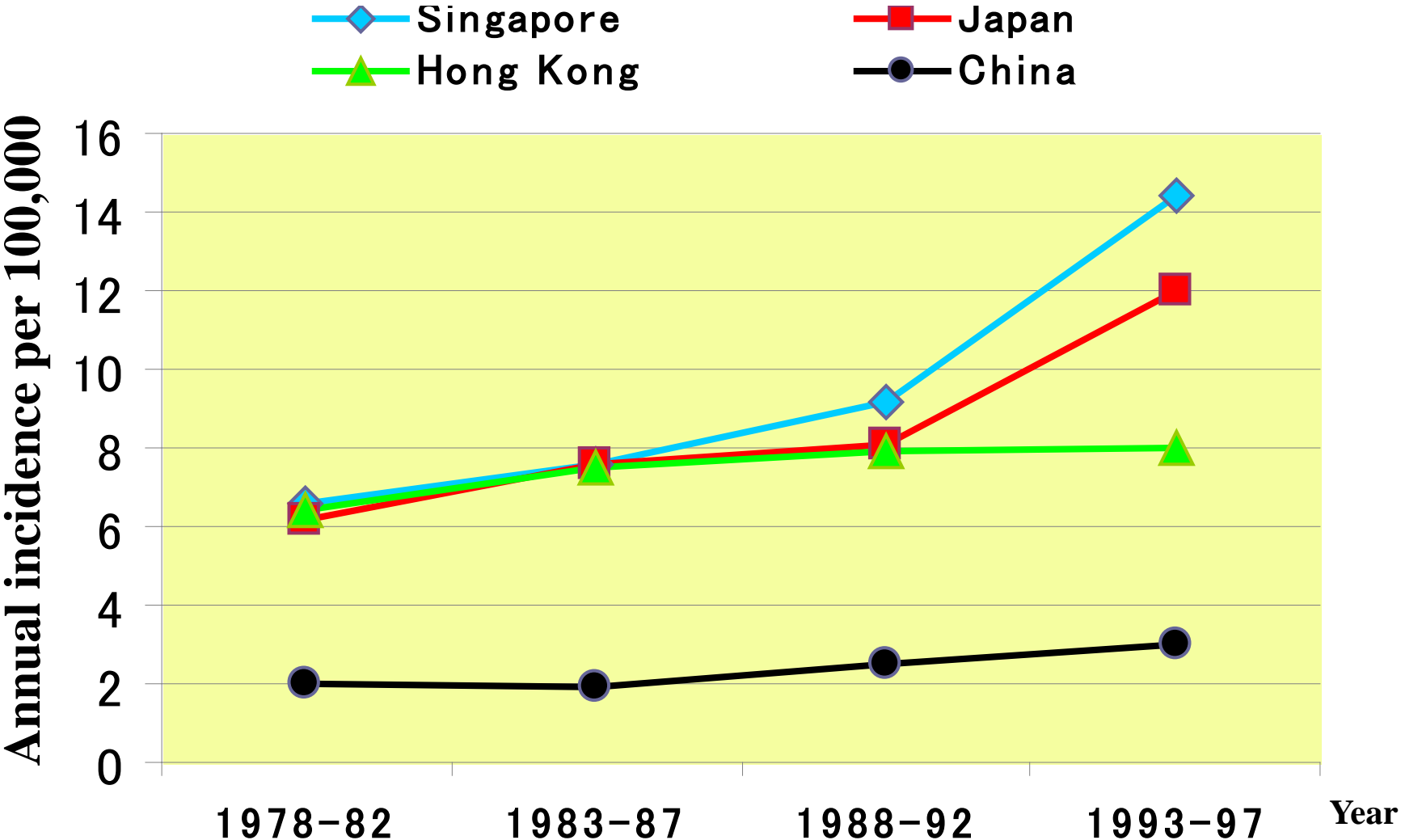# The burden of prostate cancer in Asia: prevalence & screening

Yasutomo Nasu
Okayama University Okayama Japan

特別史跡　閑谷（しずたに）学校（岡山県）

Prostate Cancer (PCa) Increasing in Asia

Changing Morbidity of PCa in Asia

Sim HG et al. Eur J Cancer, 2005
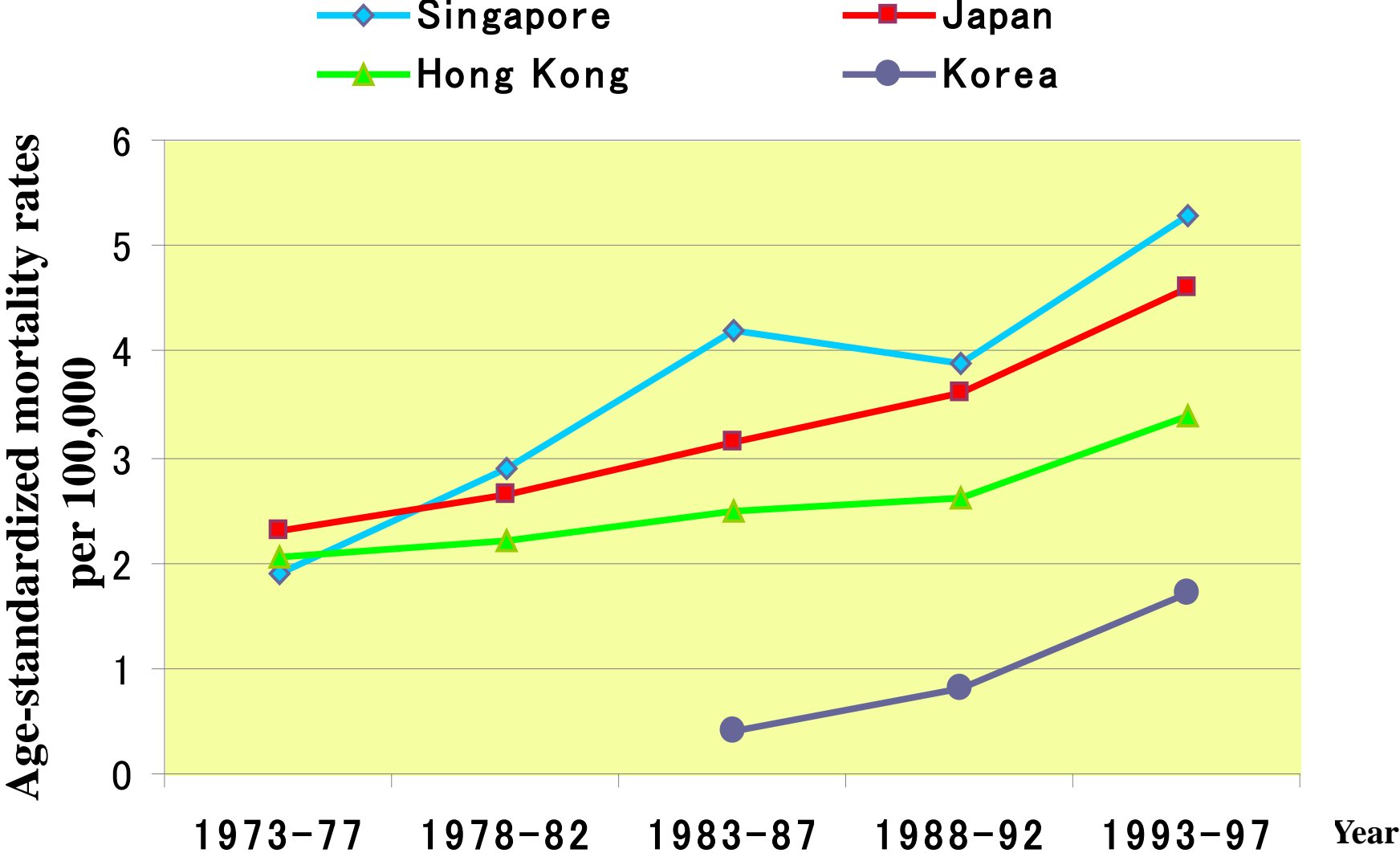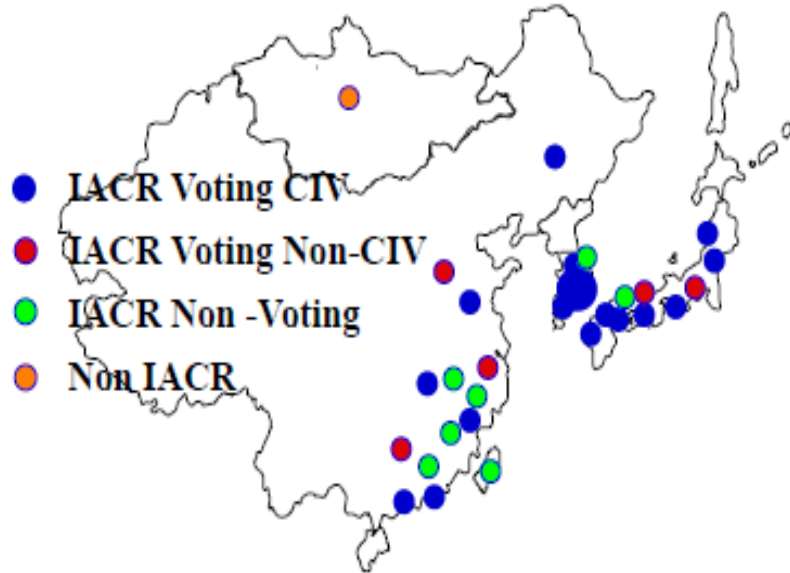
Figure 1. Cancer Registries in North-East Asia

Figure 23. Prostate Cancer Incidences/100,000 over Time(Globocan. 2002: Ferlay et al., 2004)

Figure 24. Prostate Cancer Incidences/100,000 over Time (Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007)

Figure 24. Prostate Cancer Incidences/100,000 over Time (Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007)
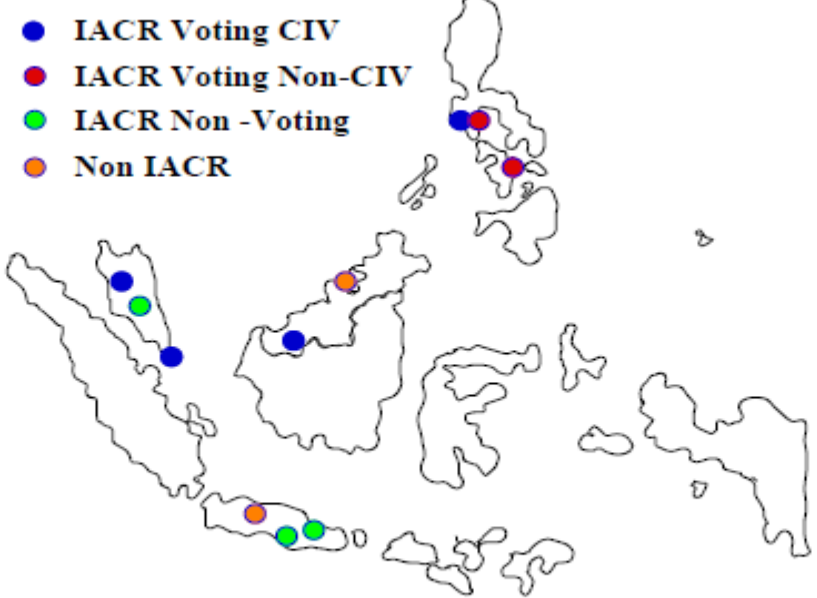
Figure 1. Cancer Registries in Peninsular and Island South East Asia

Figure 15. Prostate Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

Figure 16. Population-based CIV Prostate Cancer Incidence Rates over Time (Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007 education (Sun et al., 2002).

Figure 16. Population-based CIV Prostate Cancer Incidence Rates over Time (Waterhouse et al., 1982; Mui et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007, education (Sun et al., 2002).
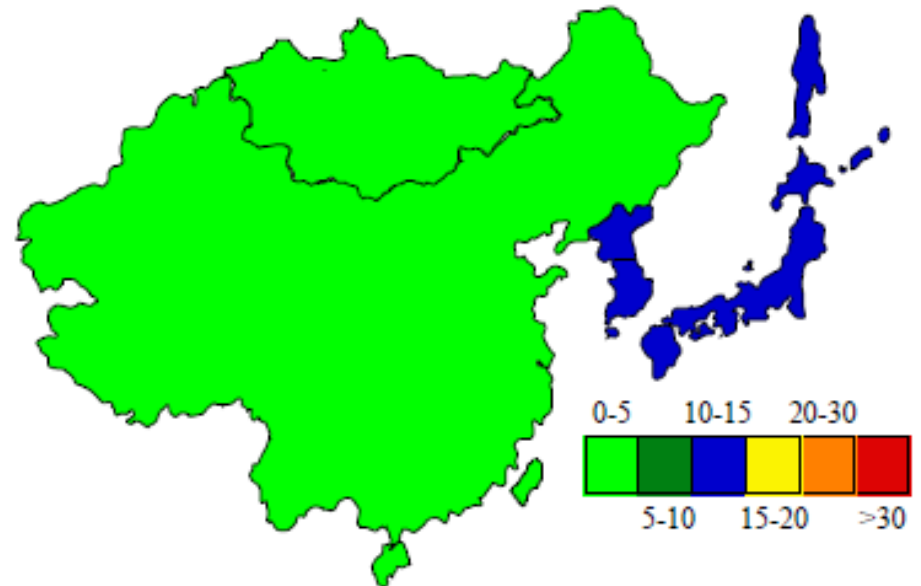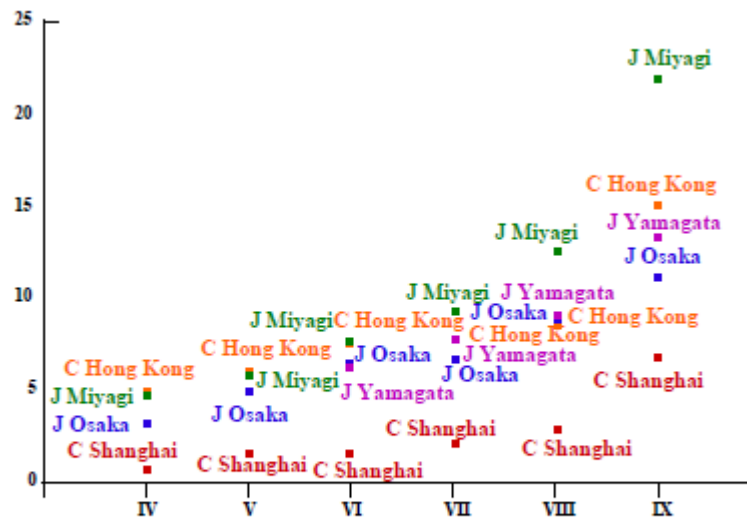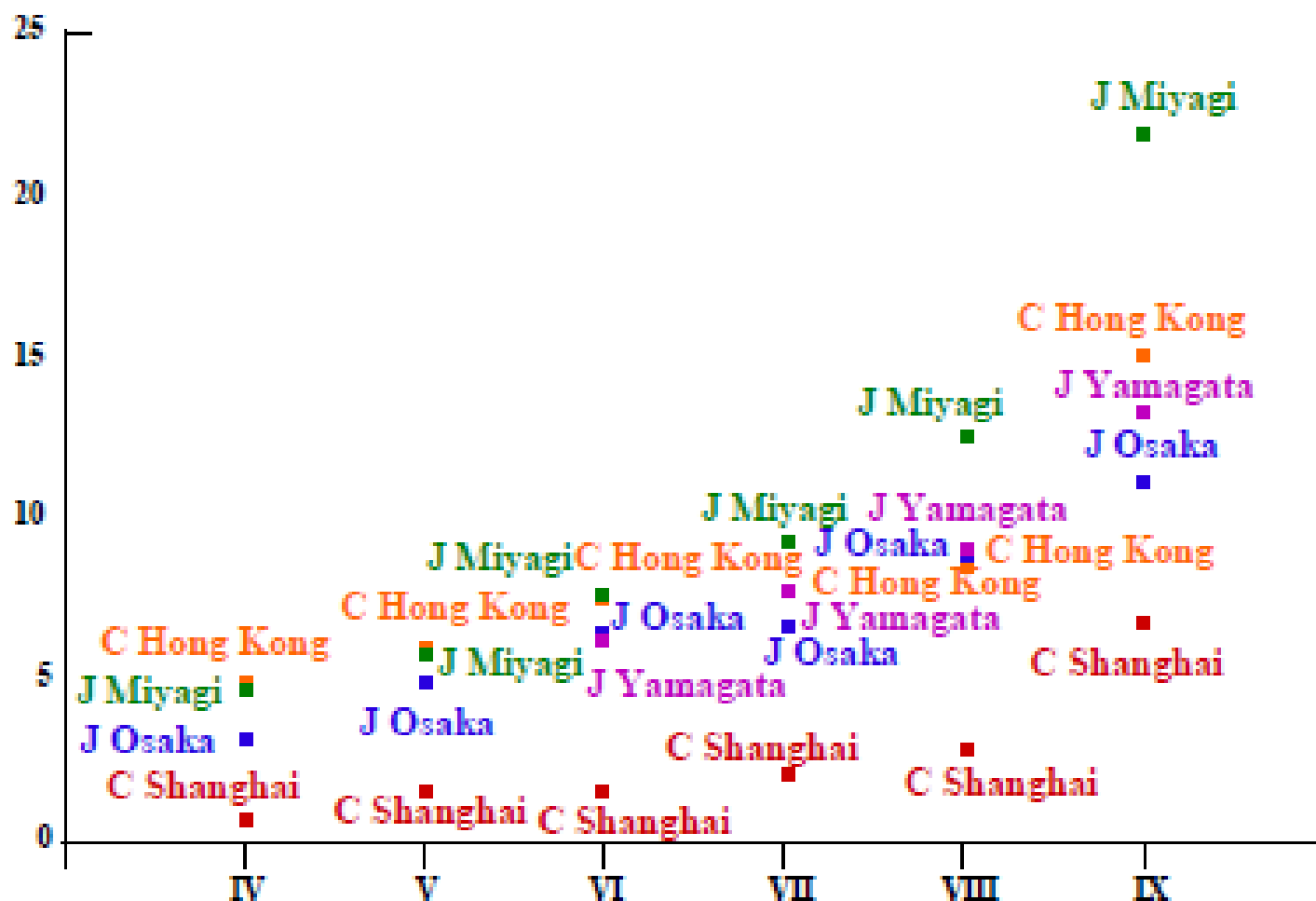
Figure 23. Prostate Cancer Incidences/100,000 over Time (Globocan, 2002: Ferlay et al., 2004)
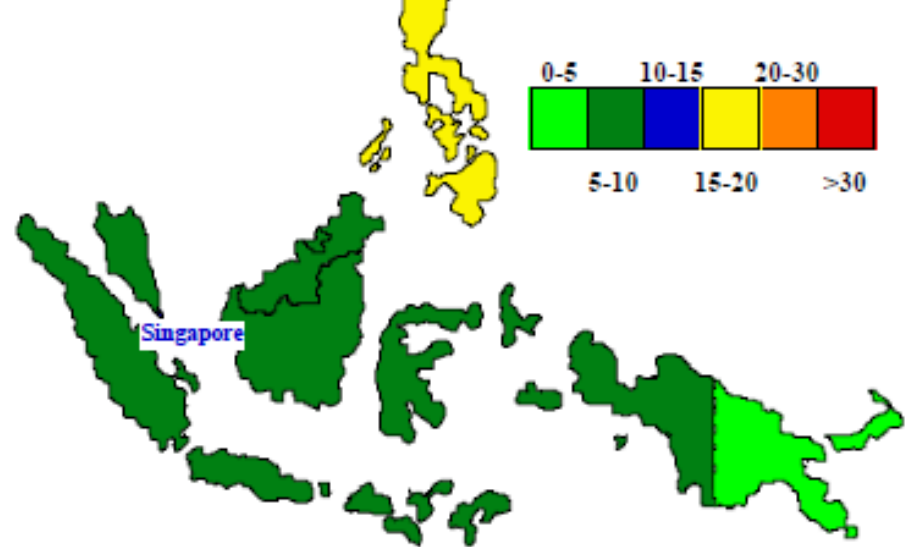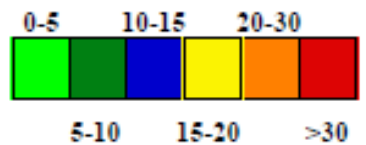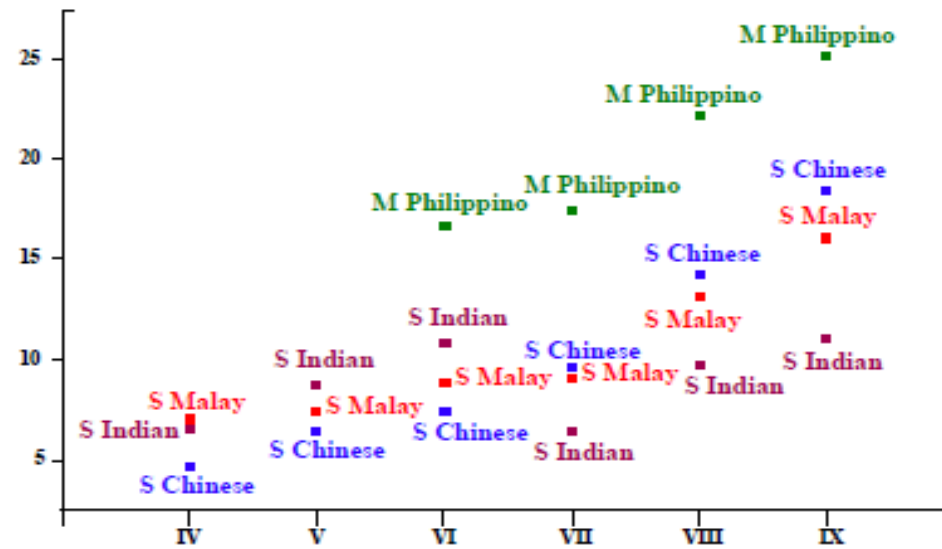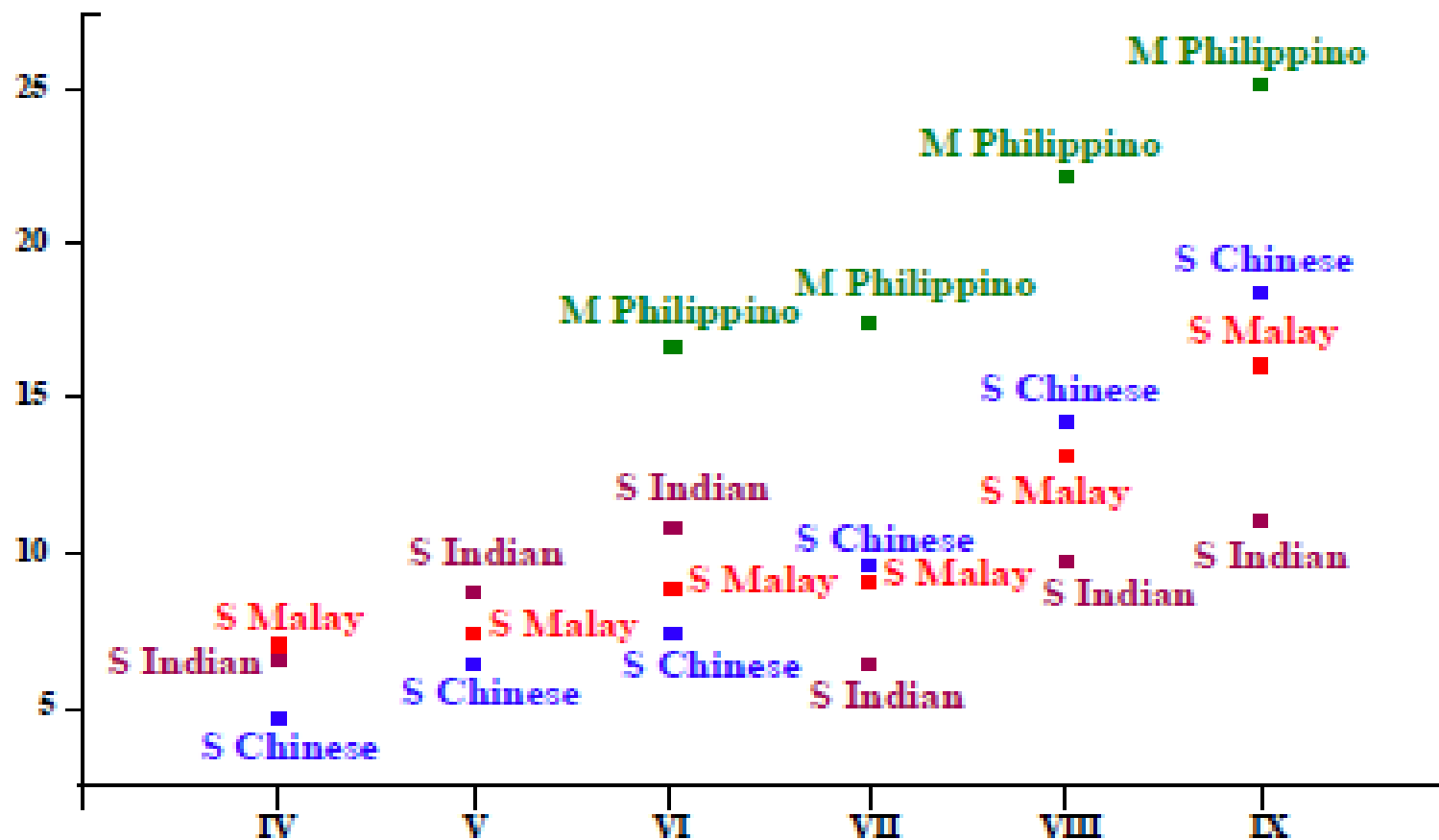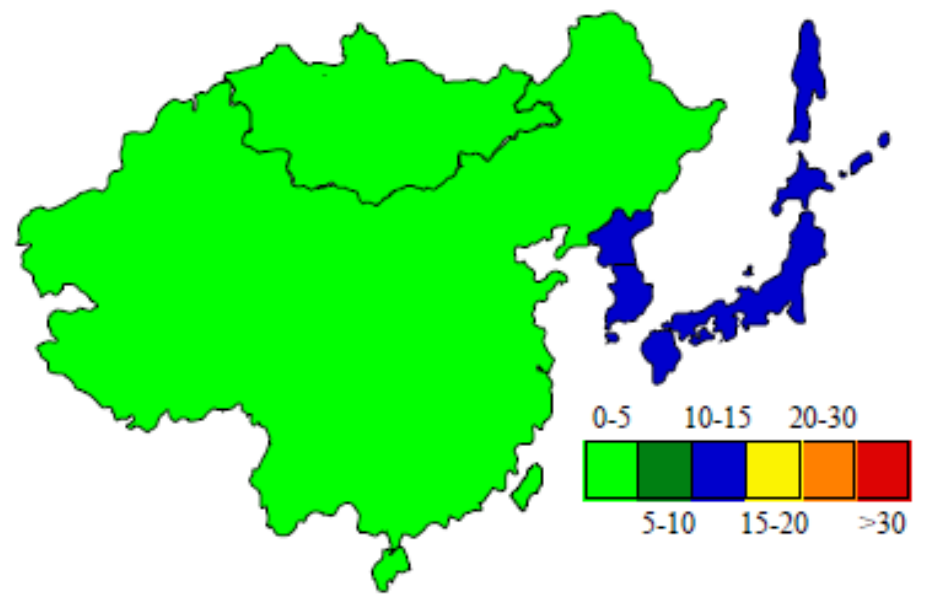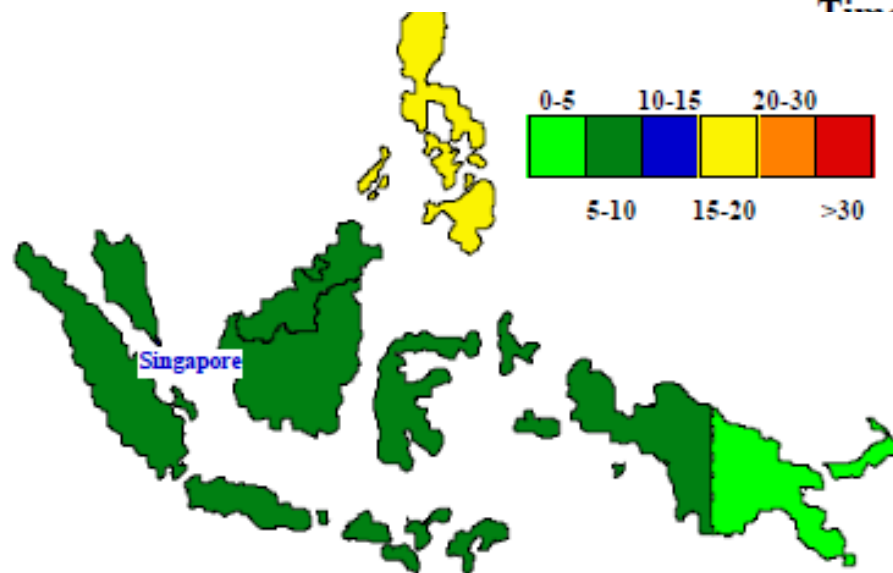

Figure 15. Prostate Cancer Incidences/100,000
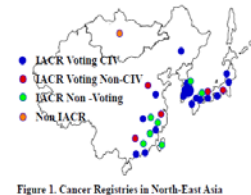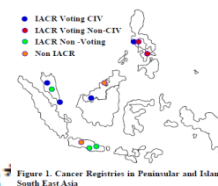(Globocan, 2002: Ferlay et al., 2004)

Table 2. Population-based Cancer Incidences/100,000 for North-East Asians - Males*

	Chinese							Korea		Japan			
	HK#	Zhong	Jiashang	Shanghai	Harbin	Taiwan	Hawaii	Seoul	Pusan	Osaka	Yama	Miyagi	Hawaii
Lip	0.1	0.1	0.1	0.6	0.1	0.7	0.1	0.1	0.0	0.0	0.1	0.1	0.0
Tongue	1.7	1.9	0.6	0.6	0.5	5.1	2.2	1.0	1.0	1.6	1.5	1.5	3.0
Mouth	1.6	1.3	0.6	0.8	0.4	9.3	1.5	1.4	1.3	1.4	1.2	1.3	1.2
Nasopharynx	17.8	26.9	4.0	4.1	1.3	13.6	9.9	1.1	0.8	0.5	0.4	0.5	0.6
Hypopharynx	1.4	0.8	0.5	0.2	0.3	-	2.1	1.2	1.0	1.5	1.1	1.4	1.7
Oesophagus	9.5	16.5	20.2	9.2	10.3	7.9	5.4	7.1	8.1	10.8	13.0	15.4	6.0
Stomach	14.7	9.4	32.1	34.1	24.8	18.6	4.6	63.7	59.9	51.3	79.4	65.8	17.2
Colon	23.8	8.5	9.8	15.8	9.4	15.1	21.6	18.7	12.7	23.6	33.9	36.0	31.9
Rectum	7.0	8.7	10.7	11.2	8.6	13.7	11.4	17.4	12.6	13.5	21.7	22.4	21.8
Liver	29.5	25.7	33.8	25.9	30.3	51.9	13.9	44.1	49.8	35.6	14.3	16.4	8.5
Gallbladder	2.9	4.4	2.2	3.2	2.1	2.6	1.2	8.0	9.3	5.7	8.4	6.9	2.4
Pancreas	4.5	2.6	7.1	7.5	7.5	4.7	8.2	8.7	7.7	9.3	9.9	10.1	7.8
Larynx	4.4	5.1	1.1	2.8	3.8	3.5	3.1	4.7	4.9	2.4	2.9	3.3	3.2
Trachea, lung	57.9	34.0	46.7	51.5	55.5	38.2	28.6	49.7	46.2	43.3	38.2	40.6	31.0
Penis	0.2	0.6	0.9	0.3	0.3	0.5	0.0	0.2	0.2	0.1	0.2	0.3	0.2
Prostate	15.0	2.2	1.4	6.9	2.1	11.9	69.1	12.7	7.3	11.3	13.4	22.0	74.2
Kidney	3.3	1.8	1.6	4.8	3.2	5.7	6.2	5.6	4.9	3.9	3.4	6.6	8.4
Bladder	10.9	5.0	5.9	8.1	6.2	8.9	7.5	11.0	10.2	7.9	7.4	10.6	13.0
Brain	3.4	1.9	4.0	5.7	5.6	3.8	1.7	3.5	3.0	2.5	2.4	2.7	3.2
Thyroid	2.2	0.9	1.0	1.4	0.7	1.5	1.6	2.5	2.2	1.3	1.5	2.0	1.8
Non-Hodgkin	8.1	4.3	3.4	5.5	3.1	5.8	13.9	6.8	4.5	6.2	5.7	7.4	11.1
Leukemia	5.5	4.8	3.1	3.6	2.7	4.9	5.9	5.2	4.6	5.7	4.0	4.9	8.7
Total	265	181	205	226	194	250	239	298	274	256	281	302	286

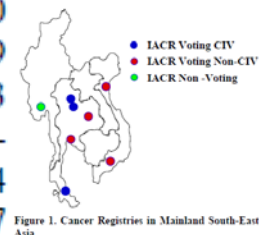*Data from Curado et al, 2007, except for Taiwan, Parkin et al., 2002; #Hong Kong; Zhong, Zhongshan; Yama, Yamagata

Figure 1. Cancer Registries in North-East Asia

Figure 1. Cancer Registries in Peninsular and Island South East Asia

Table 2. Population-based Cancer Registry Data for Peninsular and Island South-East Asia - Males[+]

| | Malaysians | | Singaporeans | | | Bruneiians[+] | Philippinos | |
	Penang	Sarawak	Chinese	Malay	Indian		Manila	In Hawaii
Lip	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Tongue	1.4	1.1	1.7	1.4	1.7	0.0	1.8	0.7
Mouth	1.7	1.0	1.5	0.5	2.8	0.2	1.8	1.2
Nasopharynx	9.3	15.0	12.8	5.5	1.8	13.0	5.8	3.3
Hypopharynx	1.3	0.6	1.0	0.7	1.4	0.4	0.4	0.9
Oesophagus	2.5	2.2	5.8	1.7	3.3	0.5	3.1	1.7
Stomach	12.5	12.3	21.5	6.5	7.8	14.5	7.9	8.7
Colon	13.9	7.3	26.5	10.5	7.4	15.0	14.5	20.6
Rectum	9.9	6.3	19.1	11.6	7.9	9.4	9.5	17.6
Liver	10.6	9.1	21.3	12.3	8.1	12.7	21.7	10.2
Gallbladder	1.0	0.6	2.1	1.4	2.3	0.7	1.2	2.1
Pancreas	3.4	2.3	5.4	3.9	3.1	5.5	4.3	5.9
Larynx	4.7	2.1	4.9	3.0	2.4	3.1	5.5	1.9
Trachea, lung	39.0	21.0	51.8	34.8	12.1	43.6	51.7	48.7
Penis	0.4	0.9	0.5	0.0	0.4	0.7	0.6	0.3
Prostate	11.3	5.8	18.6	16.1	11.1	18.6	25.3	78.0
Kidney	3.6	2.0	5.3	3.0	1.7	5.0	4.6	6.7
Bladder	7.3	3.1	8.0	7.9	4.6	3.3	4.7	6.5
Brain	3.5	1.6	2.3	1.4	2.7	2.2	2.8	2.7
Thyroid	1.1	1.1	2.0	2.3	1.3	2.8	2.9	5.7
Non-Hodgkin	7.0	6.6	8.1	11.9	3.3	4.7	6.8	10.9
Leukemia	6.0	4.4	5.8	6.2	4.5	4.1	4.9	6.6
Total	185	129	257	167	108	160	213	271

*Data (/100 000) from Curado et al., 2007; [+]Nyunt et al., personal communication

Table 2. Age-standardized Population-based Cancer Incidence Data for Mainland South-East Asian Countries - Males
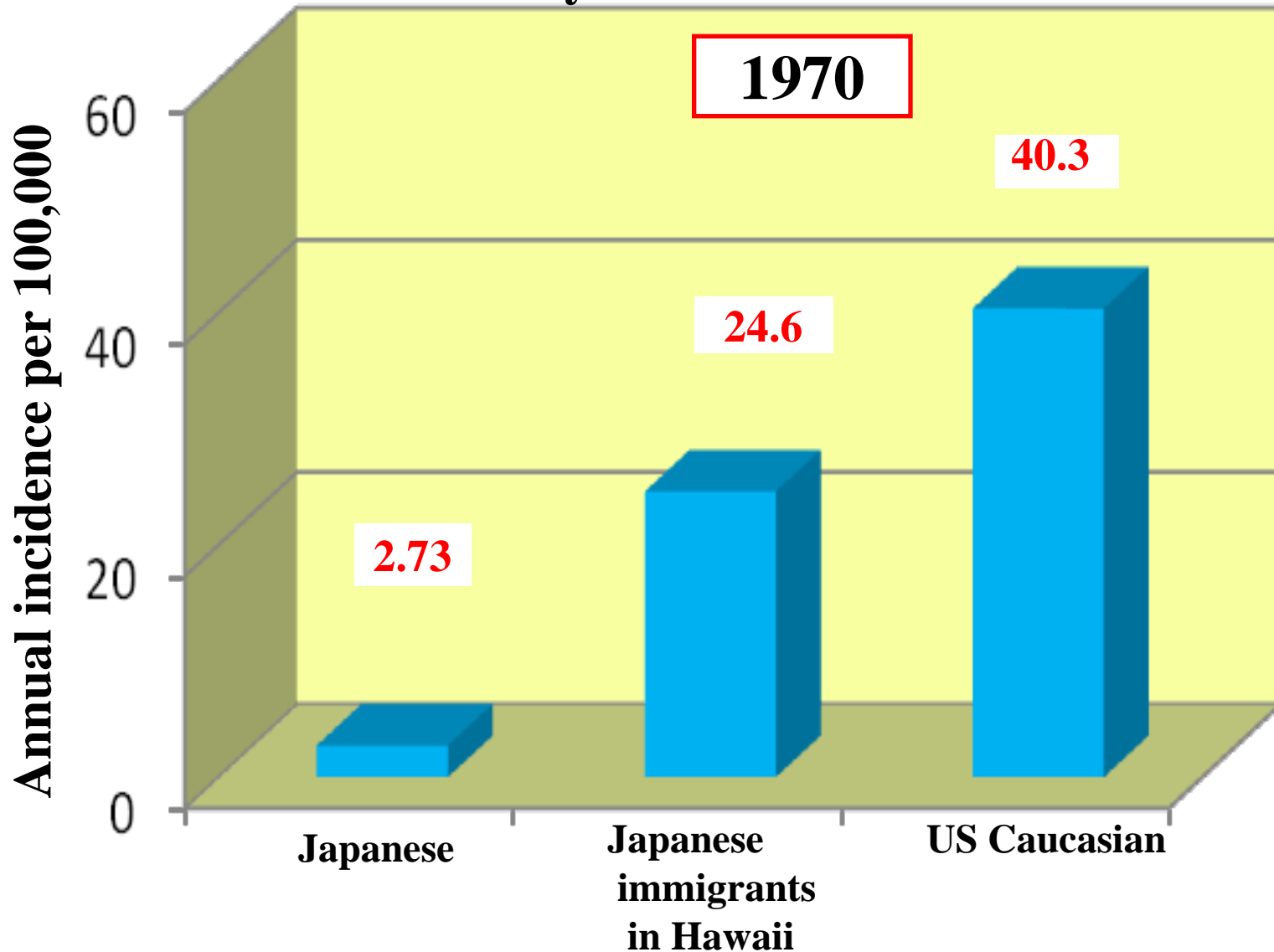
	Thailand					Viet Nam	
	Chiang Mai*	Lampang*	Khon Kaen#	Bangkok#	Songkla*	Hanoi#	Ho Chi Minh#
Lip	0.2	0.3	0.3	0.0	0.2	0.2	0.0
Tongue	2.1	0.9	0.7	2.4	4.4	1.2	2.0
Mouth	2.0	1.3	1.4	2.1	4.6	0.8	1.9
Nasopharynx	3.9	2.5	3.7	7.4	2.7	12.8	8.3
Hypopharynx	1.4	0.5	-	-	2.7	-	-
Oesophagus	2.2	1.6	1.6	4.4	7.8	2.9	4.4
Stomach	5.9	5.3	3.2	4.9	2.7	27.0	18.7
Colon	5.0	7.9	4.8	10.3	5.3	5.5	7.5
Rectum	4.6	3.9	2.7	6.3	4.4	5.2	5.5
Liver	18.4	32.3	88.0	14.4	8.6	20.0	27.1
Gallbladder	1.7	2.9	1.9	1.3	0.8	0.5	1.6
Pancreas	1.4	2.0	1.0	1.8	1.8	1.4	2.4
Larynx	3.0	1.9	1.4	4.1	3.8	1.5	4.6
Trachea, lung	32.6	51.7	18.5	25.7	15.4	34.4	26.9
Penis	1.7	1.6	1.6	0.9	2.2	2.3	1.4
Prostate	5.3	4.9	2.4	6.4	4.6	1.5	3.8
Kidney	1.7	0.8	1.4	2.0	0.7	0.5	1.3
Bladder	5.1	5.6	3.3	6.8	4.4	3.1	3.0
Brain	1.6	1.1	2.7	2.4	1.5	0.7	2.3
Thyroid	1.1	0.8	0.9	1.3	1.7	1.3	1.3
Non-Hodgkin	7.1	6.0	3.7	5.0	5.5	7.2	3.2
Leukemia	4.2	4.1	4.2	3.9	3.2	4.5	3.9
Total	148	166	179	144	109	155	147

*Curado et al., 2007; #Parkin et al., 2002

Figure 1. Cancer Registries in Mainland South-East Asia

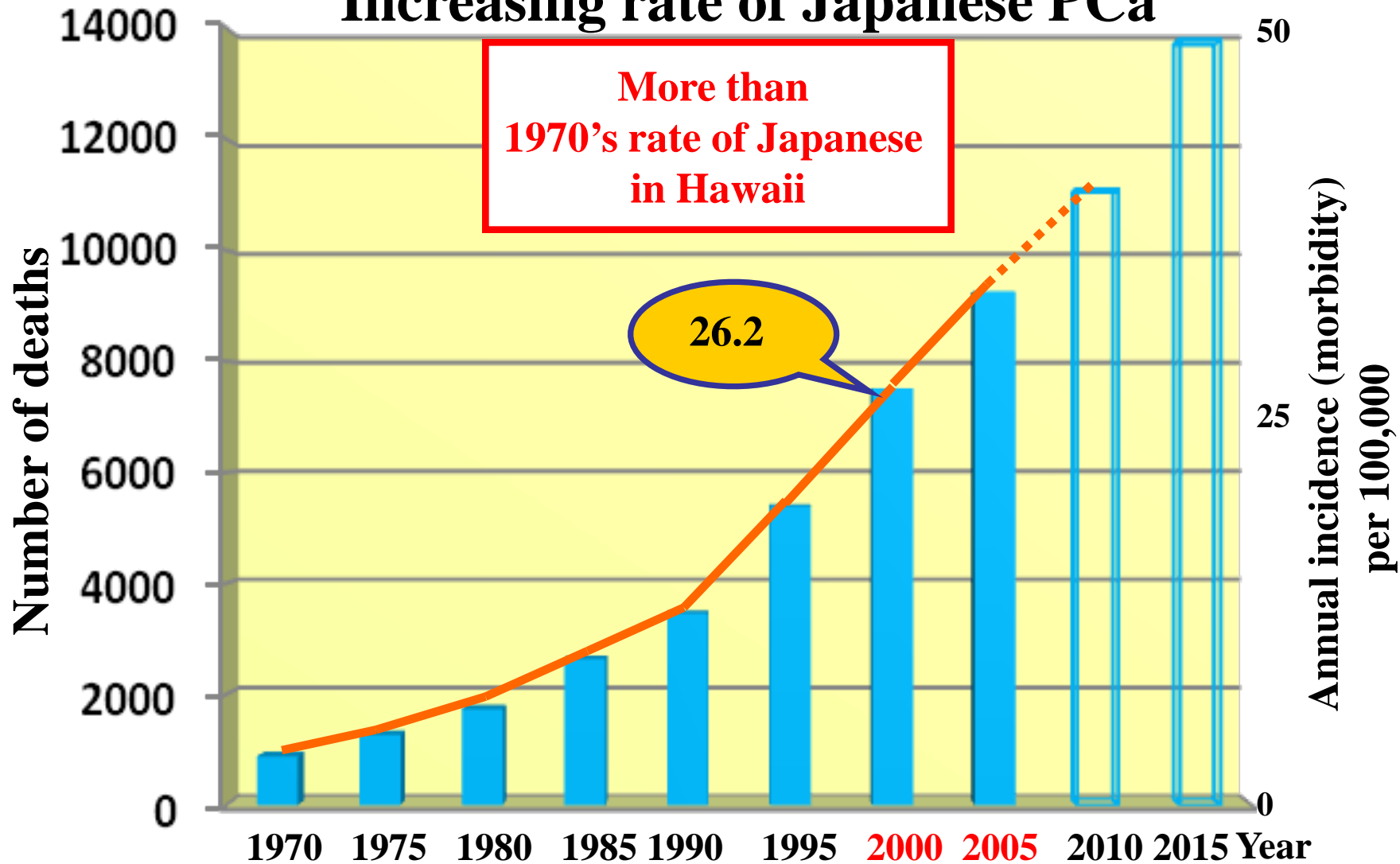- IACR Voting CIV
- IACR Voting Non-CIV
- IACR Non -Voting

Prostate Cancer (PCa) Increasing in Asia

Morbidity difference between races

Hirayama T et al.1979

Prostate Cancer (PCa) Increasing in Asia

Increasing rate of Japanese PCa

More than
1970's rate of Japanese
in Hawaii

26.2

Center for Cancer Control and Information Services,
National Cancer Center, Japan 2007, Kuroishi et al 2004

References:

1.   Long N, Moore MA, Chen W, Gao CM, Lai MS, Mizoue T, Oyunchimeg D, Park S, Shin HR, Tajima K, Yoo KY, Sobue T.   Cancer epidemiology and control in peninsular and island South-East Asia - past, present and future.AsianPac J Cancer Prev. 2010;11 Suppl 2:107-48. Review.

2.   Moore MA, Manan AA, Chow KY, Cornain SF, Devi CR, Triningsih FX, Laudico A, Mapua CA, Mirasol-Lumague MR, Noorwati S, Nyunt K, Othman NH, Shah SA, Sinuraya ES, Yip CH, Sobue T. Cancer epidemiology and control in peninsular and island South-East Asia - past, present and future.Asian Pac J Cancer Prev. 2010;11 Suppl 2:81-98. Review.

3.   Moore MA, Attasara P, Khuhaprema T, Le TN, Nguyen TH, Raingsey PP, Sriamporn S, Sriplung H, Srivanatanakul P, Bui DT, Wiangnon S, Sobue T. Cancer epidemiology in mainland South-East Asia - past, present and future. Asian Pac J Cancer Prev. 2010;11 Suppl 2:67-80. Review.

ORIGINAL ARTICLE

Screening and Prostate-Cancer Mortality in a Randomized European Study

Fritz H. Schröder, M.D., Jonas Hugosson, M.D., Monique J. Roobol, Ph.D.,
Teuvo L.J. Tammela, M.D., Stefano Ciatto, M.D., Vera Nelen, M.D.,
Maciej Kwiatkowski, M.D., Marcos Lujan, M.D., Hans Lilja, M.D.,
Marco Zappa, Ph.D., Louis J. Denis, M.D., Franz Recker, M.D.,
Antonio Berenguer, M.D., Liisa Määttänen, Ph.D., Chris H. Bangma, M.D.,
Gunnar Aus, M.D., Arnauld Villers, M.D., Xavier Rebillard, M.D.,
Theodorus van der Kwast, M.D., Bert G. Blijenberg, Ph.D., Sue M. Moss, Ph.D.,
Harry J. de Koning, M.D., and Anssi Auvinen, M.D., for the ERSPC Investigators*

PCa screening can reduce deaths by 20%

Prostate cancer is the scientific number one topic at the 24th Annual EAU Congress. At the EAU press conference Prof. Freddie Hamdy reported about congress highlights and also mentioned the European Randomized Study of Screening for Prostate Cancer. Only a few hours it was reported that screening for prostate cancer can reduce deaths by 20%, according to the results of the European Randomized Study of Screening for Prostate Cancer (ERSPC) published online by the New England Journal of Medicine.

ERSPC is the world's largest prostate cancer screening study. The findings were also unveiled at the 24th Annual EAU Congress in Stockholm.

Swedish TV star Hasse Aro

Screening and Prostate-Cancer Mortality in a Randomized European Study

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Harry J. de Koning, M.D., and Anssi Auvinen, M.D., for th

ERSPC:
Positive data for PSA screening

PLCO:
Negative data for PSA screening

Mortality Results from a Randomized Prostate-Cancer Screening Trial

Gerald L. Andriole, M.D., Robert L. Grubb III, M.D., Saundra S. Buys, M.D.,
David Chia, Ph.D., Timothy R. Church, Ph.D., Mona N. Fouad, M.D.,
Edward P. Gelmann, M.D., Paul A. Kvale, M.D., Douglas J. Reding, M.D.,
Joel L. Weissfeld, M.D., Lance A. Yokochi, M.D., E. David Crawford, M.D.,
Barbara O'Brien, M.P.H., Jonathan D. Clapp, B.S., Joshua M. Rathmell, M.S.,
Thomas L. Riley, B.S., Richard B. Hayes, Ph.D., Barnett S. Kramer, M.D.,
Grant Izmirlian, Ph.D., Anthony B. Miller, M.B., Paul F. Pinsky, Ph.D.,
Philip C. Prorok, Ph.D., John K. Gohagan, Ph.D., and Christine D. Berg, M.D.,
for the PLCO Project Team*

JUA official statement for ERSP vs PLCO

- PLCO :
  Contamination in control group
  Less valid as a RCT study
  Less scientific value

- ERSPC:
  High scientific standard
  Highest level of evicence
  20% reduction of death rate

- In Japan: Based on ERSPC result
  Promotion of PSA screening
  Social recognition of PSA screening

For whom might a PSA screening test be recommended?

The American Urological Association (AUA) issued new guidelines recommends that well informed men aged 40 and over who have a life expectancy of at least 10 years should be offered the prostate-specific antigen (PSA) test in order to establish a baseline reading and that PSA testing should be individualized rather than a blanket annual test for any man aged 50 and over.

Prostate-specific antigen (PSA) best practice statement:
2009 update. American Urological Association 2009 (AUA)

Men age 40 years with anticipated lifespan of 10 or more years should discuss the risks and benefits of PSA screening with a physician. Men who wish to be screened should consider a baseline PSA at age 40.

What tests should be offered?

Prostate specific antigen (PSA)

and

Digital rectal examination (DRE)

Other important factors:
Is there a family history of prostate cancer? Is he African American? What is his PSA history? Did he have a prior biopsy of his prostate?

If the DRE is abnormal and the PSA is low for his age, his doctor should consider possible causes: prostate cancer, BPH, infection, trauma, etc.
If his PSA is high for age/rising or he has a DRE that is abnormal and PSA that is high

Both tests are low /not suspicious

Return regularly for PSA and DRE

His doctor should counsel him regarding both risks and benefits of biopsy

Biopsy not done

Biopsy is done

Biopsy negative

Biopsy positive

Have a treatment and management discussion and risk assessment with his doctor.

Active surveillance or Treatment

Prostate-specific antigen (PSA) best practice statement: 2009 update. AUA

EAU Guidelines on PSA Screening

European Association of Urology

A baseline PSA determination at age 40 years has been suggested upon which the subsequent screening interval may then be based.

Tab. 1 Übersicht über Einstiegsalter in die Früherkennung (in Klammern Alter bei Männern mit erhöhtem Risiko), PSA-Grenzwert zur Biopsie und Untersuchungsintervall in den Leitlinien von vier internationalen Fachgesellschaften			
	Beginn	Grenzwert	Intervall
EAU 2009	Individuell, ggf. 50 Jahre	Individuell, ggf. >0,6 ng/ml/y	Individuell
American Cancer Society 2001	50 (45) Jahre	2,5 ng/ml	Jährlich
AUA Best Practice Policy 2009	40 Jahre	Individuell	Jährlich
National Comprehensive Cancer Network 2007	40 Jahre	2,6 ng/ml oder >0,35 ng/ml/y	<0,6 ng/ml: 45, 50, 51 >0,6 ng/ml: jährlich

(in German)

Guidelines on Prostate Cancer 2010 update. EAU

Medical innovations

Creation of advanced medical technology and global standard for TR

Established research seeds
・**Immune Gene Therapy**
・**Analysis of Genetic Predisposition for Cancer**

Advisory board by outside experts

① Global standard
② Ethics, Personal info.
③ Intellectual properties

Translational research（TR）
Setting up of Academic Society in East Asia

Academia network based on Okayama University's long-lasting partnership

Birth of Medical innovation

Project Organization
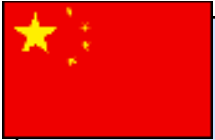
Expeditious implementation for clinical study

Prof. Yunqun NA Beijing Univ.
President for Chinese Urological Assoc.
China Rep. of China-Japan
Urological Conference

Prof. Ming LI Beijing Cancer Hospital

Prof. Liping XIA Zhejiang Univ.
Head of Urology,
Zhejiang University
1st Hospital

（Global）Advisory Board
◇Leading gene therapy TR researchers in Japan, US, and Europe
◇China Board of Science
◇Leader in Global relation
◇Leader in ethics
◇Specialist in global IP
◇Leader in CRO industry
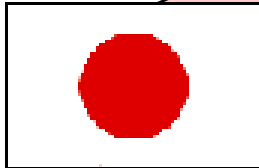
Prof. Hiromi KUMON Okayama Univ.
Chairman for Japanese Urological Assoc. (FY2009)
Japan Rep. of China-Japan Urological Conference
Chairman for Korea-Japan Urological Conference（FY2008）

Prof. Shiro BABA Kitazato Univ.
Dean, Medical School, Kitazato University

Utilization of accumulated data in the first Prostate Bank in Asia

Prof. Tae-Kon HWANG Korea Catholic Univ.
President for Korean Urological Assoc.

Dr. Ji Youl LEE
President, Korea Prostate Bank

Race diversity and leading ability in advanced medical application

Prof. Christopher CHEN
Head of Urology, Singapore SGH
Former Chairman for
Singapore Urological Assoc.

Post-Genome Genetic Analyses

Human Genome Project [1990～2003]

Mapping of entire human genome (3 billion bps)

⬇

Everyone in the world shares "Human Genome" database

Post-Genomic Era

Discovery of SNPs (Single Nucleotide Polymorphism)

SNP is a DNA sequence variation with a single nucleotide occurred in the genome between members of a species.

SNPs can affect **ethnic**/individual **constitution**

Asian
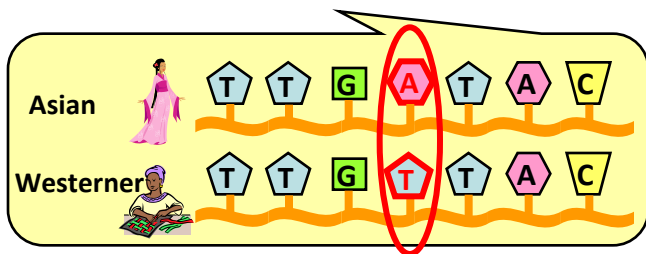
Westerner

e.g.) SNPs of aldehyde dehydrogenase (ALDH) modify alcohol tolerance.

Strong (type GG)
→ Westerners ≒100%
Japanese: 50%

Intolerant (type AA)
→Japanese: 5%

Weak (type AG)
→Japanese: 45%

Genetic predisposition for cancer and its application to personalized medicine

・Cancer risk
・Cancer progression/recurrence risk
・Drug sensitivity/toxicity
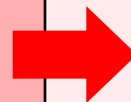
➡ SNPs provide new cancer medicine!!

Determination of cancer-predisposition by using multiple ms-SNPs, taking the initiative in the world by Prof. Shimizu, Okayama Univ.

OKAYAMA UNIVERSITY

Asia-wide Analysis of SNPs based on Japanese Data

Prostate cancer-related missense SNPs

Gene	Amino acid permutation	Frequency (%)		corrected Odds Ratio
		Healthy	Cancer	
chromosome separation A	isoleucine →phenylalanine	39	52	1.77
chromosome separation B	arginine →glutamine	22	47	3.43
Cancer suppressor A	glutamine →histidine	39	56	1.95
Cancer suppressor B	glutamine →proline	21	37	1.90
Metabolic enzyme	glutamic acid →lysine	43	56	1.74
Apoptosis	arginine →glycine	43	54	1.87

Simultaneous analysis

Cancer Healthy (135 cases) V.S. Prostate Cancer (162 cases)	Accumulated number of high risk gene	Number of cases (%)		Odds Ratio
		Healthy	Cancer	
	≤ 1	63 (46.7)	24 (14.8)	1.00 (ref.)
	2	33 (24.4)	40 (24.7)	3.18
	3	25 (18.5)	45 (27.8)	4.73
	4	10 (7.4)	35 (21.6)	9.19
	≥ 5	4 (3.0)	18 (11.1)	11.8
	≥4	14 (10.4)	53 (32.7)	9.94

Accumulation of 4 or more high−risk genes leads to 10−fold higher incidence of prostate cancer.

Preventive/therapeutic strategies for prostate cancer From Japan to Asia

Korea

Japan

China

Asian shareing putative genetic similarities

Singapore

Japanese SNPs Analysis technology
→

Feedback of Asian SNPs information
→
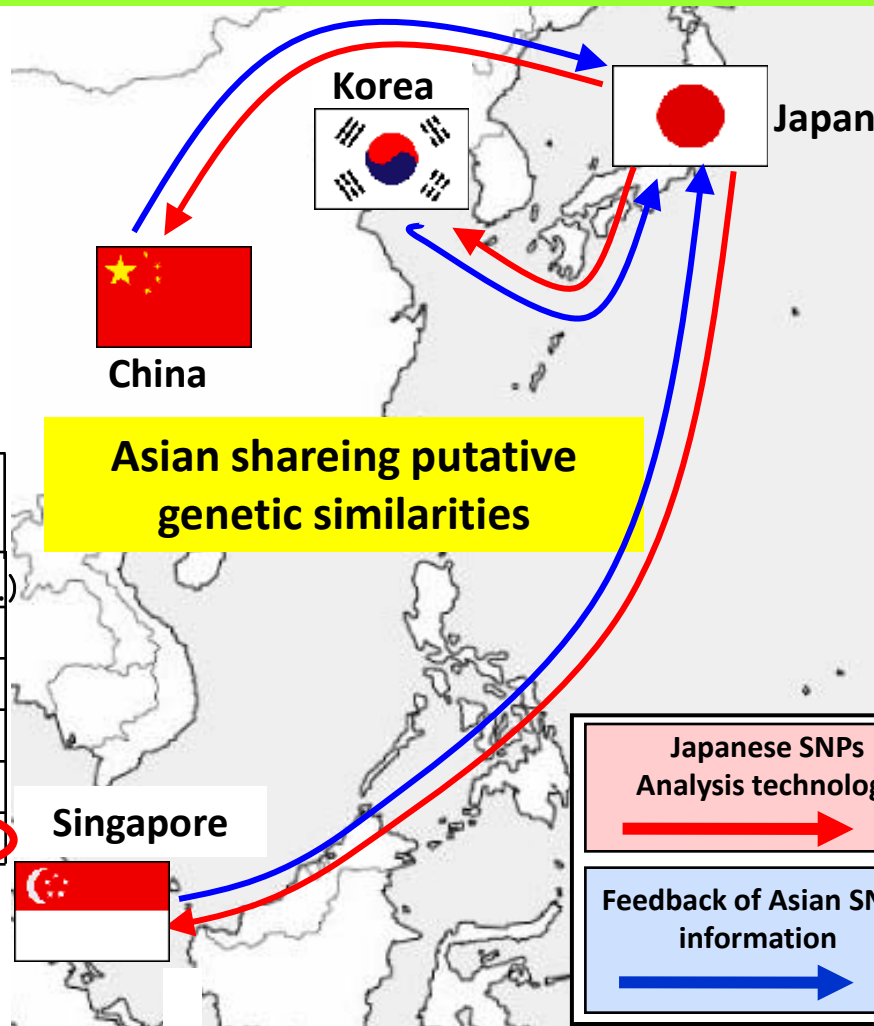
Development/Standardization of Japan-oriented Seeds

Samples Collected for SNPs Research

Conutry	PCa	Control	
Japan	619	1565	
China	150	114	
Singapore	143	150	
Korea	100	100(BPH)	
TOTAL	1012	1929	2941

Implementation of Genotyping Work

Samples Collection	DNA Extraction	First PCR	Second PCR	Analysis
Japan	Japan	Japan	Japan	Japan
China	China	China	China	Japan
Singapore	Singapore	Singapore	Japan	Japan
Korea	Korea	Japan	Japan	Japan

China: Transportation of human DNA and PCR products is forbidden
Singapore: Transportation of PCR products permitted
Korean: Transportation of human DNA permitted

Highlights for SNPs Analysis Results (Japan)

Ethnic difference for distribution of the 42 ms-SNPs

1、 8 SNPs in 6 genes associated with PCa risk;

   Risk SNPs different for people <70 years compared with ≥ 70yrs;

2、An MOR method we established was useful in predicting risk of PCa;

3、 Associations between SNPs and clinical characteristics (PSA,

   Gleason Score and Stage) were specified;

4、6 SNPs were found to be significantly associated with latent PCa;

5、 A few SNPs were found to be underlying prognosis marker after PCa

   radical therapy or Brachy therapy.

Highlights for SNPs Analysis Results (Asia)

Ethnic difference for distribution of the 21 ms-SNPs

1、 Genetic background of Japanese is similar to Korean, Chinese and Malay;

2、 At least 3-4 Risk SNPs, which are useful in Japanese, might be effective in Korean and Chinese.

Ethnic Variation in Allele Frequency of 42 ms-SNP of Cancer-related Genes

Gene	SNP (AA)	SNP (Nuc)	Japan n=474 Okayama	Korea n=100 Korean	China (Pekin) n=114 Chinese	Singapore Chinese n=50	Singapore Malay n=50	Singapore Indian n=50	Europe n=120 Caucasian	Sub-Sahara n=120 African
Chromosome Seg. # 1	P/S	C/T	0.88/0.12	0.83/0.17	0.78/0.22	0.76/0.24	0.72/0.28	0.86/0.14	0.57/0.43	0.93/0.07
Cell Cycle # 1	R/H	G/A	0.55/0.45	0.51/0.49	0.60/0.40	0.60/0.40	0.67/0.33	0.65/0.35	0.57/0.43	0.86/0.14
Repair # 1	R/Q	G/A	0.59/0.41	0.62/0.38	0.59/0.41	0.56/0.44	0.50/0.50	0.15/0.85	0.23/0.77	0.27/0.73
Repair # 2	V/M	G/A	0.63/0.37	0.74/0.26	0.66/0.34	0.66/0.34	0.68/0.32	0.92/0.08	0.84/0.16	0.97/0.03
Repair # 3a	P/L	C/T	0.57/0.43	0.58/0.42	0.60/0.40	0.54/0.46	0.52/0.48	0.90/0.10	0.83/0.17	0.78/0.22
Chromosome Seg.# 2	I/F	A/T	0.65/0.35	0.68/0.32	0.71/0.29	0.62/0.38	0.62/0.38	0.31/0.69	0.98/0.02	0.98/0.02
Tumor Suppressor # 1	R/P	G/C	0.63/0.37	0.65/0.35	0.52/0.48	0.50/0.50	0.50/0.50	0.59/0.41	0.77/0.23	0.33/0.67
Tumor Suppressor # 2	Q/H	G/T	0.72/0.28	0.69/0.31	0.65/0.35	0.72/0.28	0.59/0.41	0.81/0.19	0.78/0.22	0.55/0.45
Apoptosis # 1	V/A	T/C	0.64/0.36	0.54/0.46	0.63/0.37	0.66/0.34	0.52/0.48	0.50/0.50	0.48/0.52	0.69/0.31
Metabolic # 1	E/K	G/A	0.75/0.25	0.77/0.23	0.87/0.13	0.81/0.19	0.91/0.09	0.99/0.01	1.00/0	1.00/0
Tumor Suppressor # 3	P/S	C/T	0.70/0.30	0.74/0.26	0.65/0.35	0.62/0.38	0.46/0.54	0.46/0.54	0.47/0.53	0.98/0.02
Repair # 4	L/R	T/G	0.71/0.29	0.57/0.43	0.69/0.31	0.76/0.24	0.68/0.32	0.60/0.40	0.66/0.34	0.98/0.02
Repair # 5	F/L	T/G	0.59/0.41	0.58/0.42	0.62/0.38	0.59/0.41	0.41/0.59	0.19/0.81	0.45/0.55	0.49/0.51
Chromosome Seg.# 3	A/V	C/T	0.76/0.24	0.77/0.23	0.72/0.28	0.73/0.27	0.75/0.25		0.65/0.35	0.96/0.04
Repair # 3b	T/M	C/T	0.88/0.12	0.91/0.09		0.99/0.01	0.94/0.06	0.90/0.10	0.92/0.08	1.00/0
Tumor Suppressor # 6a	Y/D	T/G	0.54/0.46	0.67/0.33		0.52/0.48	0.61/0.39	0.73/0.27	0.59/0.41	0.20/0.80
Tumor Suppressor # 7	L/V	T/G	0.52/0.48	0.61/0.39		0.51/0.49	0.56/0.44	0.49/0.51	0.61/0.39	0.33/0.67
Tumor Suppressor # 6b	I/M	A/G	0.60/0.40	0.71/0.29		0.86/0.14	0.70/0.30	0.91/0.09	0.81/0.19	0.95/0.05
Chromosome Seg. # 6	P/L	C/T	0.59/0.41	0.58/0.42		0.63/0.37	0.56/0.44	0.81/0.19	0.82/0.18	0.83/0.17
Repair # 9	S/C	C/G	0.53/0.47	0.56/0.44		0.53/0.47	0.62/0.38	0.69/0.31	0.22/0.78	0.14/0.86
Cell-Cell Inter.# 3	V/E	T/A	0.57/0.43	0.55/0.45		0.64/0.36	0.47/0.53	0.68/0.32	0.49/0.51	0.18/0.82
Repair # 6	A/V	C/T	0.83/0.17			0.77/0.23	0.84/0.16	0.89/0.11	0.85/0.15	1.00/0
Tumor Suppressor # 4	A/S	G/T	0.93/0.07			0.98/0.02	0.93/0.07	0.96/0.04	0.84/0.16	1.00/0
Repair # 7	R/H	G/A	0.82/0.18			0.88/0.12	0.85/0.15	0.83/0.17	0.94/0.06	0.65/0.35
Chromosome Seg. # 4	S/L	C/T	0.86/0.14			0.82/0.18	0.85/0.15	0.82/0.18	0.98/0.02	0.99/0.01
Metabolic # 2	H/R	A/G	0.76/0.24			0.66/0.34	0.49/0.51	0.09/0.91	0/1.00	0/1.00
Tumor Suppressor # 5a	R/Q	G/A	0.82/0.18			0.62/0.38	0.60/0.40	0.66/0.34	0.87/0.13	0.77/0.23
Metabolic # 3	I/V	A/G	0.95/0.05			0.87/0.13	0.93/0.07	0.73/0.27	0.52/0.48	0.94/0.06
Transcrip.Factor # 1	R/G	C/G	0.57/0.43			0.56/0.44	0.58/0.42	0.47/0.53	0.51/0.49	0.89/0.11
Signaling # 1	S/L	C/T	0.78/0.22			0.84/0.16	0.82/0.18	0.93/0.07	0.96/0.04	0.99/0.01
Tumor Suppressor # 5b	Q/P	A/C	0.81/0.19			0.67/0.33	0.66/0.34	0.69/0.31	0.86/0.14	0.92/0.08
Tumor Suppressor # 8	S/P	T/C	0.85/0.15			0.74/0.26	0.84/0.16	0.70/0.30	0.74/0.26	0.73/0.27
Chromosome Seg.# 5a	P/Q	C/A	0.78/0.22			0.76/0.24	0.62/0.38	0.63/0.37	0.81/0.19	0.95/0.05
Chromosome Seg.# 5b	P/A	C/G	0.79/0.21			0.73/0.27	0.85/0.15	0.78/0.22	0.67/0.33	0.95/0.05
Signaling # 2	S/T	G/C	0.65/0.35			0.63/0.37	0.55/0.45	0.30/0.70	0.63/0.37	0.27/0.73
Repair # 8	H/D	C/G	0.54/0.46			0.54/0.46	0.36/0.64	0.29/0.71	0.27/0.73	0.54/0.46
Metabolic # 4	I/V	A/G	0.86/0.14			0.83/0.17	0.76/0.24	0.72/0.28	0.61/0.39	0.63/0.37
Cell-Cell Inter. # 1	P/R	C/G	0.71/0.29			0.87/0.13	0.80/0.20	0.74/0.26	0.95/0.05	0.85/0.15
Cell-Cell Inter.# 2	M/L	A/T	0.64/0.36			0.78/0.22	0.68/0.32	0.37/0.63	0.28/0.72	0.47/0.53
Tumor Suppressor # 9	V/M	G/A	0.64/0.36			0.51/0.49	0.64/0.36	0.59/0.41	0.63/0.37	0.65/0.35
Repair # 10	Y/H	T/C	0.52/0.48			0.54/0.46	0.47/0.53	0.12/0.88	0.22/0.78	0/1.00
Chromosome Seg.# 7	R/Q	G/A	0.74/0.26			0.86/0.14	0.65/0.35	0.57/0.43	0.37/0.63	0.94/0.06

[SUMMARY]

		Japan	Korea	China	Sing. Chinese	Malay	Indian	Caucasian	African
Identical	+ 5%	42	15	9	22	17	11	10	6
Similar	+ 13%	0	5	5	15	15	8	9	5
Neutral	13 - 20%	0	1	0	4	6	7	5	7
Distinct	> 20%	0	0	0	1	4	16	18	24
% Similarity		**100**	**92**	**93**	**91**	**87**	**73**	**73**	**66**

Criteria:
Compared to Japanese data,

Green: identical

Light blue: Similar

Yellow: Intermediate

Red: Distinct

Data of Caucasians and Africans are from NCBI database

Genetic background of Japanese is similar to Korean, Chinese and Malay

Comparison of Gene Repertoire Associated with Prostate Cancer Risk between Japan and Chinese Males

Gene	Population (Controls/Cases) Japan (474/210) a*				Population (Controls/Cases) Mainland China (114/150) b*					Population (Controls/Cases) Singapore Chinese (164/103) c*				
	Risk allele	Ref	OR	Age	Risk allele	Ref	OR	Age	Repl.	Risk allele	Ref	OR	Age	Repl.
Repair # 2	MM	R+	1.44	All	MM	RR	5.91	< 71	OK					
Repair # 3b	RR	M+	0.38	< 70	H	MM	2.06	All		H	AO	1.43	All	
TSG # 2	RR	MM	2.11	< 70	R+	MM	1.65	< 71		RR	MM	2.52	All	OK
Metablic # 1	H	MM	2.48	> 70	R+	MM	2.07	< 71	OK?	H	MM	2.33	All	OK
Repair # 4	RR	M+	2.83	> 70	RR	M+	1.65	All		RR	M+	1.56	All	
Cell-Cycle # 1	MM	R+	2.10	> 70	MM	H	1.67	< 71						
Chrom. Seg. # 3	MM	R+	1.49	All	MM	R+	2.58	< 71	OK?					
Chrom. Seg. # 2	H	AO	1.53	All	H	AO	1.39	All						
TSG # 3	H	AO	0.59	< 70	RR	AO	0.26	All	OK?	H	MM	0.76		
TSG # 7	MM	R+	1.68	> 70	ND				?	MM	R+	2.85	All	OK
Signaling # 1	R+	MM	1.45	All	ND				?	ND				?
TSG # 8	RR	H	0.50	> 70	ND				?	ND				?
TSG # 6b	MM	R+	1.60	All	ND				?	ND				?
Apop # 1			Not Sig.		RR	MM	5.17	All	x	MM	R+	2.70	All	x
Repair # 5			Not Sig.		MM	R+	1.70	All	x	MM	R+	1.81	All	x
Chrom. Seg. # 1			Not Sig.		H	AO	0.45	< 71	x	RR	MM	3.45	All	x
Repair # 1			Not Sig.							RR	M+	0.34	All	x

a*: 40 SNPs analyzed   b*: only 14 SNPs analyzed   c*: only 21 SNPs analyzed

**Risk SNPs comparison (Japanese vs. Chinese):
4were identical, 4 similar and 3 Chinese specific**