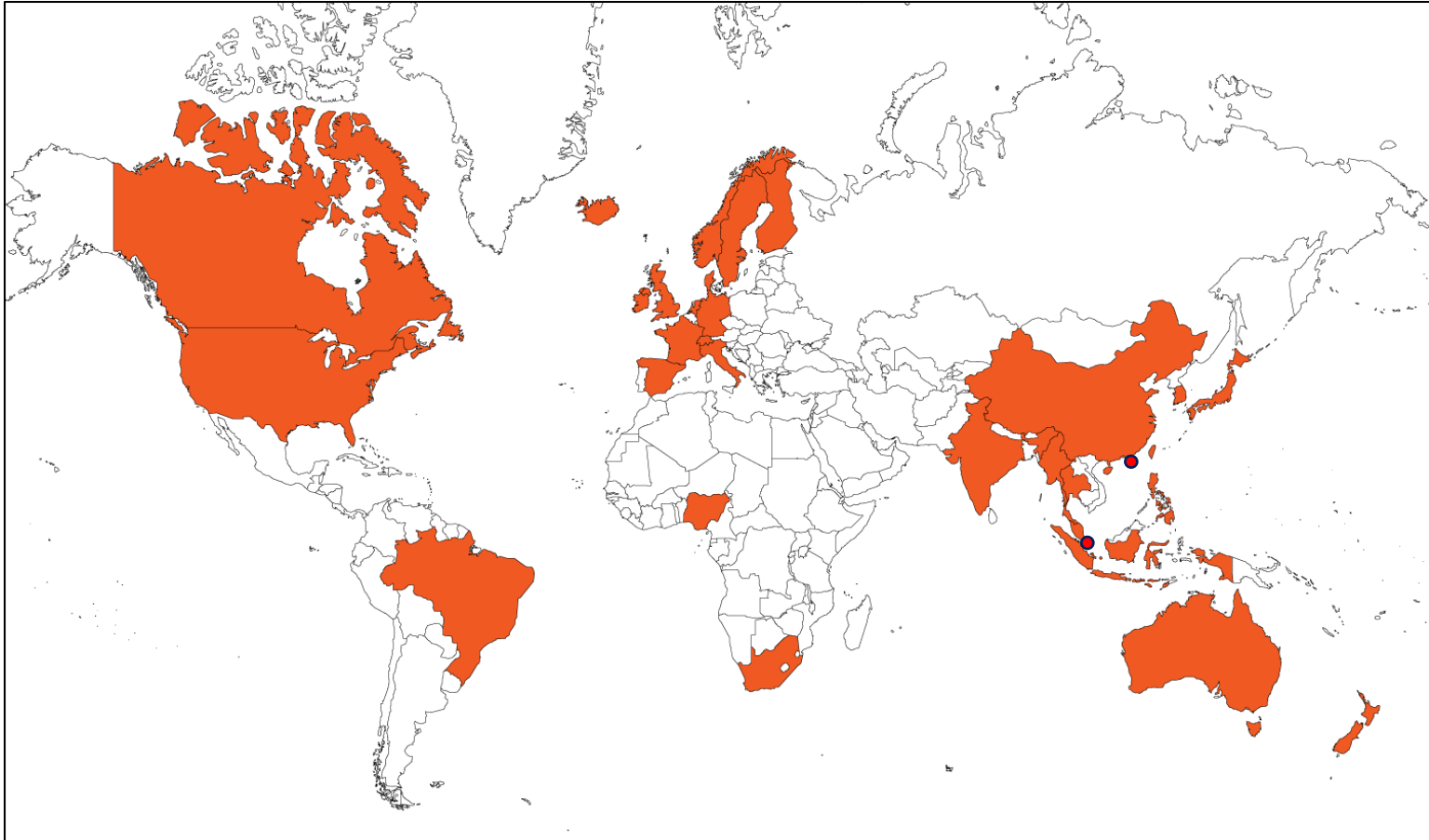
Korean

ISBER (International Society for Biological and Environmental Repositories)
ISBER 2007
연례 미팅 & 전시
국제 생물자원은행 표준화 (International Biobanking Standards)
2007년 5월 30일 - 6월 2일
Furama RiverFront 호텔
싱가포르

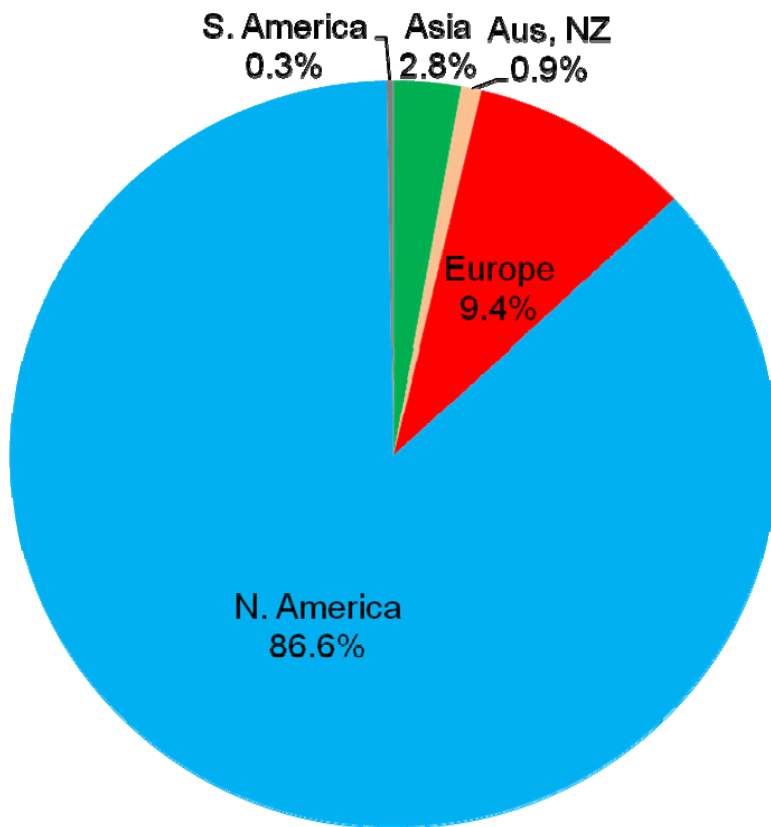
- 지안:
 - 동물시료
 - 환경
 - 인체시료
 - 박물관
 - 식물/종자
- 아시아/호주 생물자원은행
- 생체시료 연구
- 품질 보증 및 관리
- 저온학과 세포보존
- 저장 자동화 기술
- 저장 정보학
- 법적/윤리적 문제

미팅은 영어로 진행됩니다.

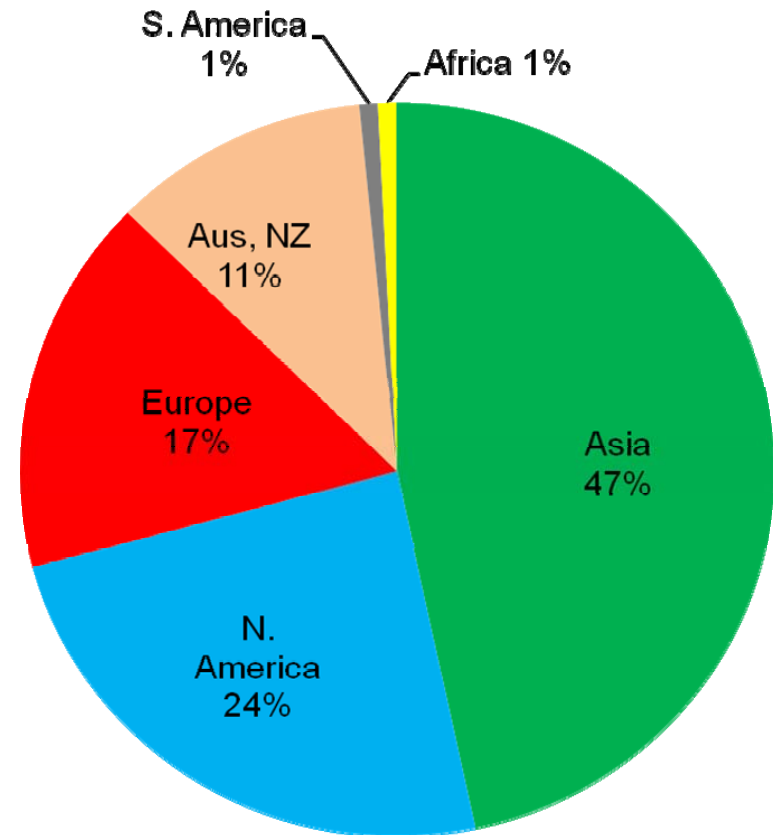
Countries Represented



Attendees At USA vs Singapore ISBER Meetings



Bethesda, USA in 2006



Singapore in 2007





Pan-Asian Biobanking Networks



Asian Consortium for the Conservation and sustainable Use of Microbial Resources (ACM)



*Slide from Dr Juncai Ma
Institute of Microbiology
Chinese Academy of Science*

Profile and Activities of ACM

Member countries = 12

Cambodia, China, Indonesia, Japan, Korea, Laos, Malaysia, Mongolia, Myanmar, Philippines, Thailand, and Vietnam

Organization

Chairperson: Indonesia

**Vice-Chairs: Korea
Vietnam**

**Secretariat:
NITE-DOB, Japan**

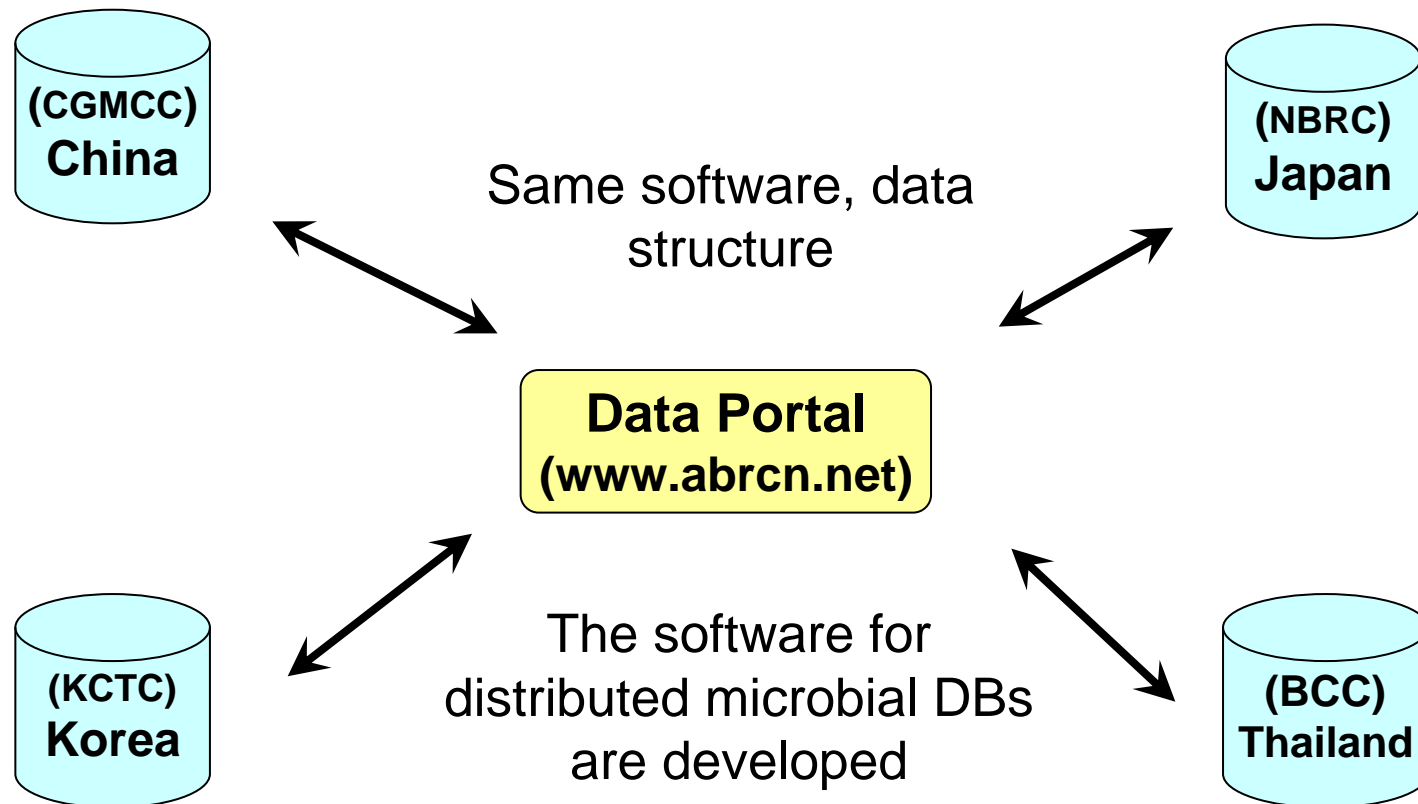
Action plan

- **Annual Meeting**
- **Information exchange through seminars and workshops**
- **Promotion for public acceptance and social infrastructure**

Task Forces

- **Asian BRC Network TF**
- **Human Resource TF**
- **MTA TF**

Prototype of Asian Biological Resource Centre Network



*Slide from Dr Juncai Ma
Institute of Microbiology
Chinese Academy of Science*

The Network for Asian Biological Resource Centers

Strain number: CGMCC NBRC KCTC BCC

Genus Name:

Species epithet:

Other collection numbers:

Status: Type strain Reference strain

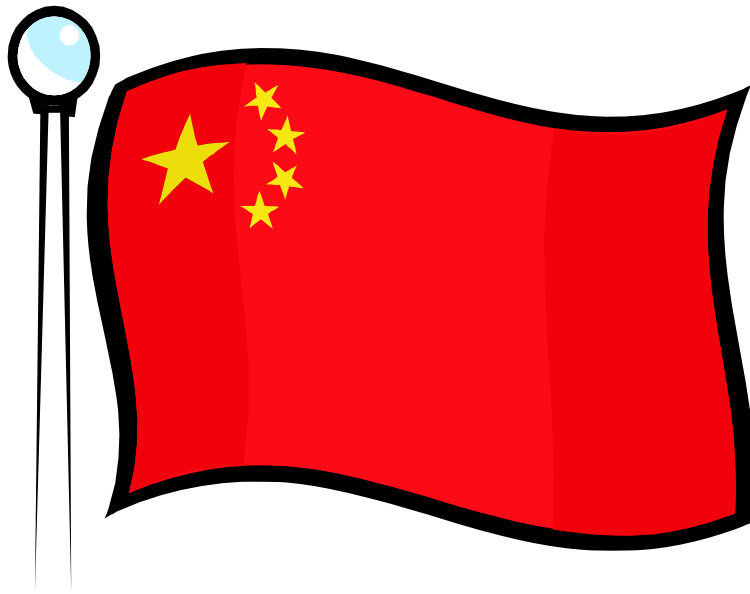
History:

Organism Type: All Archaeon Bacterium Fungus Yeast Alga
 Virus Plasmid

Database List: CGMCC(China): NBRC(Japan): KCTC(Korea): BCC(Thailand):

[Advanced search](#) [Administration](#) [\(Remote Search\)](#)

China



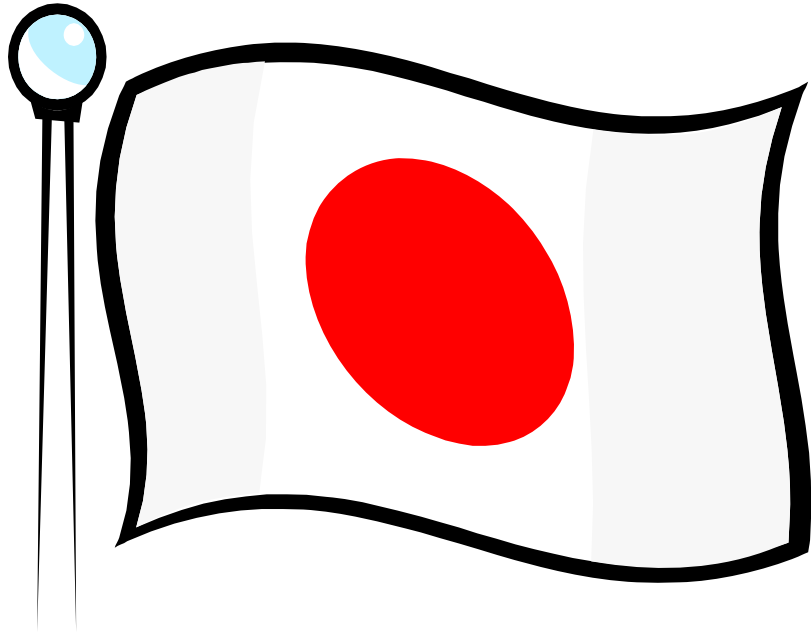
Clinical trials in China

- Advantages:
 - Large pool of treatment-naïve patients
 - Fast recruitment
 - Low cost of clinical studies
 - Market motivation: China expected to be the 3rd largest pharmaceutical market by 2020

China Export Restrictions

- Dickinson, D. China brings in regulations to put a stop to 'genetic piracy'. *Nature* 395 5 (1998).
 - China has adopted a broad set of regulations on the collection and use of its 'human genetic resources' in an attempt to restrict their exploitation by foreign biotechnology and pharmaceutical companies.
 - Official authorization required for any research project that seeks to "sample collect, merchandize or export" human genetic resources.

Japan

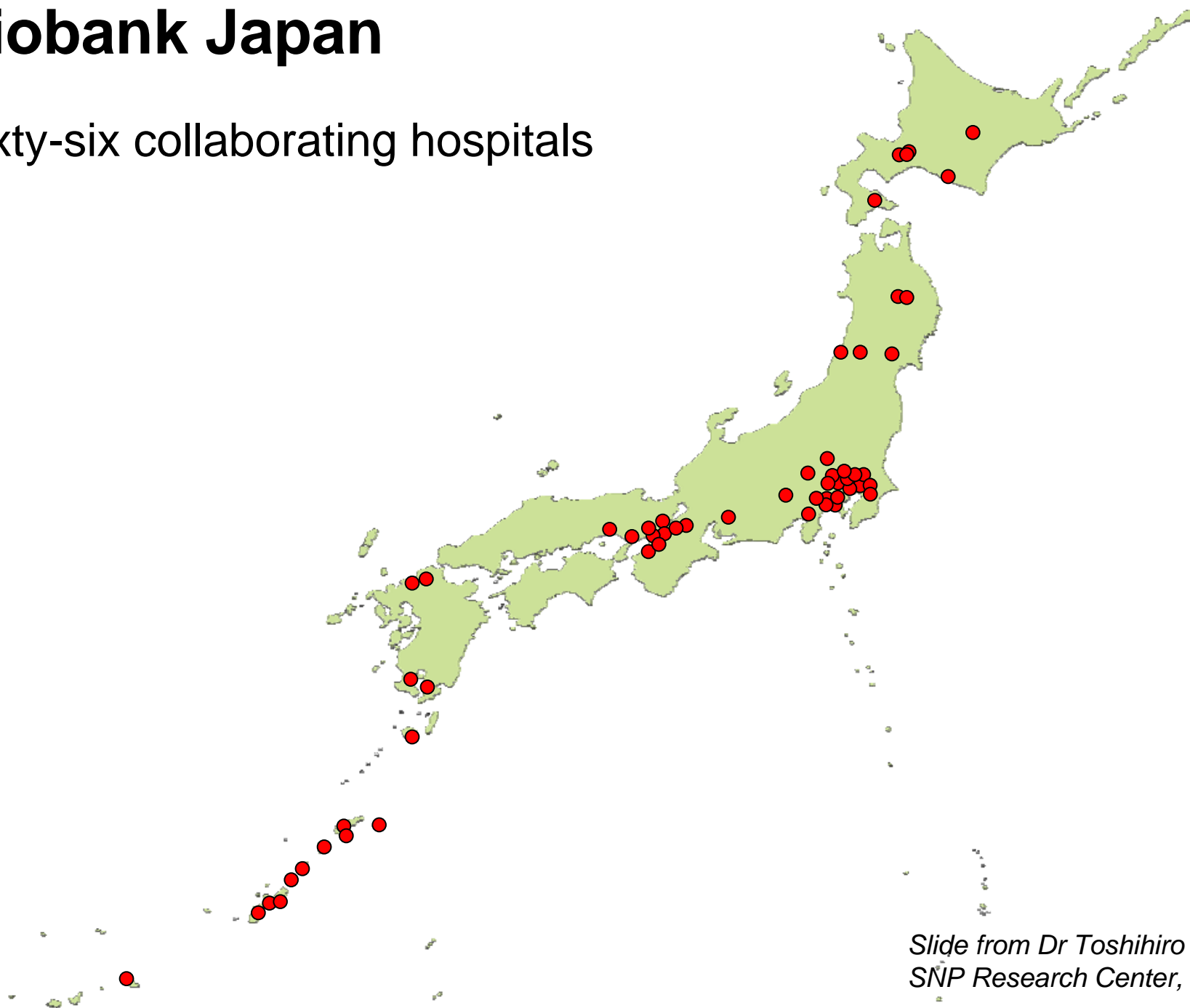


Biobank Japan

- Triendl, R. Japan launches controversial Biobank project. *Nature* 9, 982 (2003)
 - 5 year, \$180 million project to build a bio-repository of blood and tissue samples from 300,000 citizens suffering from cancers, diabetes, rheumatoid arthritis and other common diseases.
 - Led by Yusuke Nakamura of Tokyo University Institute of Medical Sciences (IMS).
 - Samples and patient data collected by a network of collaborating organizations and several large private medical schools.

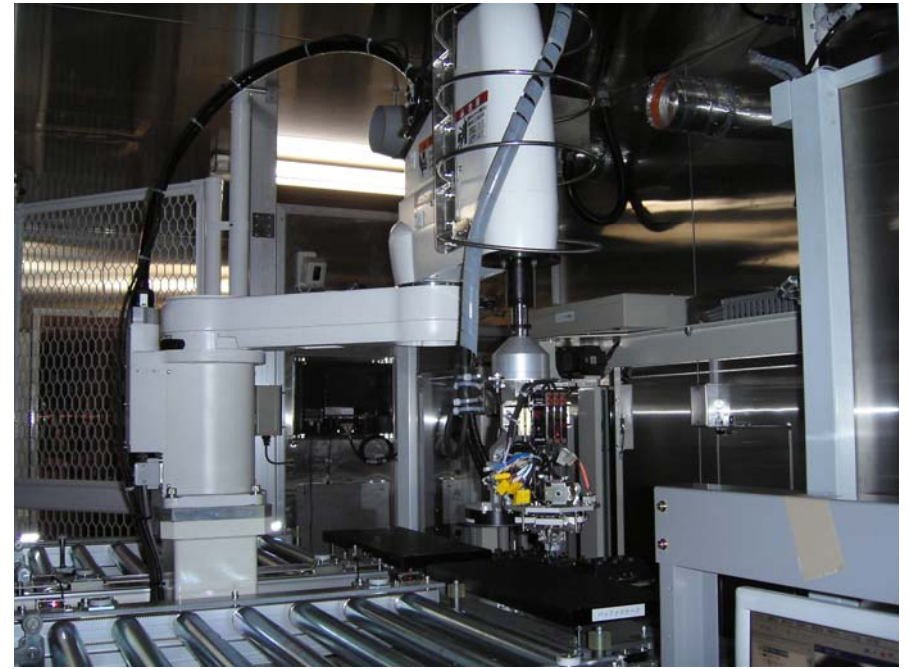
Biobank Japan

Sixty-six collaborating hospitals



*Slide from Dr Toshihiro Tanaka
SNP Research Center, RIKEN*

Biobank Japan – DNA Bank



Capacity: 1,000,000 tubes

*Slide from Dr Toshihiro Tanaka
SNP Research Center, RIKEN*

Biobank Japan – Serum Bank



47 LN tanks with capacity for ~2,700,000 tubes

*Slide from Dr Toshihiro Tanaka
SNP Research Center, RIKEN*

Biobank Japan – Status in March 2007

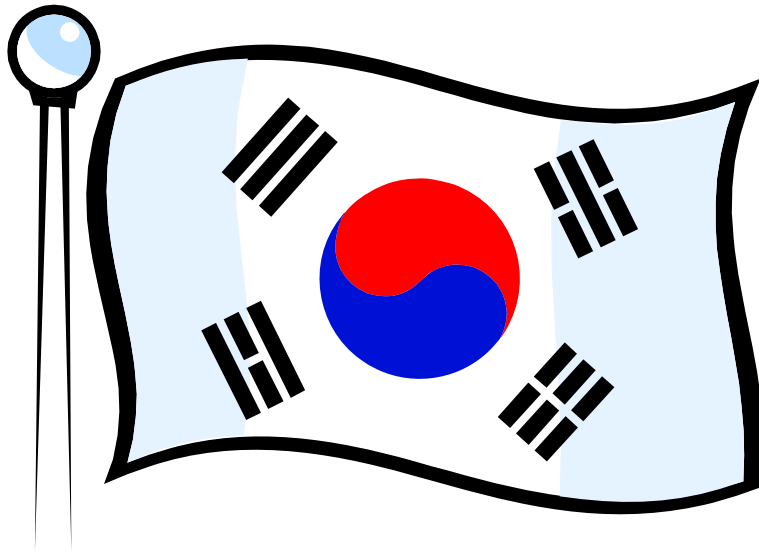
Disease	# of samples	Disease	# of samples	Disease	# of samples
Hyperlipidemia	35,497	Hepatitis C	5,083	Myeloproliferative diseases	1,312
Diabetes mellitus	34,494	Pollinosis	5,040	Uterine cervical cancer	1,197
Cataract	14,980	Prostatic carcinoma	4,864	Esophageal cancer	1,160
Cerebral infarction	13,996	Glaucoma	4,446	Hepatitis B	1,155
Arrhythmias	12,842	Lung cancer	3,863	Endometrial cancer	988
Angina pectoris	12,806	Unstable angina	3,655	Nephrotic syndrome	932
Myocardial infarction	11,601	Rheumatoid arthritis	3,651	Ovarian cancer	860
Bronchial asthma	7,640	Atopic dermatitis	2,555	ALS	753
Congestive heart failure	6,046	COPD	2,445	Keloid	715
Breast cancer	5,948	Cerebral aneurysm	2,416	Tuberculosis	712
Colorectal cancer	5,890	Liver cirrhosis	2,095	Pulmonary fibrosis	617
Gastric adenocarcinoma	5,796	Basedow's disease	2,057	Drug induced eruption	521
Ureterolith	5,686	ASO	2,005	Pancreatic cancer	442
Osteoporosis	5,576	Hepatocellular carcinoma	1,964	Cholangiocarcinoma	431
Periodontosis	5,221	Epilepsy	1,942	Febrile convulsion	430
Hysteromyoma	5,100	Endometriosis	1,563		

*Slide from Dr Toshihiro Tanaka
SNP Research Center, RIKEN*

Human Tissue Samples in Japan

- Triendl, R. Japan moves towards experimental tissue regulation. *Nature Medicine* 5, 473 (1999):
 - Setting up new tissue repositories is “almost unthinkable at present” Nobuyuki Nukina , head of molecular neuropathology at RIKEN.
 - Most human tissue used for research is imported through commercial suppliers, or through the Human and Animal Bridge Discussion Group.
 - Pharmaceutical companies have found it particularly hard to access sufficient quantities of the variety of tissues they require.
- Royston, UK, 30 October 2002 - Pharmagene plc (LSE: PGN) announced today that Shionogi & Co., Ltd, a leading Japanese pharmaceutical company, has become Pharmagene’s ninth partner in Japan ...
http://www.investinbiotech.com/pressroom_release.php?id=1033

South Korea (Republic of Korea)



South Korea (Republic of Korea)

Korea National Research Resource Center



Prof. Yeonhee Lee

knr^{rc} human biobanks

- Korea Human Biorepository Network
- Specimen Bank for Liver Cancer Research
- The Korean Leukmia Cell and Gene Bank
- Korea Lung Tissue Bank
- Korean Eye Tissue and Gene Bank Related of Blindness
- Korea Prostate Bank

knr^{rc} microbial biobanks

- Korea National Microbiology Research Resources Center
- Culture Collection of Antimicrobial Resistant Microbes
- Plant Virus Genbank
- Extraction Collection of Useful Microorganism
- Bank for Pathogenic Viruses (BPV)
- Helicobacter pylori Korean Type Culture Collection (HpKTCC)
- Korea Marine Microalgae Culture Center
- Center for Fungal Genetic Resources
- Culture Collection of Environmental / Industry Microorganisms and Genes
- Culture Collection of Myxobacteria
- Culture Collection of Lichen

knr^{rc} animal biobanks

- Korean Cell Line Bank
- Aging Tissue Bank
- Bovine Genome Resources Bank
- Arthropods of Medical Importance Bank
- Animal Bio Resources Bank
- Zebrafish Organogenesis Mutant Bank
- The Biodiversity Bank of Terrestrial Annelids
- Parasite Resource Bank

knr^{rc} plant biobanks

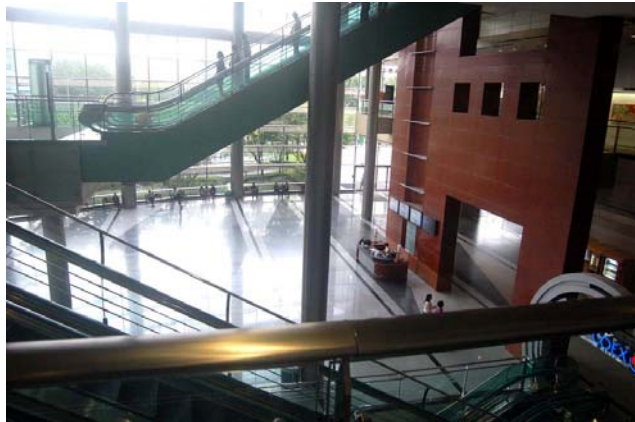
- Korea National Plant Research Resources Center
- Korea Brassica Genome Resource Bank
- Plant DNA Bank in Korea II
- Ginseng Genetic Resource Bank
- Gene & Material Bank for Citrus Breeding
- Arabidopsis Developmental Mutants Bank

2009 Korean Biobanking Meeting

Dates: Tue 22 – Fri 25 Sept 2009

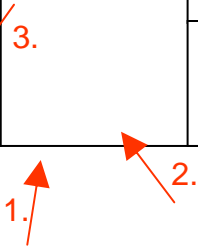
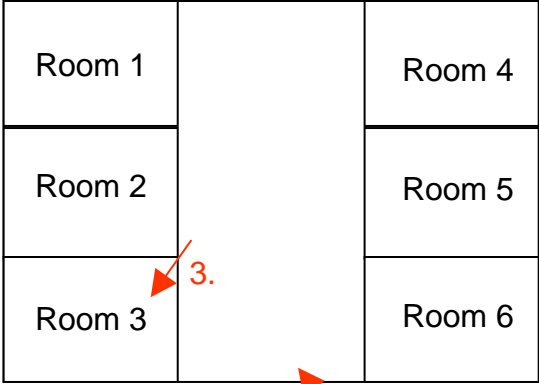
Venue: COEX Convention & Exhibition Center
Seoul, South Korea

Organiser: Professor Yeonhee Lee



Rooms Booked For September 2009

Diagram showing room layout



Arrows show direction of photos 1-3.





코엑스몰 안내도

COEX MALL GUIDE MAP



아가사랑방 Nursing Room



화장실 Restroom



안내 Information



병원 Clinic



약국 Pharmacy

아셈길 (ASEM-gil)

Dept Store

Bus Terminal

Hotel

Convention Center

Hotel

Shopping Mall

Hotel

Food Court

Multiplex Cinema

Food Court

테헤란길 (Teheranro)

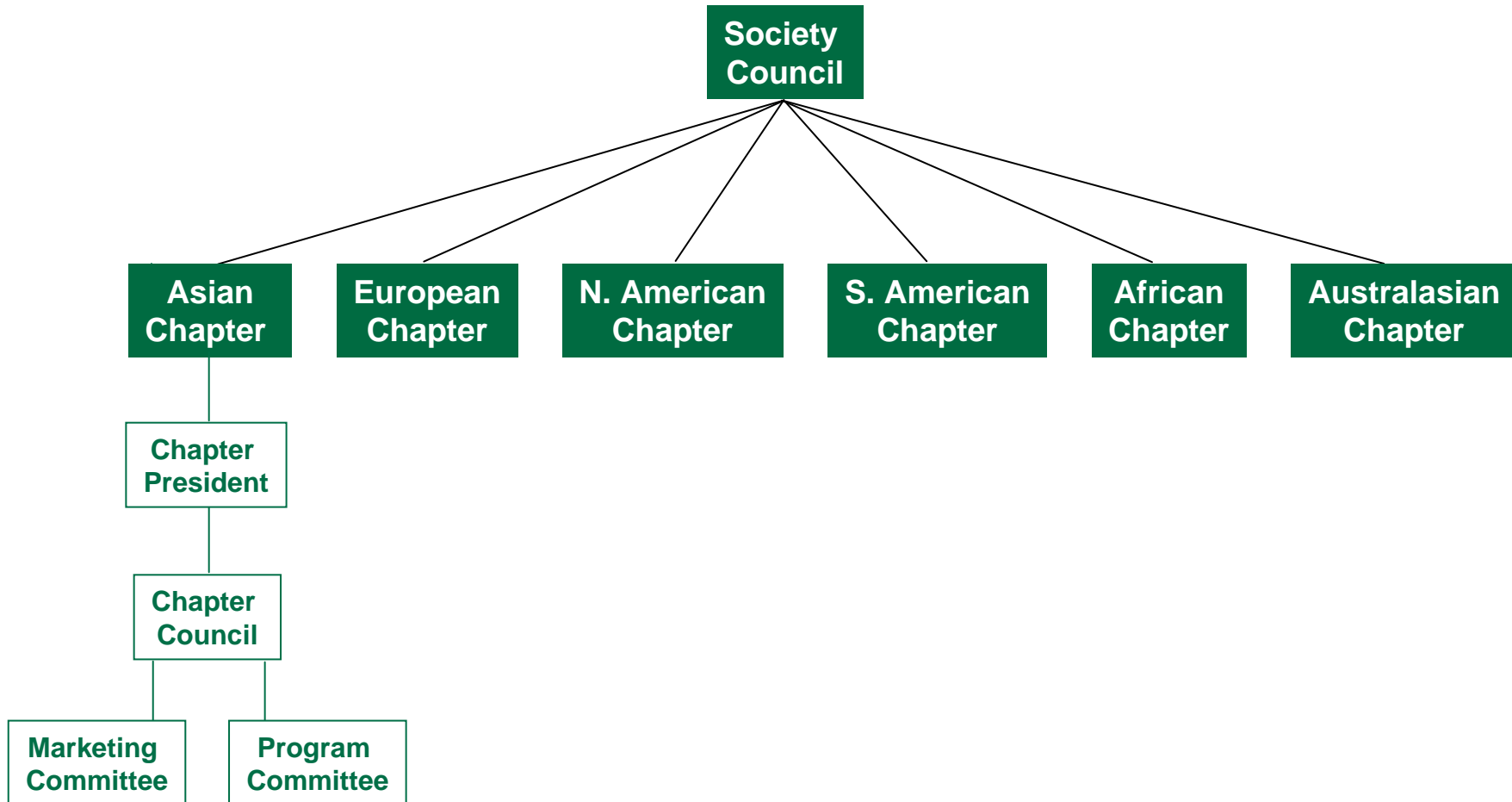
봉선사길 (Bongunsaro)

영동대로 (Yeongdongdaero)

자세한 정보는 상담부 inquiry
Detailed information, please contact us

고객상담부
Customer Service Center
02-2650-1111

Possible Model for Regional Chapters



Why Form A Regional Chapter?

- Allows regular meetings to be held in the region
 - Travel will be more affordable.
 - Meeting topics will be more relevant to the region.
- Fees can be adjusted to meet regional needs.
- Member services can be adapted to regional needs.
- Regional networking will be improved by the chapter marketing team.
- Retain the advantages of being part of an international organisation.

Possible Model for Regional Chapters

- President and members of committees are chosen by the region
- Regional committees organise fundraising and conferences
- There is an administrative office in the region
 - provides society services to members of the chapter
 - supports fundraising for the chapter
- The chapter is licensed to use parent society name and logo
- The chapter follows operating procedures approved by parent society
- Regular conferences and workshops are held in the region

Forum for International Biobanking Organisations (FIBO)



BBMRI
Biobanking and
Biomolecular
Resources Research
Infrastructure



ISBER



International Agency for Research on Cancer

Centre International de Recherche sur le Cancer

OBBR

Office of Biorepositories
and Biospecimen Research

FIBO Meetings To Date

- Munich, Nov 2007
- Paris, Dec 2007
- Hinxton, Cambridge, Feb 2008
- Bethesda, MD, June 2008
- Barcelona, June 2008
- Saint Feliu de Guixols, Nov 2008



FIBO says ...

