

# Harnessing big data and analytics for precision medicine

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09/16/2021  
弘光科技大學



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- 台北市智慧健康促進協會 理事長
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- 台灣泌尿腫瘤醫學會 常務監事
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- 台灣腦庫協會 理事



Academic Degrees	Columbia University School of Public Health, M.P.H. National Yang-Ming University School of Medicine, Ph.D.
Experience	<ul style="list-style-type: none"><li>• Research Scientist/Management Scientist, <b>Columbia-Presbyterian Medical Center</b>, NYSPI</li><li>• Division Head, Planning Office, <b>Department of Research Resources</b>, NHRI</li><li>• Management Scientist, <b>Center for Health Policy Research and Development</b>, NHRI</li><li>• Associate Investigator, <b>Institute of Population Health Sciences</b>, NHRI</li><li>• Associate Professor, School of Public Health, <b>China Medical University</b>; Institute of Biomedical Informatics, <b>National Yang-Ming University</b></li></ul>
Specialty	Public Health Informatics, Health Risk Analysis, Geographic Information System (GIS)

Outpatient file (cd1996-cd2012)

Variable Name	Prescription	Note
FEE_YM	Year and month of fee	
APPL_TYPE	Type of application	
HOSP_ID	Hospital ID	
APPL_DATE	Date of application	
CASE_TYPE	Case type	
SEQ_NO	Sequence number	
CURE_ITEM_NO1	Cure item number 1	
CURE_ITEM_NO2	Cure item number 2	
CURE_ITEM_NO3	Cure item number 3	
CURE_ITEM_NO4	Cure item number 4	
FUNC_TYPE	Specialty visit	
FUNC_DATE	Date of visit	
TREAT_END_DATE	End date of chronic	
ID_BIRTHDAY	Data of birth	
ID	Personal identification	
CARD_SEQ_NO	Insurance card sequen	
GAVE_KIND	Payment type	
PART_NO	Copayment number	
ACODE_ICD9_1	Diagnosis 1	
ACODE_ICD9_2	Diagnosis 2	
ACODE_ICD9_3	Diagnosis 3	
ICD_OP_CODE	Procedure code	
DRUG_DAY	Number of days for	
MED_TYPE	Type of medication	
PRSN_ID	Physician identificat	
PHAR_ID	Pharmacy identificat	
DRUG_AMT	Drug fee	
TREAT_AMT	Treatment fee	
TREAT_CODE	Treatment item num	
DIAG_AMT	Diagnosis fee	
DSVC_NO	Drug services item n	
DSVC_AMT	Drug services fee	
BY_PASS_CODE	DRG number	
T_AMT	Total fee	
PART_AMT	Copayment	
T_APPL_AMT	Total fee minus cop	
ID_SEX	Patient's sex	

Outpatient prescription files oo1997-oo2012)

Variable Name	Prescription	Note
FEE_YM	Year and month of fee	
APPL_TYPE	Type of application	
HOSP_ID	Hospital ID	
APPL_DATE	Date of application	
CASE_TYPE	Case type	
SEQ_NO	Sequence number	
ORDER_TYPE	Order type	
DRUG_NO	Drug item number	
DRUG_USE	Drug dosage	
DRUG_FRE	Frequency of drug	
UNIT_PRICE	Unit price	
TOTAL_QTY	Total quantity	
TOTAL_AMT	Total amount	

Inpatient file (dd1996-dd2012)

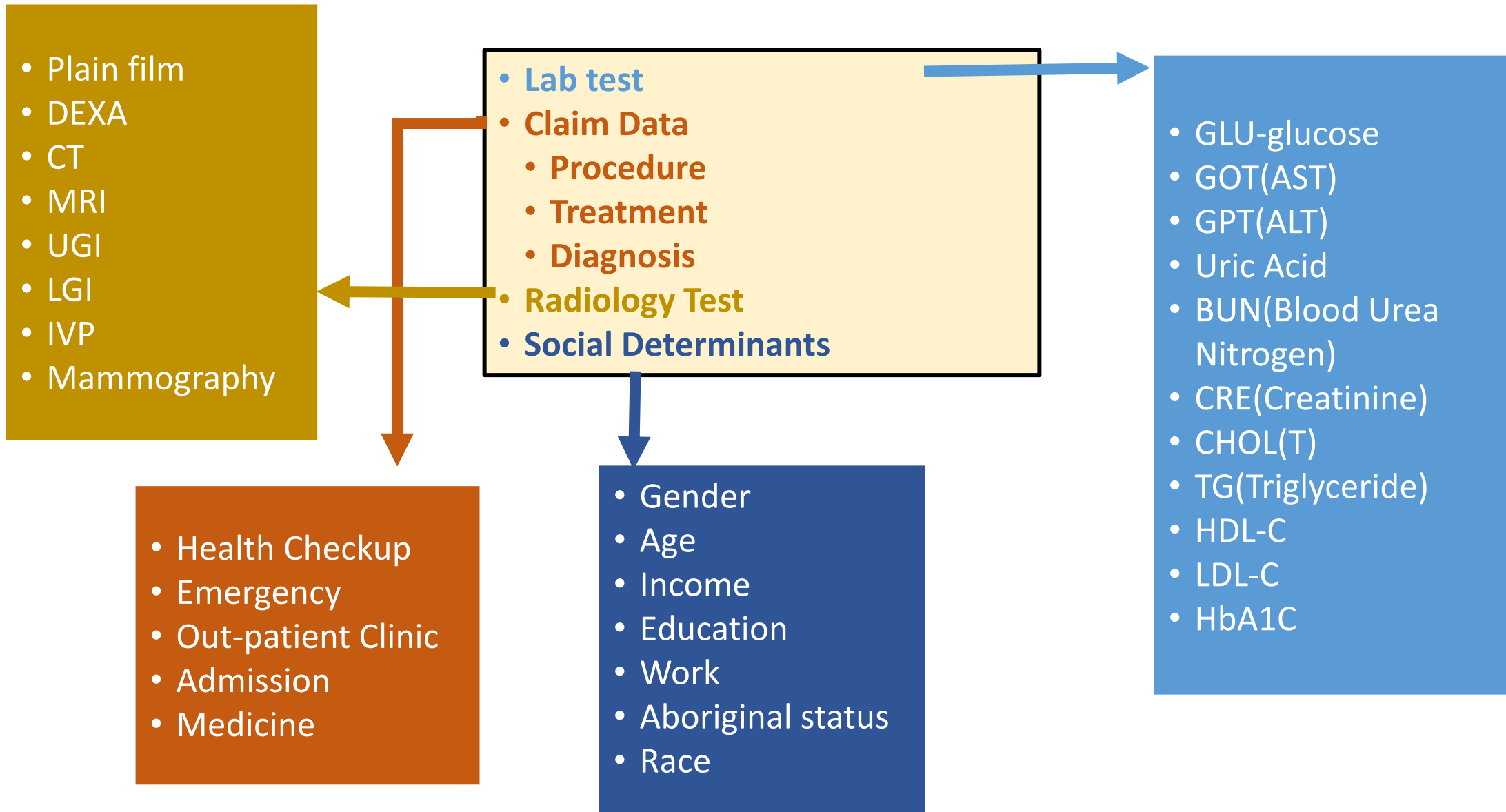
Variable Name	Prescription	Note
FEE_YM	Year and month of fee	
APPL_TYPE	Type of application	
HOSP_ID	Hospital ID	
APPL_DATE	Date of application	
CASE_TYPE	Case type	
SEQ_NO	Sequence number	
ID	Personal identification nu	
ID_BIRTHDAY	Data of birth	
GAVE_KIND	Payment type	
TRAC_EVEN	Traffic accident code	
CARD_SEQ_NO	Card sequence number	
FUNC_TYPE	Specialty visit	
IN_DATE	Admission date	
OUT_DATE	Discharge date	
APPL_BEG_DATE	Application begin date	
APPL_END_DATE	Application end date	
E_BED_DAY	Number of days in acute	
S_BED_DAY	Number of days in chroni	
PRSN_ID	Physician identification n	
DRG_CODE	DRG number	
EXT_CODE_1	External injury code 1	
EXT_CODE_2	External injury code 2	
TRAN_CODE	Disposition	
ICD9CM_CODE	Principal diagnosis	
ICD9CM_CODE_1	Secondary diagnosis 1	
ICD9CM_CODE_2	Secondary diagnosis 2	
ICD9CM_CODE_3	Secondary diagnosis 3	
ICD9CM_CODE_4	Secondary diagnosis 4	
ICD_OP_CODE	Principal procedure code	
ICD_OP_CODE_1	Secondary procedure code	
ICD_OP_CODE_2	Secondary procedure code	
ICD_OP_CODE_3	Secondary procedure code	
ICD_OP_CODE_4	Secondary procedure code	
DIAG_AMT	Diagnosis fee	
ROOM_AMT	Admission ward fee	
MEAL_AMT	Tube feeding fee	
AMIN_AMT	Examination fee	
RADO_AMT	Radiology fee	
THRP_AMT	Therapy fee	
SGRY_AMT	Surgery fee	
PHSC_AMT	Physical rehabilitation fee	
BLOD_AMT	Blood fee	

Inpatient prescription files do1997-do2012)

Variable Name	Prescription	Note
FEE_YM	Year and month of fee	
APPL_TYPE	Type of application	
HOSP_ID	Hospital ID	
APPL_DATE	Date of application	
CASE_TYPE	Case type	
SEQ_NO	Sequence number	
ORDER_SEQ_NO	Order sequence number	
ORDER_TYPE	Order type	
ORDER_NO	Order item number	
RATE_TYPE	Payment weight	
ORDER_QTY	Order quantity	
ORDER_PRICE	Unit price	
ORDER_AMT	Total amount	

Variables for linking

# Data Mapping Models





亞健康  
疾病

回朔分析

健保資料

疾病

疾病預測

醫療資料

健康  
亞健康

個人健康index

健檢資料



Open  
Data

健康量測

過去就醫  
資料

未來就醫  
預測

健康大數據  
Health Risk Appraisal



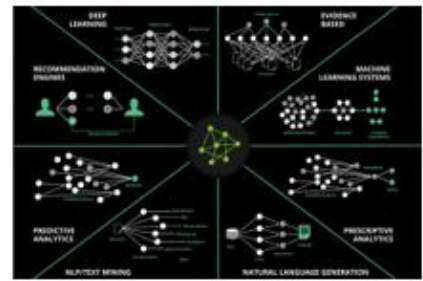
醫療/  
診斷應用

個人健康管理  
/健康保險

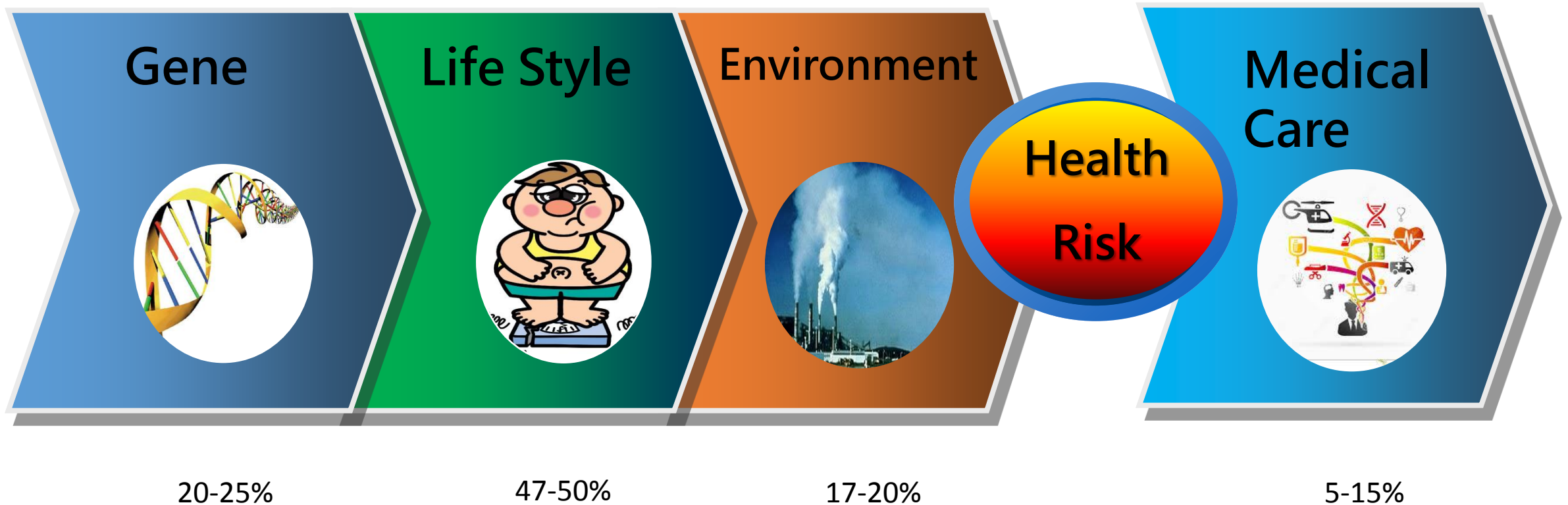


診斷判斷  
疾病預測  
預後評估

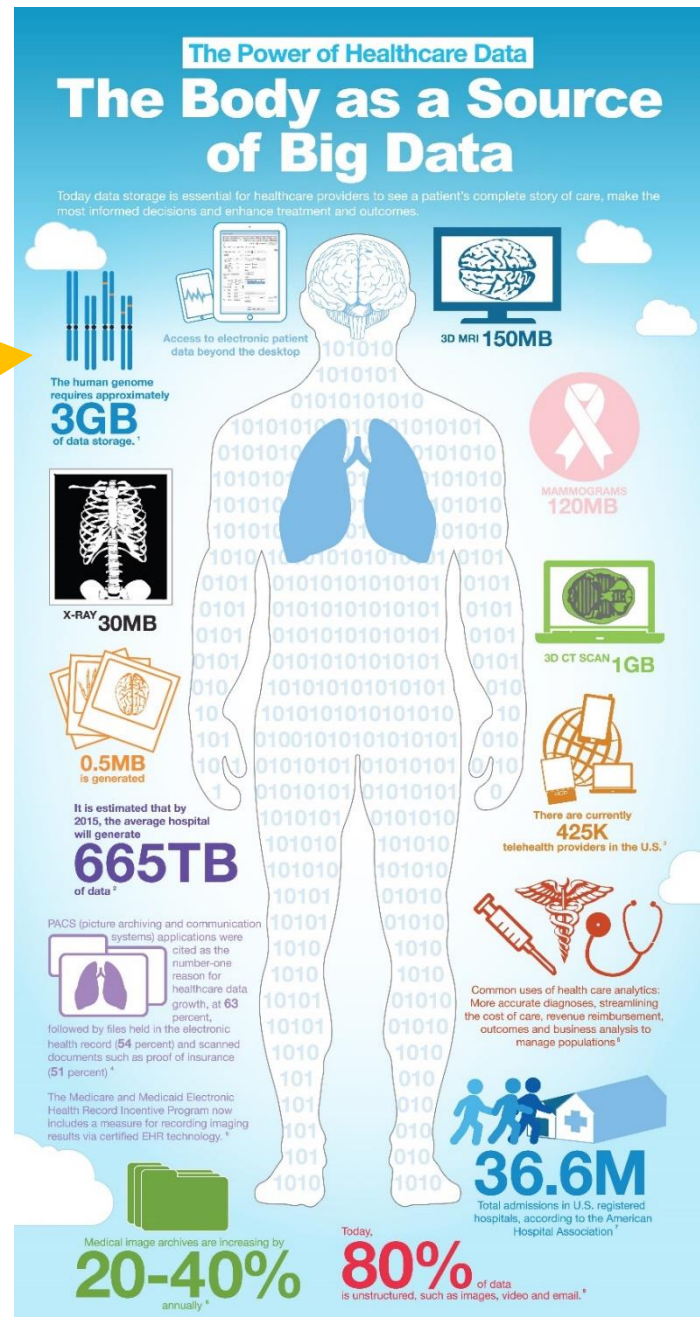
未來得病預測  
個人健康管理  
個人衛教諮詢



# Determinants of Health



# What Makes Us Healthy



Source: Bipartisan Policy Center, "F" as in Fat: How Obesity Threatens America's Future (TFAH/RWJF, Aug. 2013)

# 透過基因體資訊進行的個人化醫療

解讀每個人的基因體  
降低成本並大幅增加資料量！

基因體資訊

2003年完成基因體解讀

13年  
850億NTD

2008年國際千人基因體

8週  
790億NTD

2014年千美元讀取基因體

24小時  
3.2萬NTD

進一步降低成本並  
縮短處理時間！

3GB / 人  
x1.2億人

醫療資訊

以電子型態儲存  
一生的醫療資訊

醫療影像(CT, MRI)

電子病歷

生活習慣  
飲食、嗜好、壓力等

借助大數據  
從事醫療活動

大數據催生的  
次世代醫療商機

個人化預防

透過基因體資料與PHR, 在發病前介入治療

個人化醫療



預防副作用的  
最佳醫療處置

新藥研發及診斷技術



研發反應率高的  
藥品以降低  
成本

# National Quality Forum Data Initiative

**Data**  
for Systematic  
Improvement

010011010101100101100

This graphic features the word 'Data' in large white letters on a dark blue background. Below it, 'for Systematic Improvement' is written in smaller white text. The background is decorated with various white icons related to healthcare and data, such as a database cylinder, a clock, a plus sign, a person in a wheelchair, a globe, a syringe, a pill, a document, and a computer monitor. At the bottom, there is a binary code sequence: 010011010101100101100.

Systems improvement requires good data

Integrate multiple data sources

Timely and clinically relevant feedback

This panel has a green background. It contains two main sections. The top section is titled 'Systems improvement requires good data' and includes the text 'Integrate multiple data sources' next to an illustration of a database cylinder with arrows pointing to it from various sources. The bottom section is titled 'Timely and clinically relevant feedback' and includes an illustration of a person at a computer monitor, a patient in a hospital bed, and a clock, with arrows indicating a feedback loop.

需要正確資料

Healthcare needs to improve – and it can

Systems approaches have improved care

Systems approaches can address major healthcare challenges

This panel has a green background. The top section is titled 'Healthcare needs to improve – and it can' and includes the text 'Systems approaches have improved care' next to an illustration of a folder labeled 'MEDICINE' and three checkmarks. The bottom section is titled 'Systems approaches can address major healthcare challenges' and includes an illustration of a computer monitor, a person, and various healthcare icons like a pharmacy (Rx), a hospital, a doctor (Dr. Smith), and a home.

Using good data to accelerate progress remains a national challenge.

Lack of interoperability

Too few tools for clinicians to use data

Difficulty scaling up what works best

This panel has a green background. It contains three main sections. The top section is titled 'Using good data to accelerate progress remains a national challenge.' and includes an illustration of a server rack. The middle section is titled 'Lack of interoperability' and includes an illustration of a person with question marks. The bottom section is titled 'Too few tools for clinicians to use data' and includes an illustration of a person with question marks and a database cylinder. The bottom-most section is titled 'Difficulty scaling up what works best' and includes an illustration of a person with question marks and a database cylinder.

需要資料工具

複雜且大量

Patients are a largely untapped data resource

Expand patient-generated data

Ensure data are meaningful to patients

This panel has a green background. The top section is titled 'Patients are a largely untapped data resource' and includes the text 'Expand patient-generated data' next to an illustration of a person running and a database cylinder. The bottom section is titled 'Ensure data are meaningful to patients' and includes an illustration of a person with question marks.

The NQF Data Initiative

> For more information, go to [www.qualityforum.org/data/](http://www.qualityforum.org/data/)

NATIONAL QUALITY FORUM

This panel has a dark blue background. It contains the text 'The NQF Data Initiative' followed by a link: '> For more information, go to www.qualityforum.org/data/'. At the bottom, it says 'NATIONAL QUALITY FORUM'. There is also a small graphic of a person with question marks and a database cylinder.

AI ?

# Precision Medicine

# CURRENT IN PRECISION MEDICINE

## ONCOLOGY



New understanding of oncogenic mechanisms influences:

- Risk assessment
- Diagnostic categories
- Therapeutic strategies

Source: “A New Initiative on Precision Medicine,” N Engl J Med (2015)  
“Precision medicine is coming, but not anytime soon.” Harvard Health Blog (2015)

## PHARMACOGENOMICS



- Give the right drug at the right dose to the right patient
- Identify persons with rare loss-of-function mutations that protect against common diseases may point to attractive drug targets for broad patient populations
- Observations of mobile health technologies may improve strategies for preventing and managing chronic diseases.

## PERSONALIZED DATA

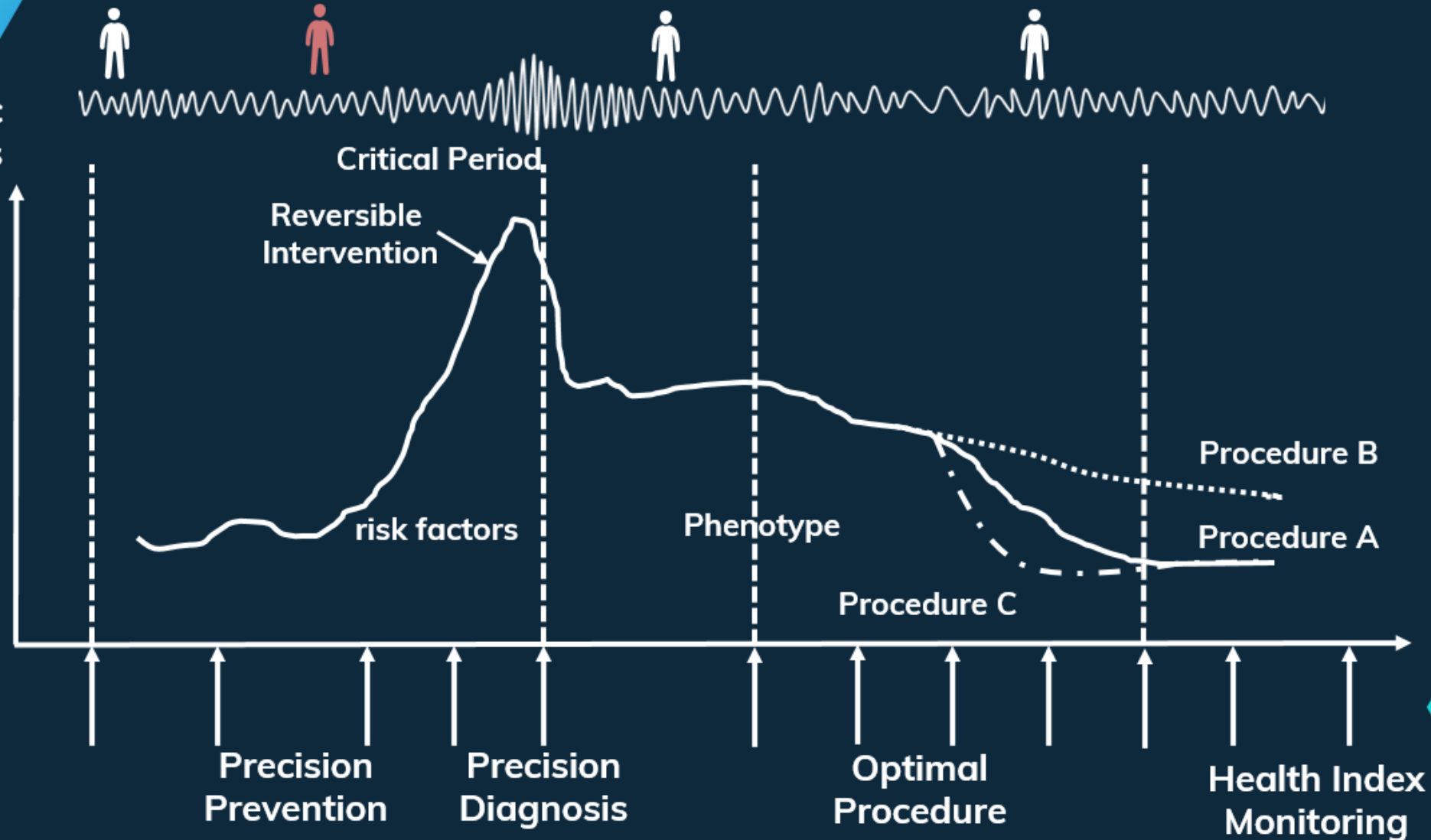


- Large-scale biologic databases (eg. Human genome sequence)
- Proteomics
- Metabolomics
- Genomics
- Diverse cellular assays
- Mobile health technology

# Precision Medicine Scope

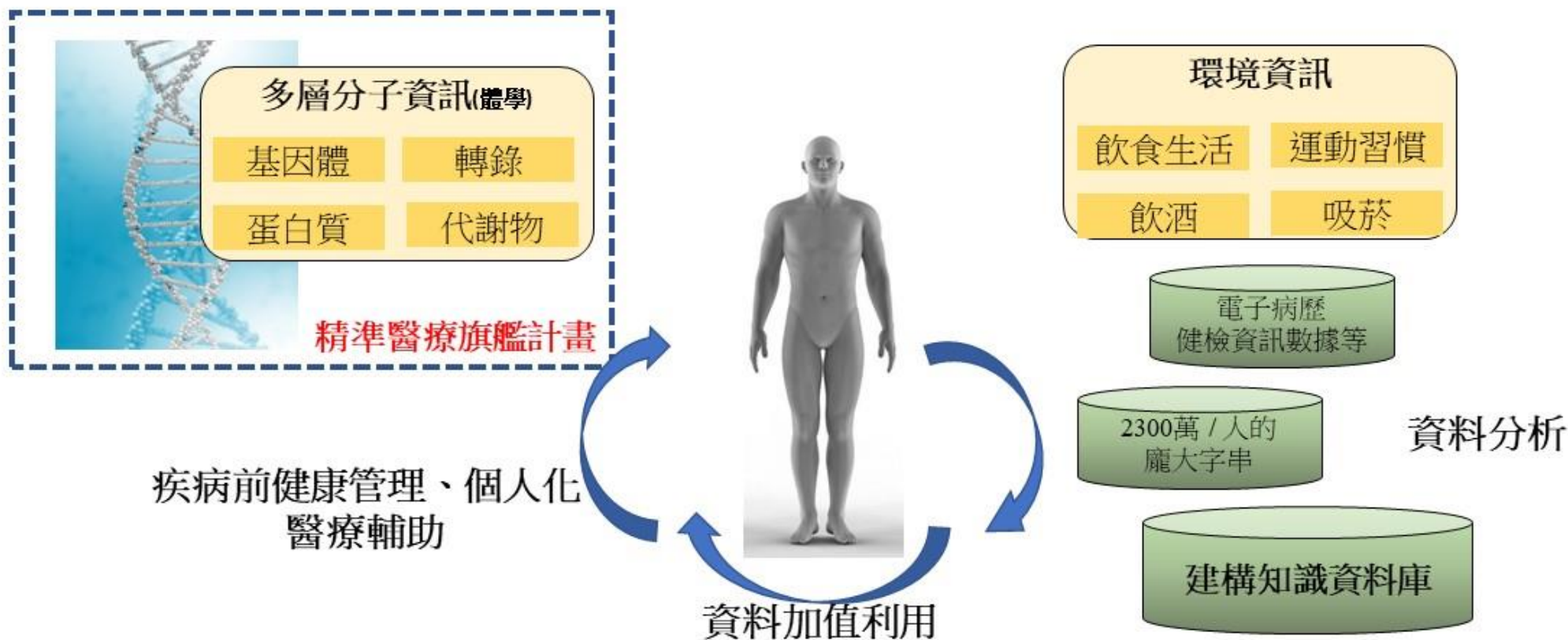
Dynamic  
Indicators

Entropy  
network



# 針對個人化健康管理的資料分析

~ 建立對於疾病前健康管理、個人化醫療有助益的「知識」資料庫 ~



相關分析案例(依據R進行統計分析)

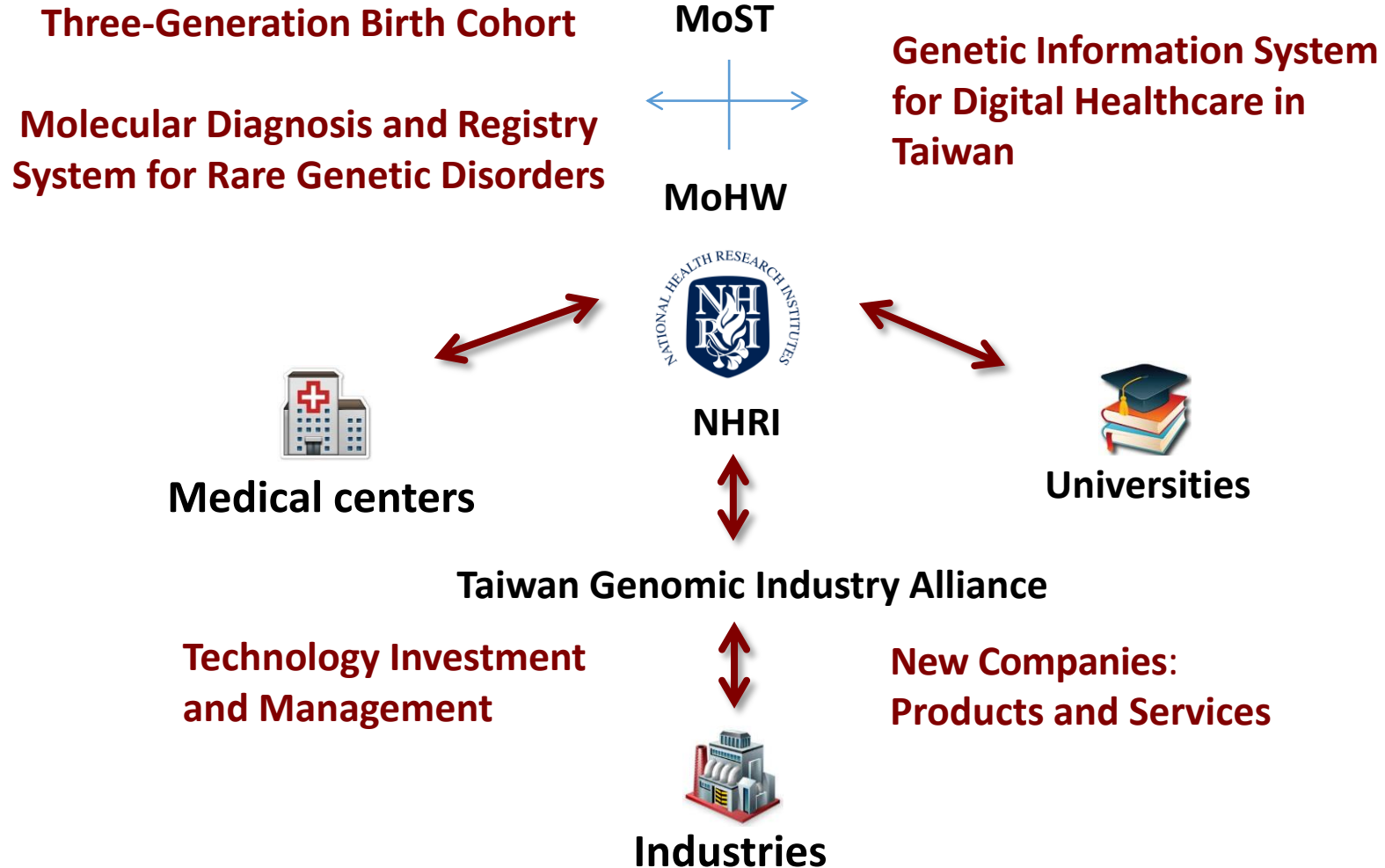
- 癌症惡化程度(期)與腫瘤大小
- 基因NTN4的發現與高血壓
- 基因HPD的發現與糖尿病併發

相關分析案例(依據AI進行健康風險統計分析)

- 慢性病疾病(心血管/中風/腎臟)
- 癌症風險評估
- 急診風險預測
- 預後預測/住院時間花費預估

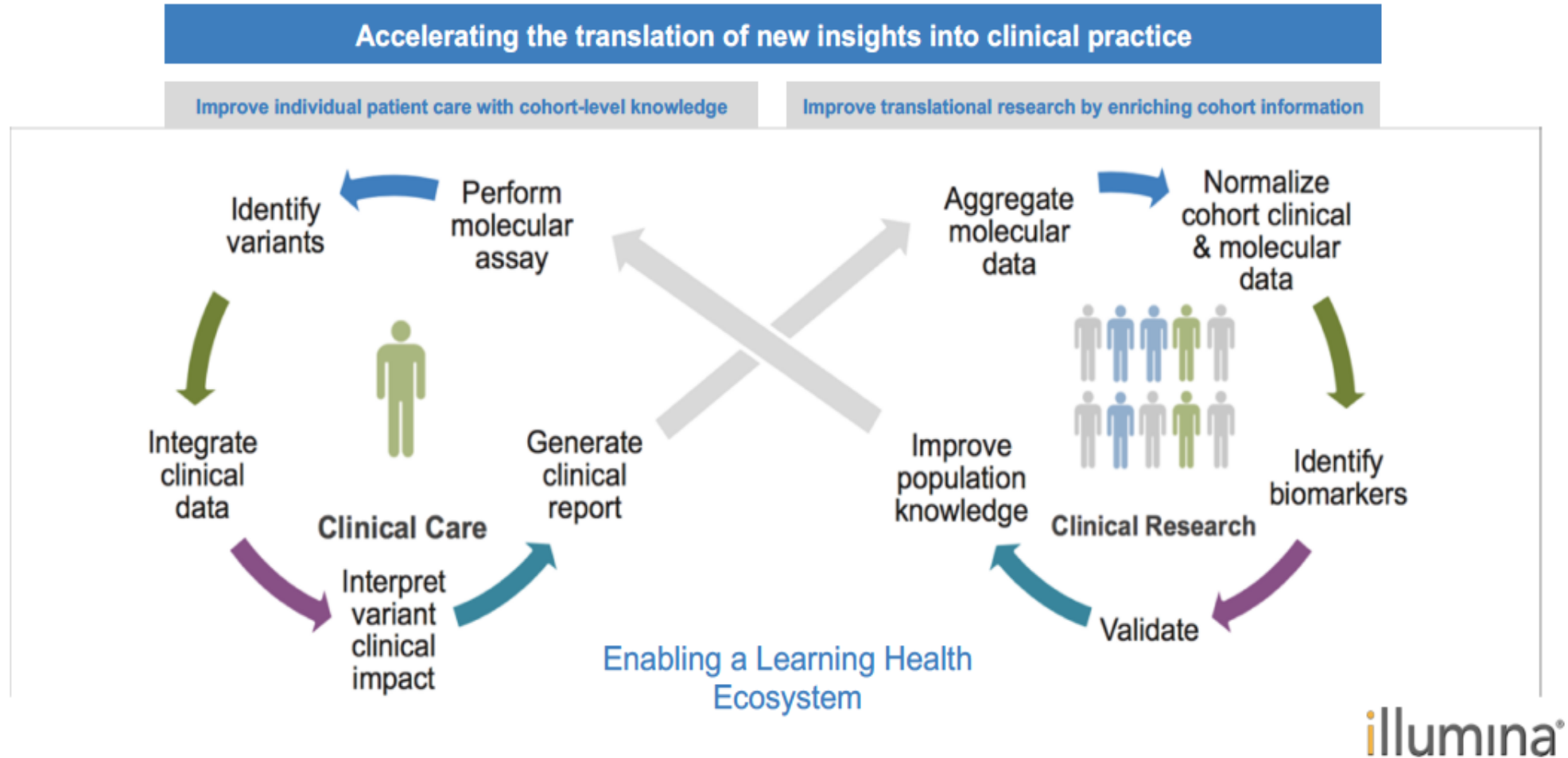
Flagship Project:

# Flagship Program of Precision Medicine for AsiaPacific Biomedical Silicon Valley



# Population Genomics Links Research with Clinical at Scale

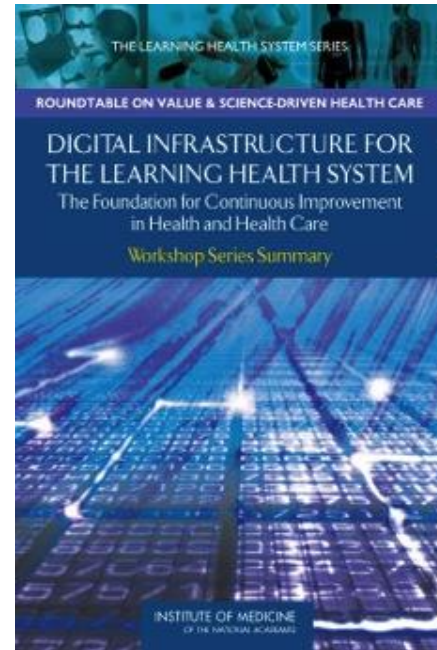
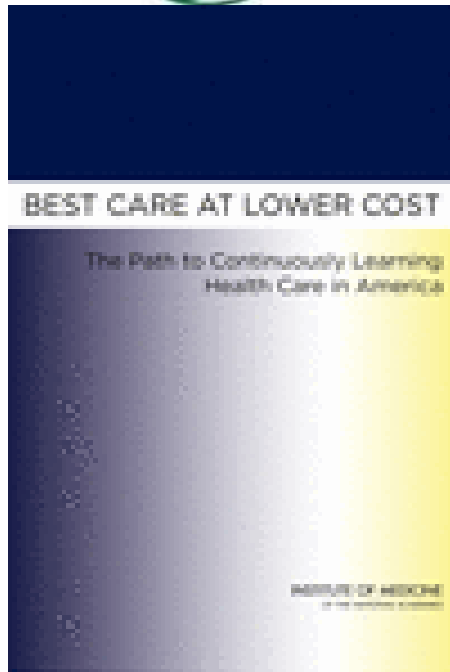
*Fully Reap the Benefits of Big Data in the Context of Clinical Care*



# Flagship Project: Learning Health System

# The Learning Health System

*Health systems--at any level of scale--become learning systems when they can, continuously and routinely, study and improve themselves*



The NEW ENGLAND  
JOURNAL of MEDICINE

Perspective: Jan 3, 2013

“Code Red and Blue — Safely Limiting Health Care’s GDP Footprint”

Arnold Milstein, M.D., M.P.H.

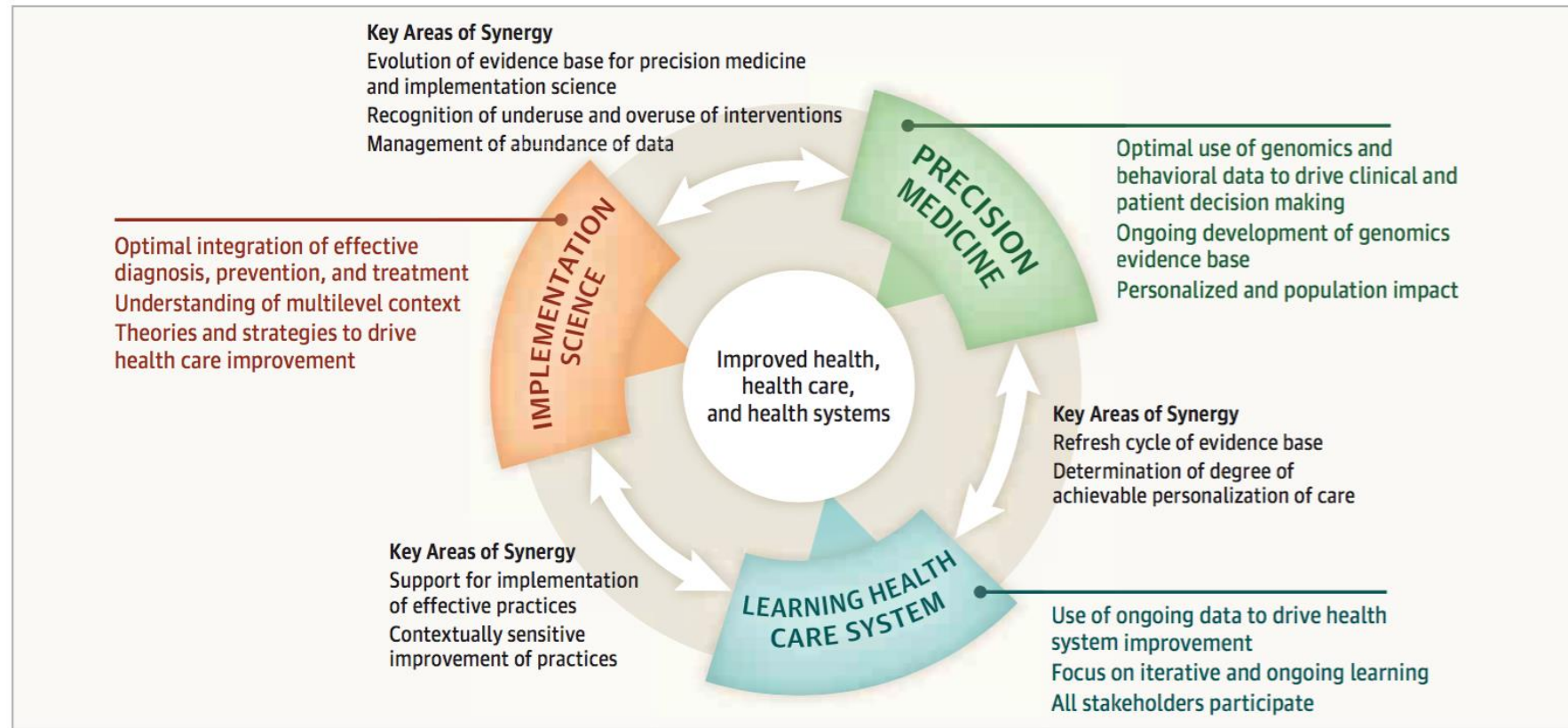
*...U.S. health care needs to adopt new work methods, outlined in the Institute of Medicine’s vision for a learning health system...*

## VIEWPOINT

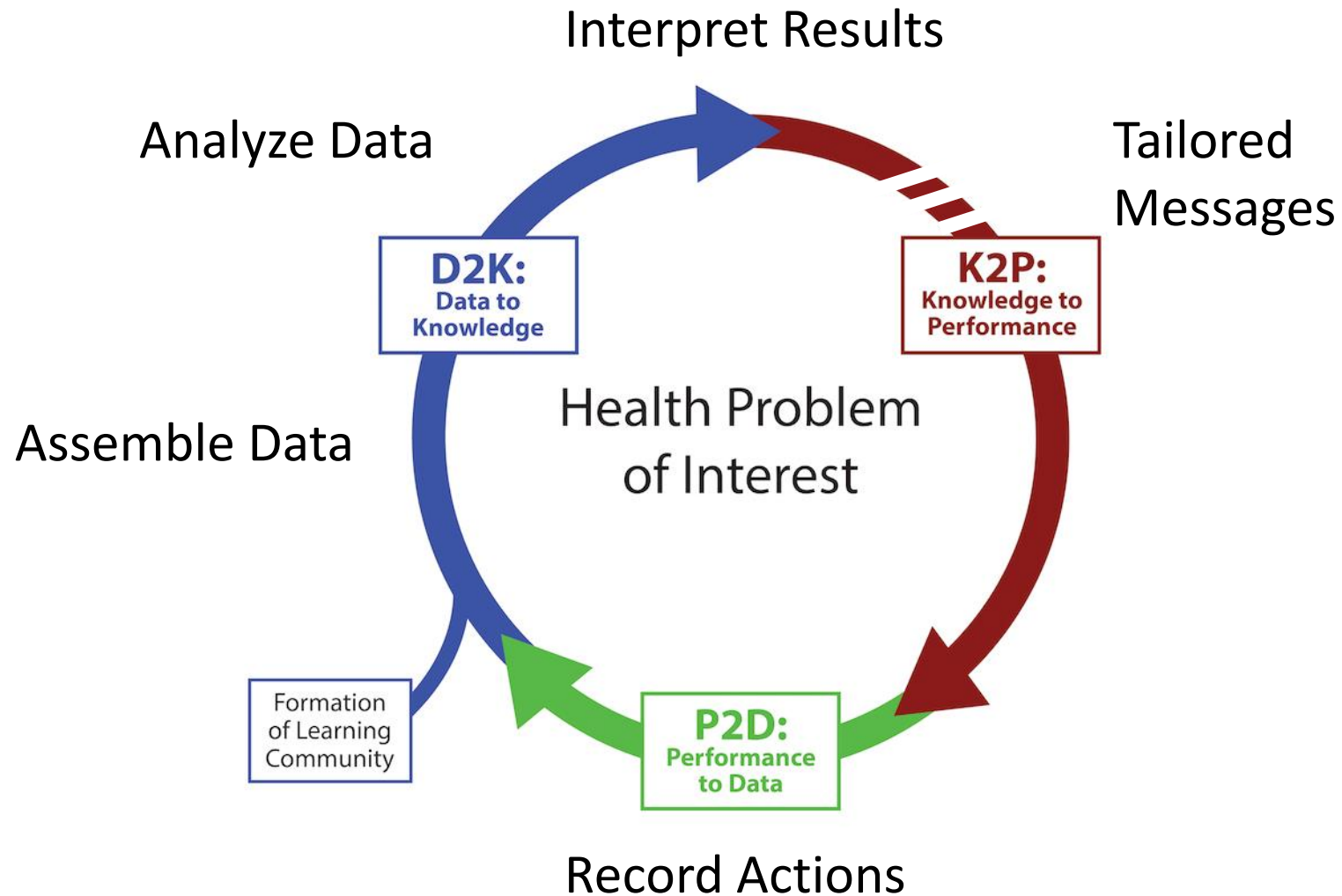
## INNOVATIONS IN HEALTH CARE DELIVERY

# Convergence of Implementation Science, Precision Medicine, and the Learning Health Care System

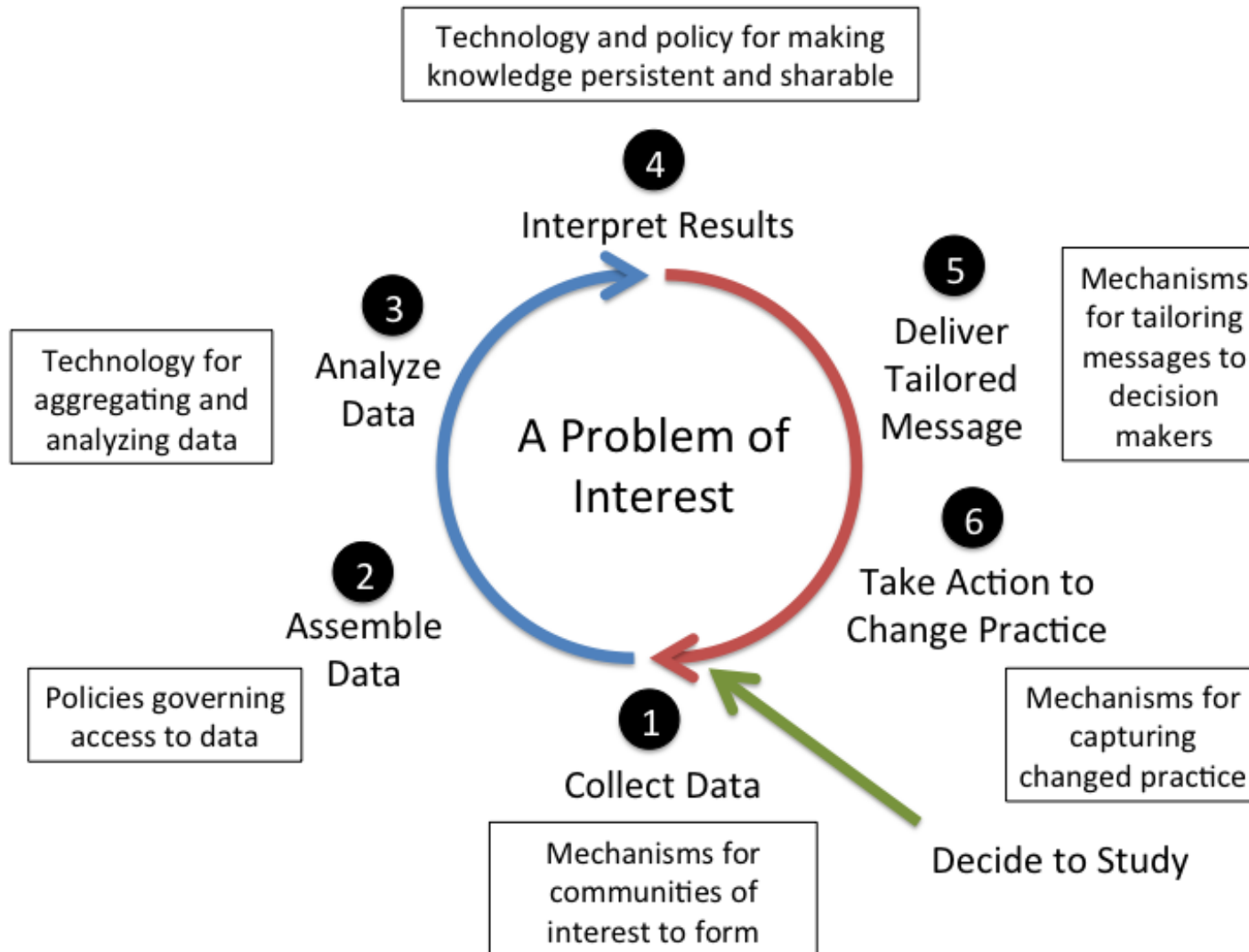
## A New Model for Biomedical Research



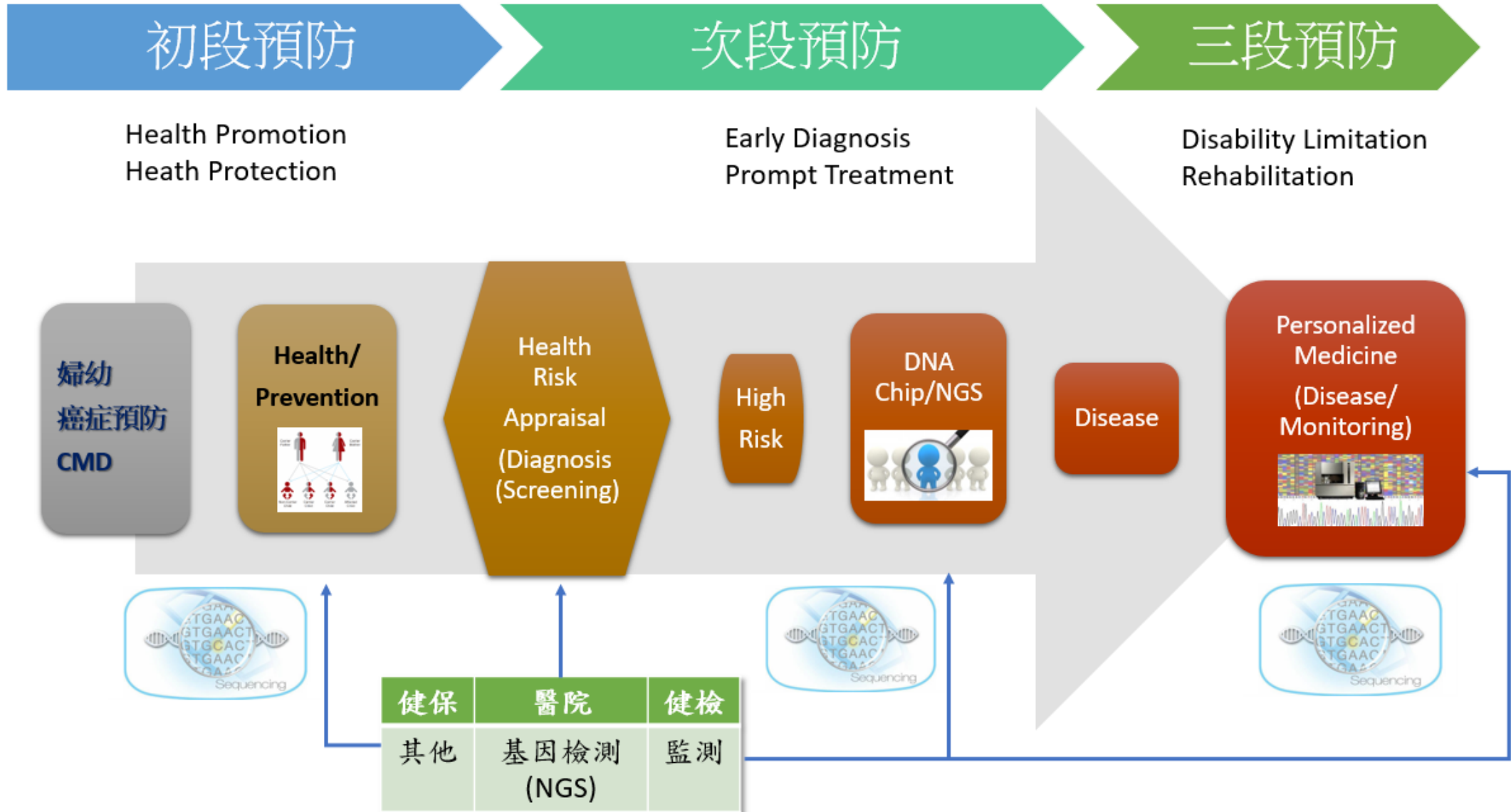
# The LHS Links Discovery to Better Health



# What is Learning Health System



# LHS meets Precision Health Management



# Flagship Project: Genetic Risk Score

# Types of Genetic Tests

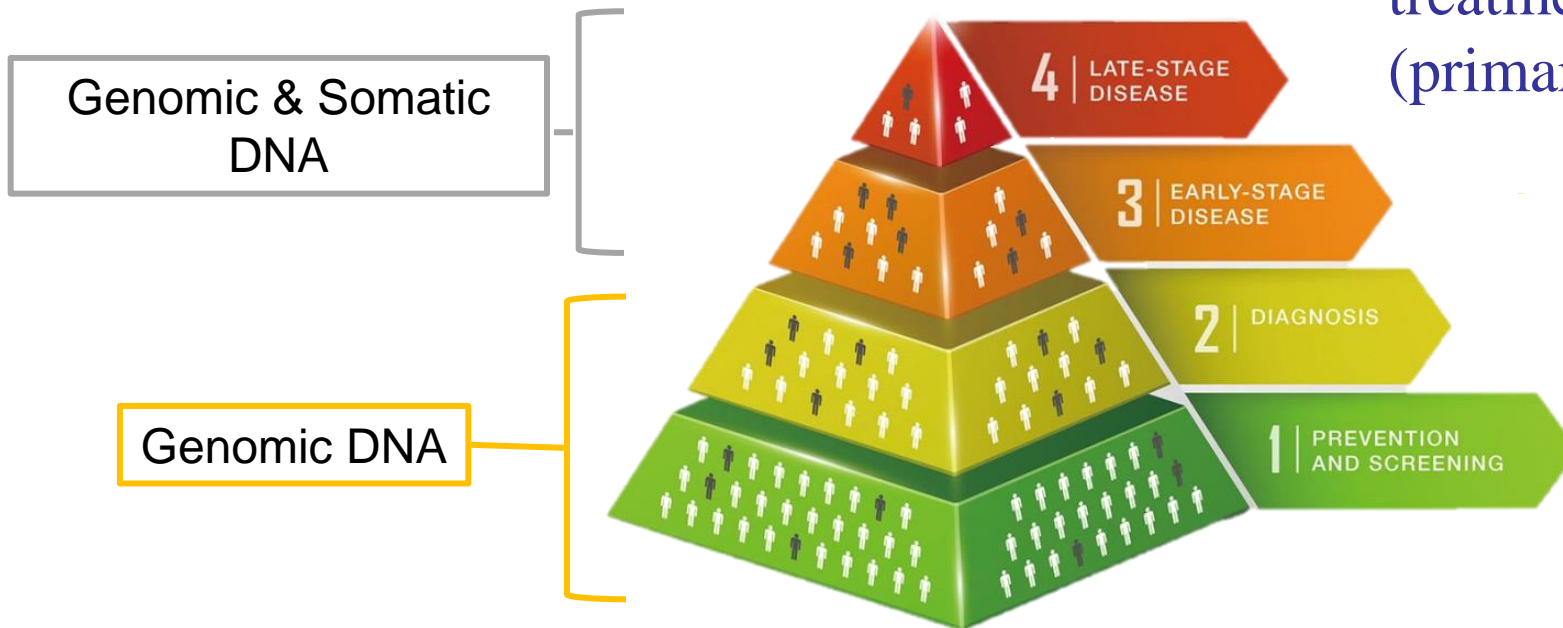
## Germline DNA (from blood/saliva)

- ✓ Inherited risk of disease
- ✓ Rarely changes during life
- ✓ **DONE JUST ONCE IN LIFETIME**

## Somatic DNA (from tissue/tumor)

- ✓ Mutations that cause cancer to progress/resist treatment
- ✓ Tumors adapt/change to environment/treatment
- ✓ Tumor samples analyzed before/after treatment and from different areas (primary site vs. metastatic site)

Pyramid Model of Precision Cancer Care



2018

2019

2020

2025

UTUC/Heart Disease Panel

Pharmacogenomics (PGx)

Disease Risk prediction (Cancer)

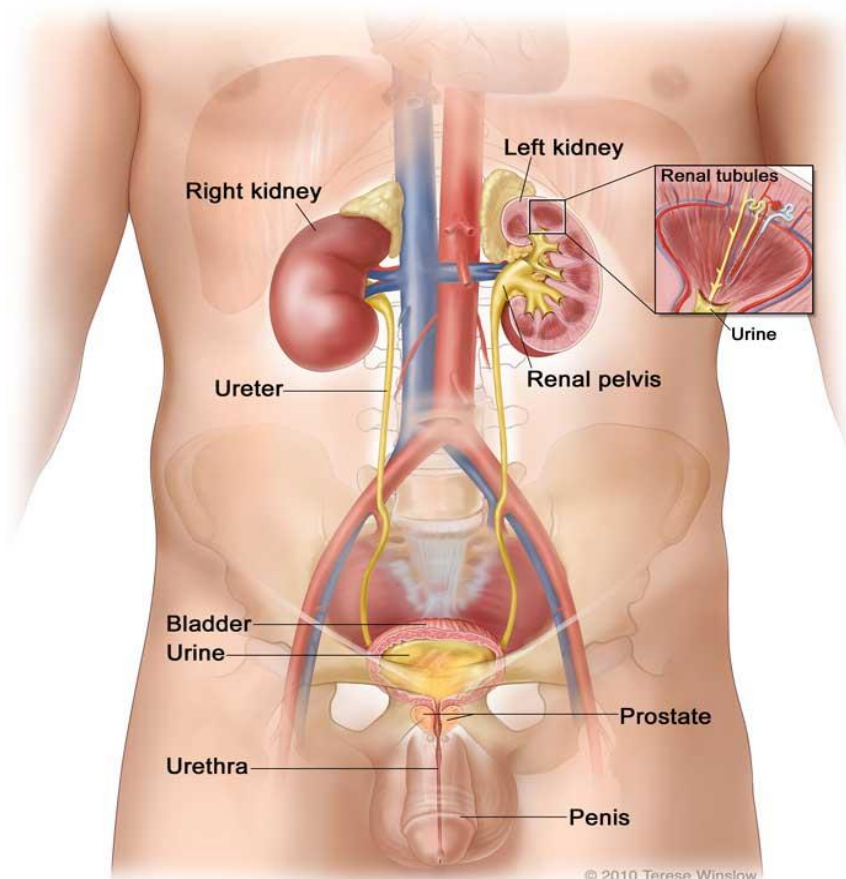
Upper Tract Urothelial Carcinoma (UTUC)

Disease Risk Prediction (Non-Cancer)

W&C: Rare Disease, DD/ID; HD: SLE, T2DM, DN; Parkinson's Disease

Flagship-supported networks

# Unusual Clinical Incidences of UTUC in Taiwan



© 2010 Terese Winslow  
U.S. Govt. has certain rights

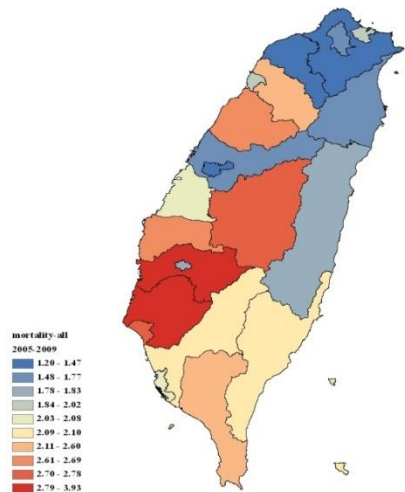
	Western Country	Taiwan
M:F ratio	3 : 1	1 : 1.2
Renal pelvis / ureter / bladder	3 : 1 : 51	1.5 : 1 : 5.4
Upper tract / all urothelial tumor	5-10 %	31.4 %
Renal pelvis / all kidney	10 %	42.6 %
incidence ( $10^5$ )	1-2	3-4

- 台灣上泌尿道尿路上皮癌盛行率高出世界其他國家
- 發生率也快速在增加
- 在非抽菸、女性、及慢性腎病明顯較西方國家多

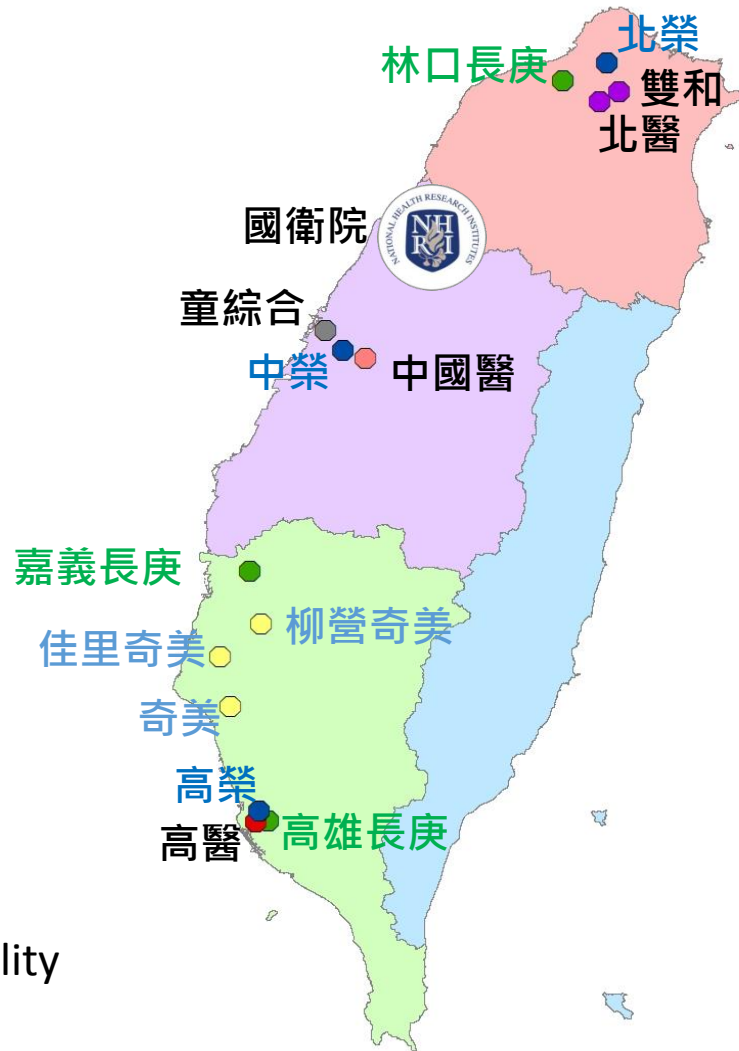
Eur Urol 2004;46:147  
General urology 2004;325  
Cancer 1999;85:1342

# Taiwan UTUC Biobank – Cancer Perdition and Prevention

## Partnership



2005-2009 Bladder Cancer Mortality



2015, 3, 26

- 2015 MOHW project
- 2016 Tainan, Taipei Conference Meeting
- 2016-2017 NHRI Mini-Project



# WGS meets UTUC

## UC/Unmet Clinical needs:

Risk Stratification by Using “Objective” Parameters  
(Qualitative, not Quantitative)

Non-invasive Tools for Screening and Follow-up  
(Policy/Strategy and Methods)

Personalized Tx – Immuno-Oncology / ChemoTx

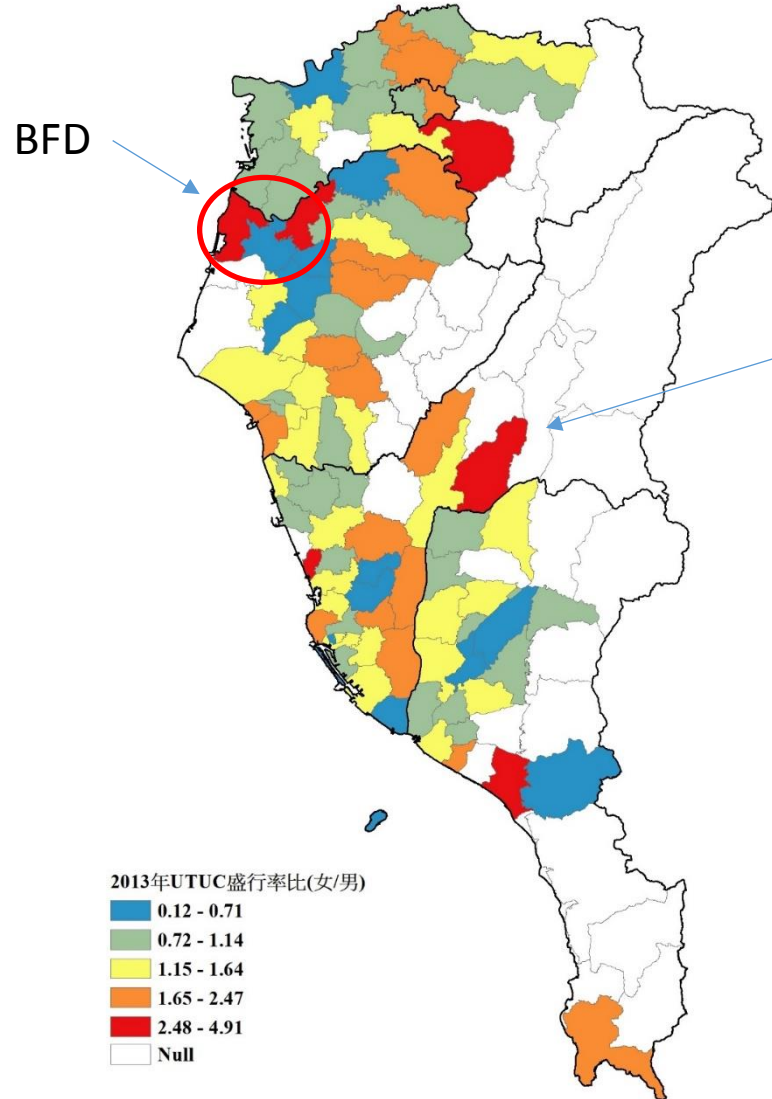
## Risk Prediction Tools

建立預測chemo, PDL1 inhibitor, or combination therapy response rate 的genetic nomogram.

- 周邊血及腫瘤組織的WGS，找出poor chemo response predictor ->  
是否單用 chemotherapy
- 周邊血及腫瘤組織的WGS，找出poor PDL1 inhibitor response predictor ->  
是否單用 PDL1 inhibitor  
或需要combined chemotherapy

嚴重併發症的prediction nomogram

# UTUC Prevalence (F/M ratio)



美濃

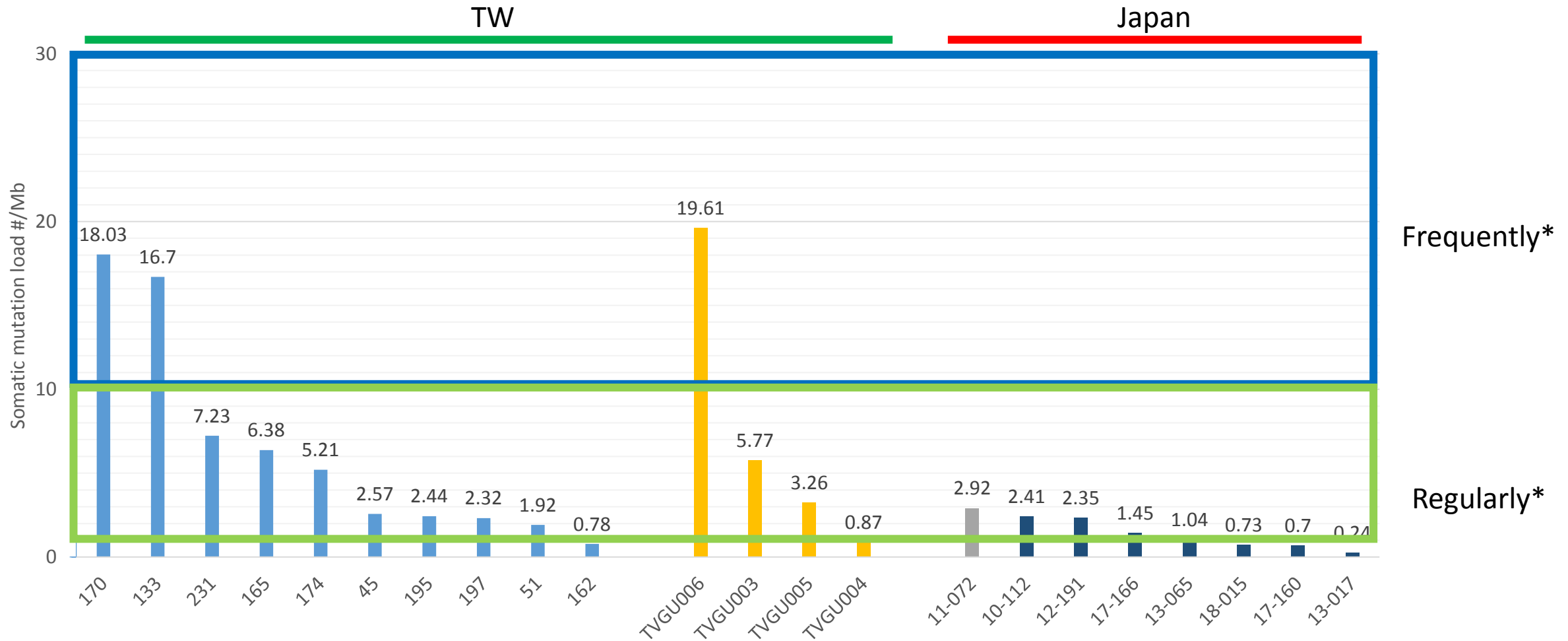


# KDM6A, KMT2C, TP53 : Affected in TW UTUC only

	KCMH (N=10)										TVGH (N=4)				Japan (N=8)								Count* (N=22)
FGFR3	■	■	■	■							■				■	■							7
KDM6A	■	■	■		■	■					■	■											7
ARID1A				■							■	■			■			■					5
HRAS					■							■	■				■						4
KMT2D		■				■	■									■							4
PIK3CA		■	■								■						■						4
KMT2C					■		■				■												3
TP53						■	■	■			■												3
ARSE														■			■						2
COL2A1		■																			■		2
EP300			■														■						2
KMT2B				■													■						2
PIK3R1											■								■				2
SMARCA4				■							■												2
TSC1								■													■		2

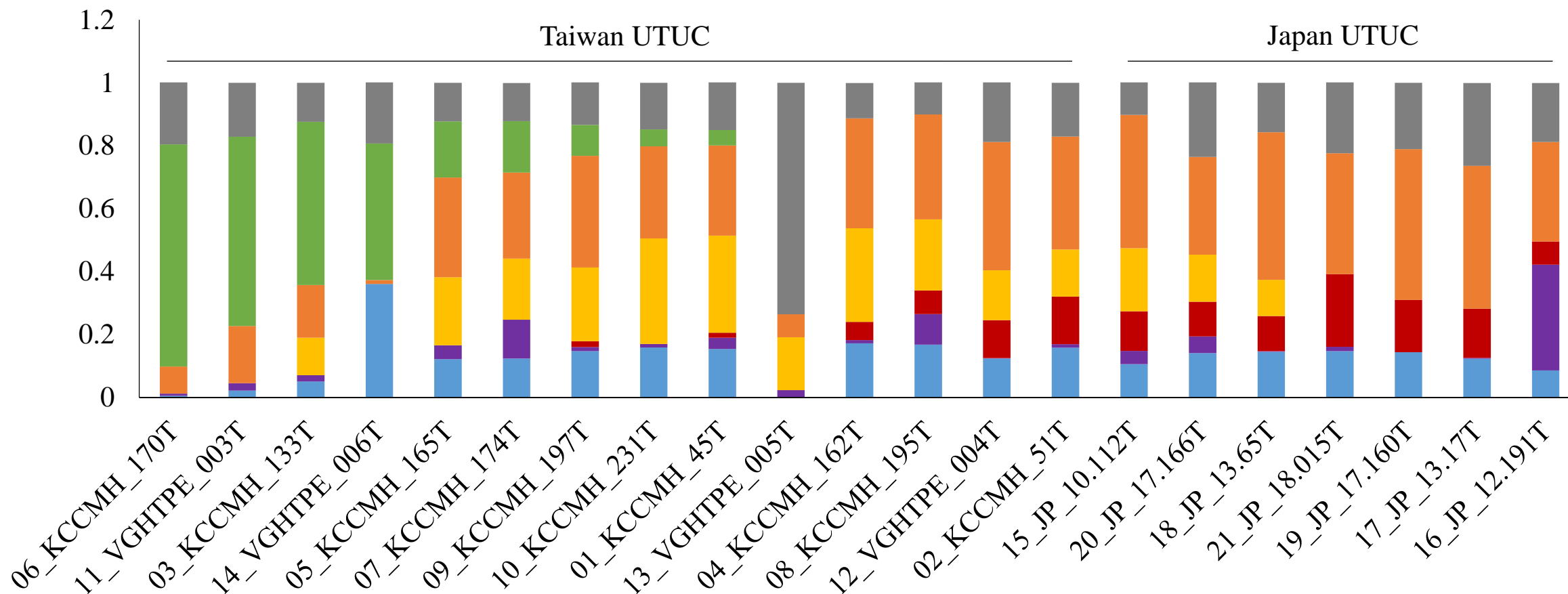
\* Two more samples with same affected gene are shown in this table

# TW UTUC have more frequently neoantigen formation



\* Cutoff adopt from *Science* 2015: Vol. 348, Issue 6230, pp. 69-74

# Mutation percentage-mutational signatures



# TRDN (Taiwan Rare Disease Network) Partnership

NHRI: support the network through the Flagship Program

Taiwan Foundation for Rare Disorders (TFRD; 罕見疾病基金會)

Taiwan Human Genetics Society (THGS; 中華民國人類遺傳學會)

International collaboration - Contribution by Professor LJ Huang (Baylor)

## Genome Sequencing - R/D & Services



Illumina NovaSeq 6000

<b>Reference lab</b>	<ul style="list-style-type: none"> <li>WGS (30x): 200 /week</li> <li>Exome (300x): 100/week</li> <li>Transcriptome (500M reads): 500/week</li> <li>Other applications</li> </ul>
<b>R/D</b>	<ul style="list-style-type: none"> <li>Population genomics</li> <li>Rare genetic diseases</li> <li>Cancer genome sequencing</li> </ul>
<b>Services</b>	50% capacity, contract out

### COMMENTARY

The Undiagnosed Diseases Network:  
Accelerating Discovery about Health and Disease

Rachel B. Ramoni,<sup>1,2,\*</sup> John J. Mulvihill,<sup>3</sup> David R. Adams,<sup>3</sup> Patrick Allard,<sup>4,5</sup> Euan A. Ashley,<sup>6</sup> Jonathan A. Bernstein,<sup>7</sup> William A. Gahl,<sup>3</sup> Rizwan Hamid,<sup>8</sup> Joseph Loscalzo,<sup>9</sup> Alexa T. McCray,<sup>1</sup> Vandana Shashi,<sup>10</sup> Cynthia J. Tift,<sup>3</sup> Undiagnosed Diseases Network, and Anastasia L. Wise<sup>3</sup>

AJHG (2017) 100: 185-192

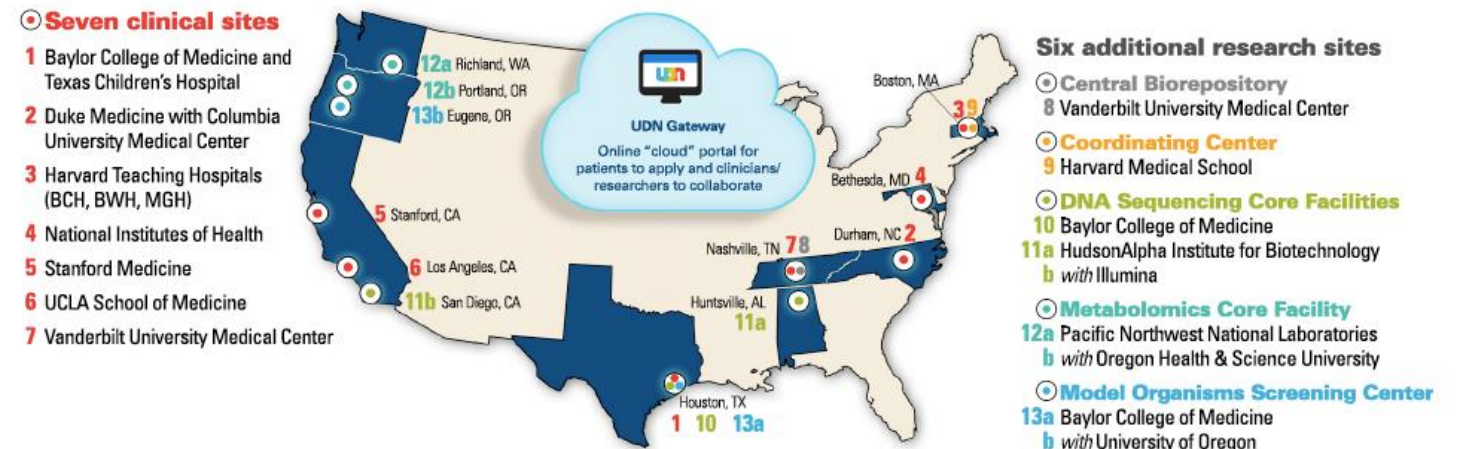
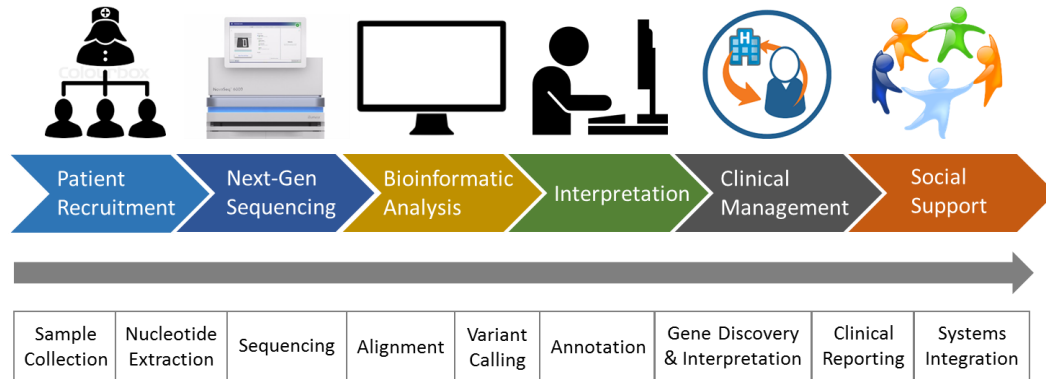


Figure 1. The Undiagnosed Diseases Network

The Undiagnosed Diseases Network (UDN) includes seven clinical sites, two DNA sequencing cores, a metabolomics core, a model-organism screening center, a central biorepository, and a coordinating center. Technologically, the sites are linked via the UDN Gateway, through which participants also apply. Abbreviations are as follows: BCH, Boston Children's Hospital; BWH, Brigham and Women's Hospital; and MGH, Massachusetts General Hospital. (Figure modified from the UDN website, maintained by the coordinating center.)

# 台灣罕見疾病研究網絡 (Taiwan Rare Disease Network)



完成276個收案家庭的分析，並於194個家庭中找出致病之基因突變 (診斷率 70.3%)

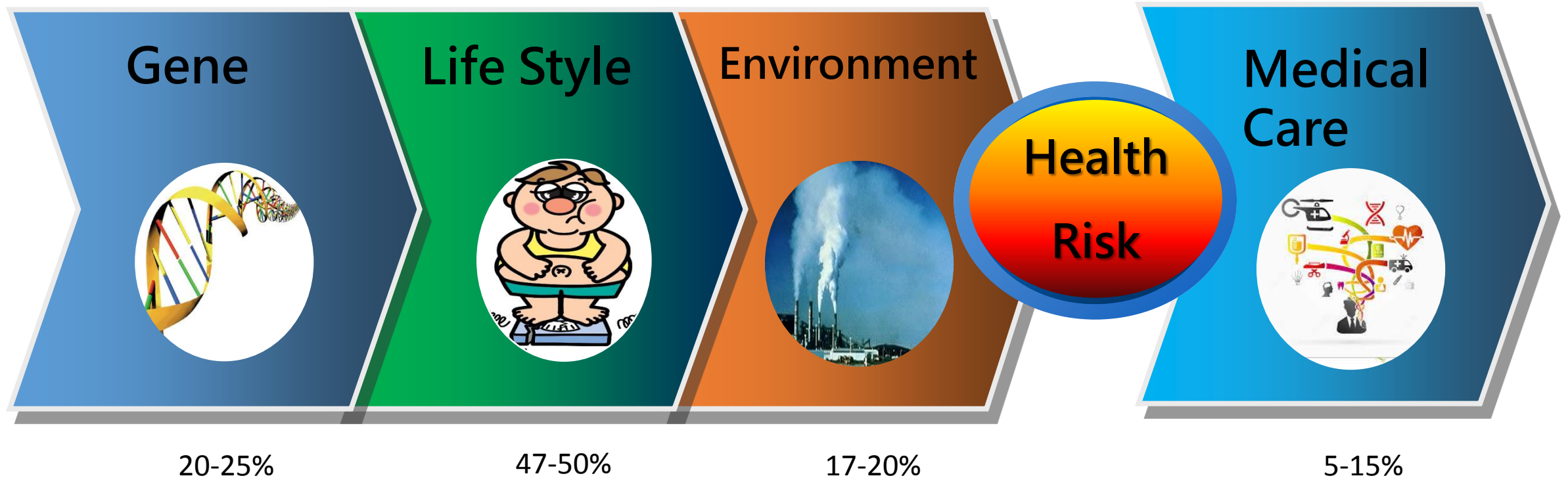
No	Case Recruitment	Scheduled (family)	Sample received (family)	NGS completed (family)	Analysis finished (family)	Project PI
1	Immunodeficiency	4	4	4	4 (4/4)	李文益 傅令嫻 韓舒萍
2	Epilepsy	189	189	188	91 (71/91)	劉祐岑 王緒斌 林為聖
3	Spinocerebellar ataxia	13	13	13	13 (8/13)	宋秉文 葉建宏
4	Hearing impairment	41	41	41		吳振吉 鄭彥甫
5	Rett syndrome	26	26	26	26 (17/26)	洪碧蓮 王緒斌
6	General undiagnosed disease	226	226	224	142 (94/142)	林炫沛 牛道明 靖永皓....等
Total		499	499	496	276 (194/276)	



台灣罕病研究網絡

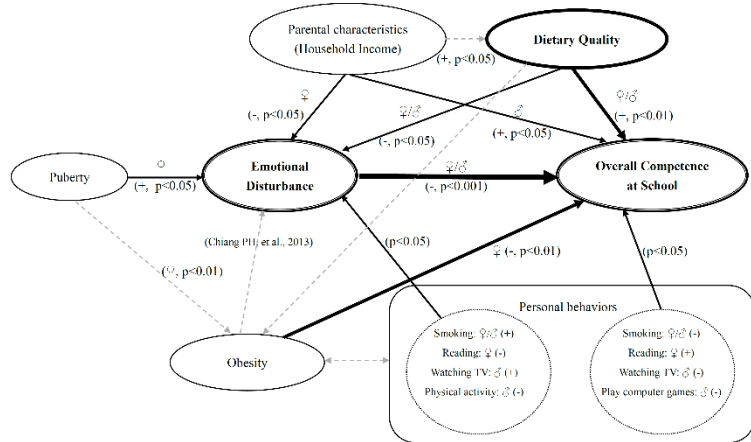


# Time trend and spatial pattern of important health risks



# Health Risk – Behavior (Po-Huang Chiang)

## • Emotional Disturbance



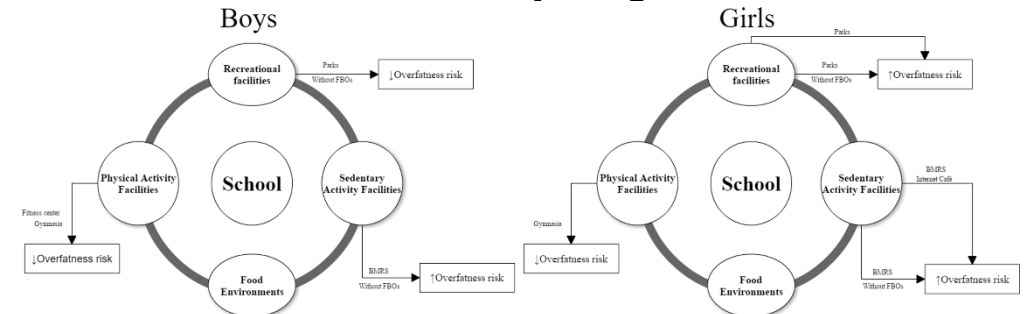
- Emotional disturbance increases the risk of obesity among Taiwanese schoolchildren, as obesity also increase the risk of emotional disturbance, among both boys and girls.
- Unsatisfactory food intake is associated with the link between emotional disturbance and impaired school performance, as assessed by OCS, especially among girls. For both genders, socio-economic and behavioral factors including parenteral income, reading, screen viewing, and smoking are modulators of this association.

### References:

1. Huang LY, Wahlqvist ML, Lee MS, **Chiang PH\***. Dietary Quality linkage to Emotional Disturbance and School Performance in Pubertal Junior High School students: dependence on Gender, Parental Characteristics and Personal Behaviors. *Nutrition Journal*. Feb. 22, **2018**, 17:29.
2. **Chiang PH**, Huang LY, Lo YT, Lee MS, Wahlqvist ML\*, Bidirectionality and gender differences in emotional disturbance associations with obesity among Taiwanese schoolchildren, *Research in Developmental Disabilities*. October, **2013**, 34(10): 3504-3516.

## • Obesogenic environments

- Fast food store (FS) densities predicted weight and BMI in boys. FS densities also predicted height for girls. Except for weight and BMI in boys, Convenience store (CS) did not have effects evident with FS for boys or girls.

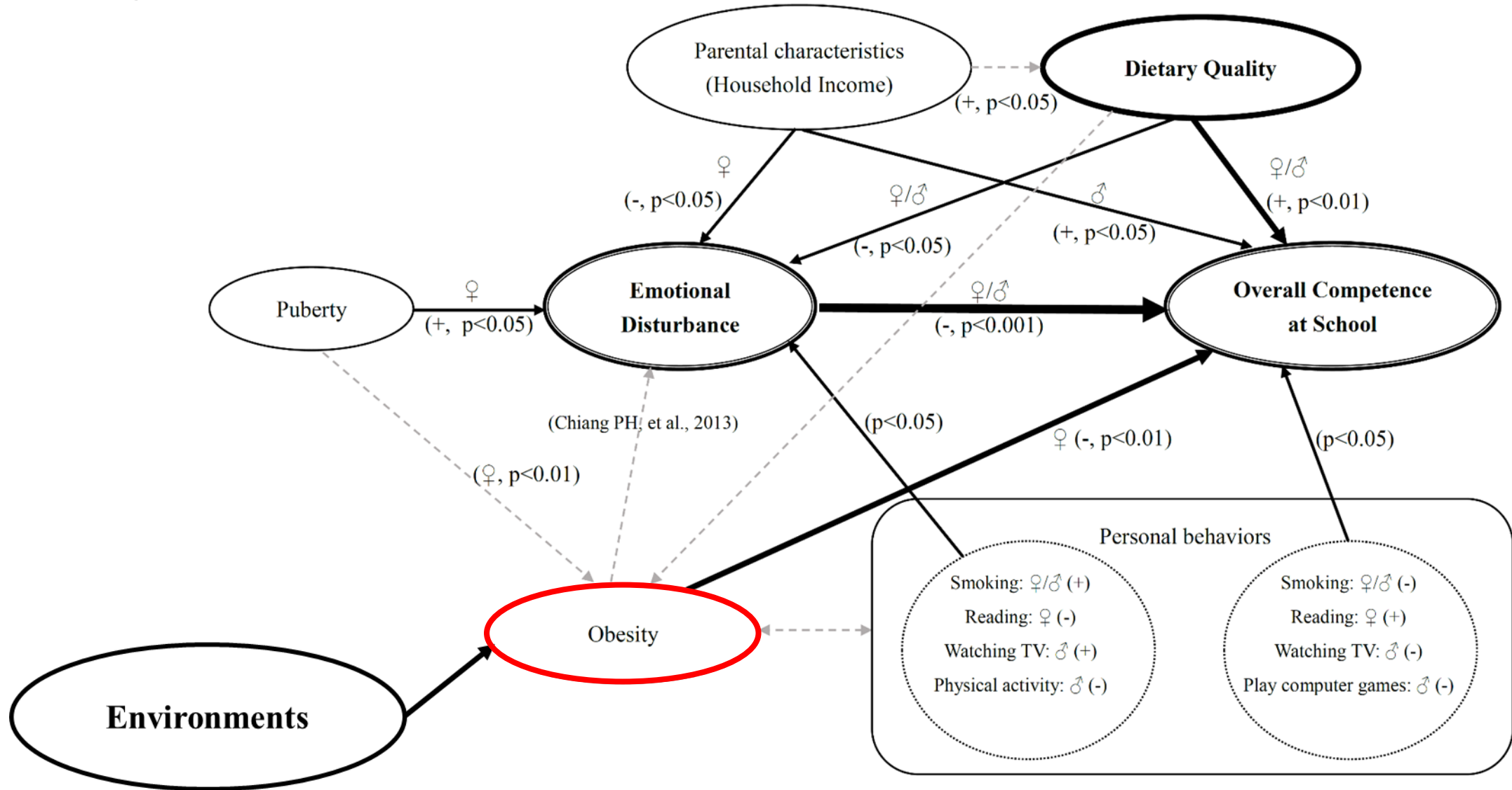


- There were no significant associations between body composition and food environments among junior high school students. Physical activity facilities in school environments favor healthier adolescent body composition, but differently for adolescents.
- The net association of facilities for physical and sedentary activity around junior high schools on body composition is dependent on stage of puberty.

### References:

1. **Chiang PH**, Huang LY, Lee MS, Tsou HC, Wahlqvist M\*. Fitness and food environments around junior high schools in Taiwan and their association with body composition: gender differences for recreational, reading, food and beverage exposures. August 3, **2017**. *PLoS One*.
2. **Chiang PH**, Wahlqvist ML\*, Lee MS, Huang LY, Chen HH, and Huang STY. Fast food outlets and walkability in school neighborhoods predict fatness in boys and height in girls: A Taiwanese population study. *Public Health Nutrition*. September, **2011**; 14(9):1601-1609.

# Major Results



# Major Results – *Obesity and Environments*

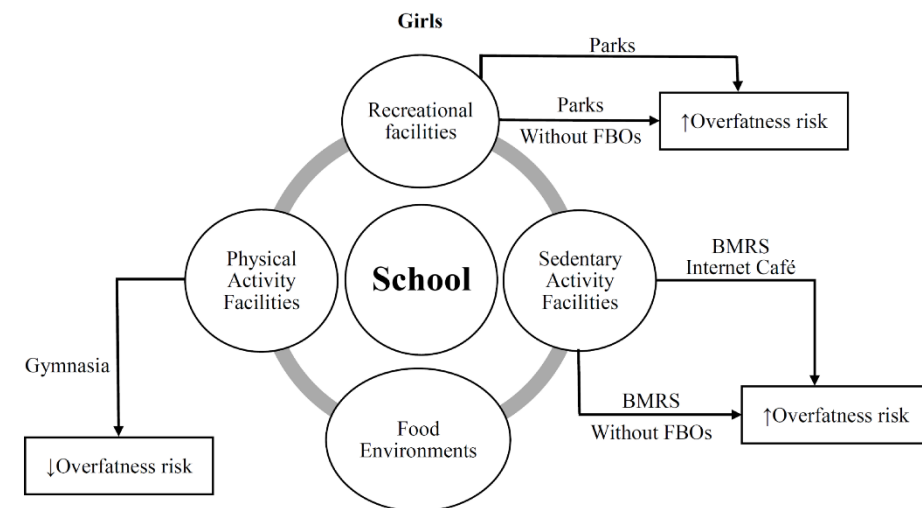
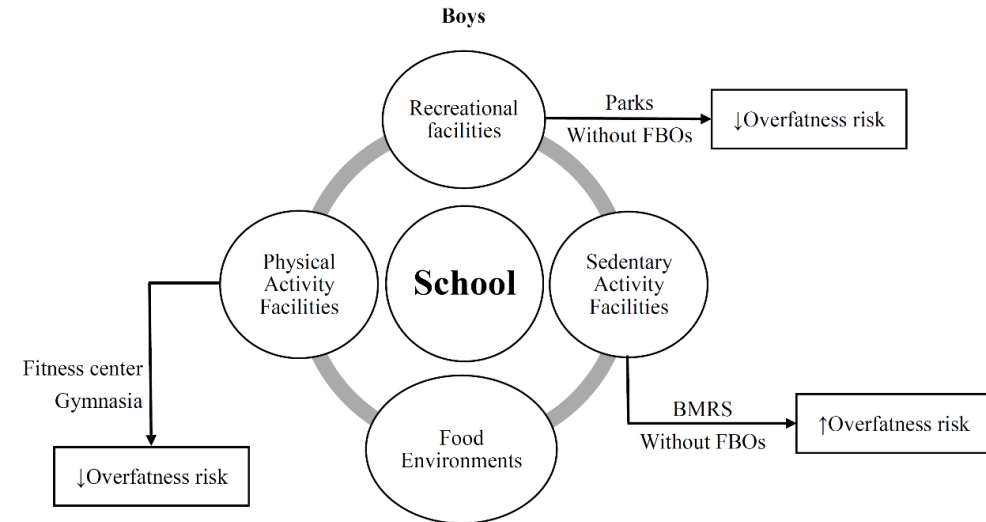
- Elementary school students

- Junior high school students

Multiple regression results for body composition and store numbers within **500m** around school on the basis of gender

	Boys		Girls	
	CS (β)	FS (β)	CS (β)	FS (β)
Height z-score	0.014	0.031	0.012	<b>0.093*</b>
Weight z-score	<b>0.016*</b>	<b>0.076*</b>	0.016	0.062
BMI z-score	0.013	<b>0.077*</b>	0.015	0.032
WC z-score	0.008	0.048	0.007	0.016
TSF z-score	0.010	0.048	0.015	0.011

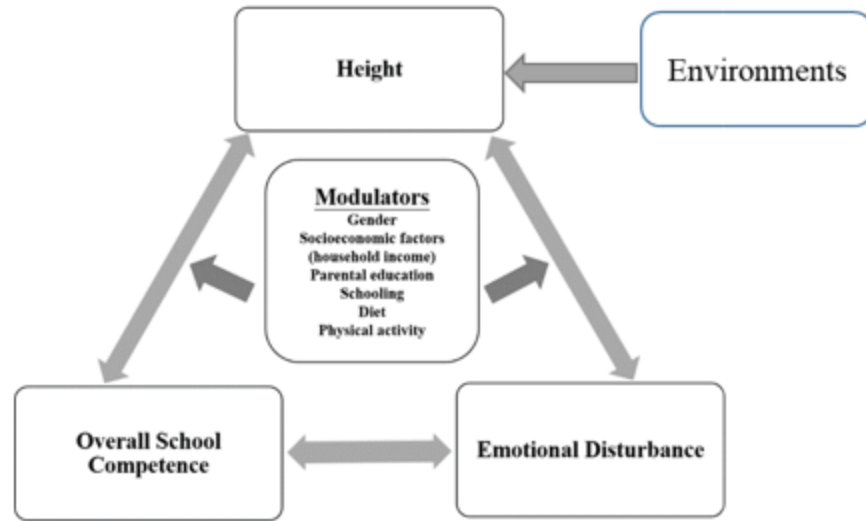
(Chiang PH, et al., Public Health Nutrition 2011)



(Chiang PH, et al., PLoS ONE 2017)

# Health Risk – Height (Po-Huang Chiang)

- Elementary school students

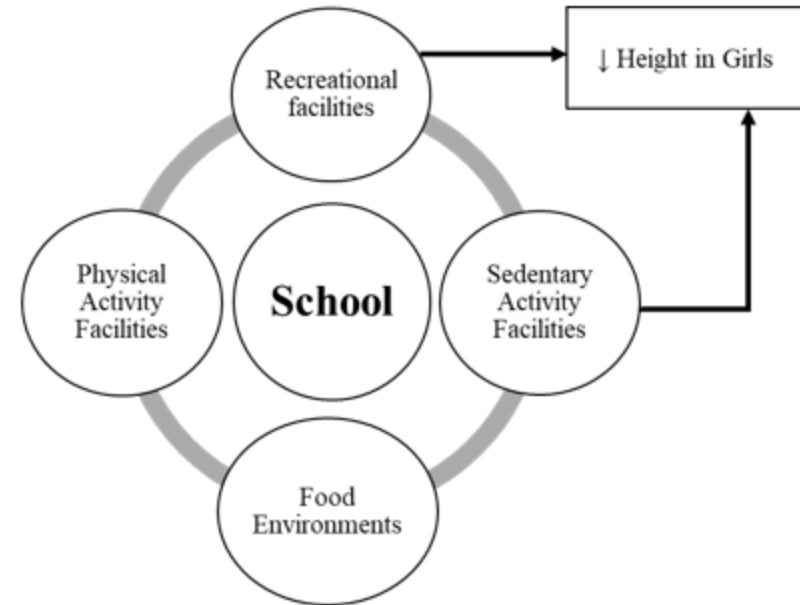


- Shorter stature can compromise OSC among school girls.
- The major determinants in shorter girls are less household income and limited parental education.
- Considering height as an index of growth, girls were taller when they had greater exposure to FS, but this was not so for boys.

## References

- Huang LY, Lee MS, **Chiang PH\***, Huang YC, **Wahlqvist ML\***. Household and schooling rather than diet offset the adverse associations of height with school competence and emotional disturbance among Taiwanese girls. *Public Health Nutrition*. March 22, 2021.
- Chiang PH**, **Wahlqvist ML\***, Lee MS, Huang LY, Chen HH, and Huang STY. Fast food outlets and walkability in school neighborhoods predict fatness in boys and height in girls: A Taiwanese population study. *Public Health Nutrition*. September, 2011; 14(9):1601-1609.

- Junior high school students



- Reading rental shops encourage shortness in girls and boys, dependent on whether there are food and beverage outlets, and, for girls, in relation to puberty.
- Parks also have predisposition towards shortness in girls without regard to puberty, but not in boys.

## References

- Chiang PH**, Huang LY, Lee MS, Tsou HC, **Wahlqvist ML\***. Fitness and food environments around junior high schools in Taiwan and their association with body composition: Gender differences for recreational, reading, food and beverage exposures. *PLoS ONE*. 2017; 12(8): e0182517. (SCI)

# Health Risk – (Rare Disease/DD/ID) (Po-Huang Chiang)

## Glucose-6-Phosphate Dehydrogenase (G6PD) deficiency

Table 1. Annual births versus the incidence of neonatal jaundice with different severity in Taiwan, 2000-2010.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Newborn	305,312	260,354	247,530	227,070	216,419	205,854	204,459	204,414	198,733	191,310	166,886
NJ <sup>a</sup>	17,877 (5.86%)	17,699 (6.80%)	19,295 (7.80%)	19,200 (8.46%)	22,253 (10.28%)	22,809 (11.08%)	24,413 (11.94%)	25,082 (12.27%)	25,590 (12.88%)	25,399 (13.28%)	22,929 (13.74%)
Level of Severity <sup>b</sup>											
phototherapy	12,335 (69%)	12,610 (71.25%)	14,179 (73.49%)	14,046 (73.16%)	15,591 (70.06%)	16,136 (70.74%)	17,152 (70.26%)	17,211 (68.62%)	17,088 (66.78%)	17,080 (67.25%)	15,451 (67.39%)
Intensive Phototherapy	2,498 (13.97%)	2,706 (15.29%)	2,900 (15.03%)	3,164 (16.48%)	4,242 (19.06%)	4,622 (20.26%)	5,003 (20.49%)	6,023 (24.01%)	6,588 (25.74%)	6,521 (25.67%)	6,069 (26.47%)
ET <sup>a</sup>	96 (0.54%)	67 (0.38%)	67 (0.35%)	55 (0.29%)	40 (0.18%)	49 (0.21%)	23 (0.09%)	20 (0.08%)	15 (0.06%)	23 (0.09%)	18 (0.08%)
Untreated	2,948 (16.49%)	2,316 (13.09%)	2,149 (11.14%)	1,935 (10.08%)	2,380 (10.70%)	2,002 (8.78%)	2,235 (9.15%)	1,828 (7.29%)	1,899 (7.42%)	1,775 (6.99%)	1,391 (6.07%)

<sup>a</sup> NJ: neonatal jaundice; ET: exchange transfusion;

<sup>b</sup> Include NJ with phototherapy, intensive phototherapy and ET except without any procedure.

Tsao PC, Yeh HL, Chang YC, **Chiang PH**, Shiao YS, Chiang SH, Soong WJ, Jeng MJ, Hsiao KJ\*. Outcomes of Neonatal Jaundice in Taiwan, 2000–2010: A Population-Based Cohort Study, *Archive of Disease in Childhood*. January **2018**, 0: 1-3.

- The admitted NJ newborns who need to do exchange transfusion were dramatically decreased to 0 ~ 2 cases per year since 2006 nationwide.
- The newborn G6PD screening program almost eliminated “severe morbidity and mortality” caused by NJ with G6PD deficiency in Taiwan.
- Close follow-up of those cases with NJ admission are still needed for early intervention of developmental delay, mental disorders, hearing loss, and speech problems.

Tsao PC, Yeh HL, Shiao YS, Chang YC, Chiang SC, Soong WJ, Jeng MJ, Hsiao KJ\*, **Chiang PH**. Long-Term Neurodevelopmental Outcomes of Neonatal Jaundice in Taiwan from 2000–2010: A Nationwide, Population-Based Cohort Study, *BMC Pediatrics*. (Summited, October, **2018**)

## Developmental Delay/Intellectual Disability

- Su CN, **Chiang PH**, Hsu SW\*. The Utilization of **Chinese Medicine** Outpatient Service of the National Health Insurance among the People with Intellectual Disability. *Journal of Disability Research (Taiwan)*. November **2017**, 15 (3): 151-163.
- Hsu SW, **Chiang PH**, Lin LP, Chang YC, Lin JD. Preventive **Pap Smear Use** among Women with Intellectual Disability, Autism, and Down Syndrome: Long-term Analysis and its following Outpatient Visits. *Journal of Disability Research (Taiwan)*. October, **2017**, 15(2): 106-123.
- **Chiang PH**, Yang TY, Hsu SW\*. Trends in **Ambulatory Care Visits** and **Expenditures** among Persons with **Down Syndrome** in Taiwan, *Journal of Disability Research (Taiwan)*, December, **2015**, 13(4): 268-283.
- **Chiang PH**, Hsu SJ, Hsu SW\*. Trends in the use of **Psychotropic Drugs** among Children and Adolescents with Intellectual Disability in Taiwan, *Journal of Disability Research (Taiwan)*. December, **2015**, 13(4): 284-29.
- Chang YC, Lin JD, Tung HJ, **Chiang PH**, Hsu SW\*. Outpatient **physical therapy utilization** for children and adolescents with intellectual disabilities in Taiwan: A population-based nationwide study. *Research in Developmental Disabilities*. February **2014**, 35(2): 498–505.

# Outcome of Different Sequela in Admitted NJ Newborns

HHA : Hereditary Hemolytic Anemia

Different categories (ICD-9-CM)	Reference newborn <sup>1</sup>		Admitted NJ w/o HHA				Admitted NJ with HHA			
	Total subjects ( Follow 7 years )	12,579 (%)	3,314 (%)	Odd ratio	P-value <sup>2</sup>	183 (%)	Odd ratio	P-value <sup>2</sup>		
Developmental delay (315)	614 ( 4.88 )	337 ( 10.13 )	<b>2.09</b>	<0.001	24 ( 13.11 )	<b>2.37</b>	<0.001			
Infantile cerebral palsy (343)	63 ( 0.50 )	29 ( 0.88 )	<b>1.75</b>	<0.05	5 ( 2.73 )	<b>5.81</b>	<0.001			
Lack of expected normal physiological development (783.4)	218 ( 1.73 )	86 ( 2.58 )	<b>1.50</b>	<0.01	8 ( 4.37 )	<b>2.60</b>	<0.05			
Hearing loss (389)	169 ( 1.34 )	98 ( 2.94 )	<b>2.23</b>	<0.001	6 ( 3.28 )	<b>2.36</b>	<0.05			
Developmental speech or language disorder (315.39)	250 ( 1.99 )	144 ( 4.33 )	<b>2.13</b>	<0.001	10 ( 5.46 )	<b>2.32</b>	<0.05			
Dysarthria; Dyslalia; Speech disturbance (784.5)	178 ( 1.42 )	82 ( 2.46 )	<b>1.68</b>	<0.001	5 ( 2.73 )	1.55	<u>0.345</u>			
Mental retardation (317-319)	118 ( 0.94 )	56 ( 1.68 )	<b>1.73</b>	<0.001	4 ( 2.19 )	1.96	<u>0.194</u>			
ADHD (314.01)	324 ( 2.58 )	145 ( 4.36 )	<b>1.57</b>	<0.001	9 ( 4.92 )	1.38	<u>0.354</u>			
Autism (299.0)	61 ( 0.48 )	28 ( 0.84 )	<b>1.61</b>	<0.05	1 ( 0.55 )	0.80	<u>0.829</u>			

1. Reference newborn were selected from a cohort of randomly sampled one million individuals from the general population in Taiwan (database LHID2000).

2. The **logistic regression** (adjusted gender) for admitted NJ cases (with HHA or w/o HHA ) and reference newborns in each sequela.

# Health Risk – (Rare Disease/DD/ID) (Po-Huang Chiang)

## Long-term neurodevelopmental outcomes of significant neonatal jaundice in Taiwan

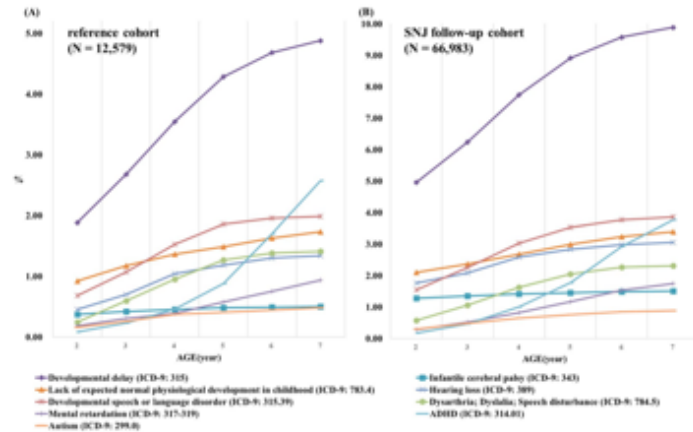


Figure 2. The cumulative incidence of long-term sequelae (ICD-9-CM) in (A) the reference cohort and (B) the SNJ follow-up cohort.

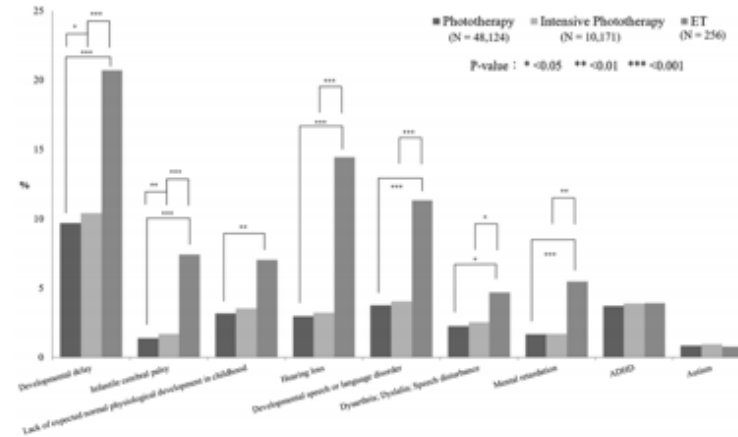


Figure 3. The cumulative incidence of long-term neurodevelopmental sequelae for various intervention subgroups. \*P was calculated using multivariate logistic regression.

- The significant neonatal jaundice (SNJ) follow-up cohort exhibited significantly higher cumulative rates of long-term neurodevelopmental sequelae than did the reference cohort ( $P < 0.05$ ).
- The risks of infantile cerebral palsy, hearing loss, and developmental delay in the SNJ follow-up cohort were between twice and three times of those in the reference cohort after adjusting for gender, comorbid perinatal disorders and urbanization levels.
- All intervention subgroups demonstrated higher risks for long-term neurodevelopmental sequelae than the reference cohort ( $P < 0.05$ ) after adjustment.
- Patients with SNJ are at risk of developing neurodevelopmental disorders during their growth period.
- A scheduled follow-up protocol of physical and neurodevelopmental assessment during early childhood for these SNJ patients would potentially be helpful for the early detection of and intervention for neurodevelopmental disorders.

### Reference

1. Tsao PC, Yeh HL, Chang YC, Shiao YS, Chang YC, Chiang SH, Soong WJ, Jeng MJ, Hsiao KJ\*, Chiang PH\*. Long-term neurodevelopmental outcomes of significant neonatal jaundice in Taiwan from 2000–2003: a nationwide, population-based cohort study. *Scientific Reports* 10, 11374 (2020).

# System-driven Diagnosis System for Primary Care

Major Depression, Anxiety Disorder, **ADHD**,  
Obsessive Compulsive Disorder, Suicide Ideation

> Arch Fam Med. 1995 Mar;4(3):220-7. doi: 10.1001/archfami.4.3.220.

## Brief diagnostic interviews (SDDS-PC) for multiple mental disorders in primary care. A pilot study

M M Weissman<sup>1</sup>, M Olsson, A C Leon, W E Broadhead, T T Gilbert, E S Higgins, J E Barrett, R S Blacklow, M B Keller, C Hoven

Affiliations + expand

PMID: 7881603 DOI: 10.1001/archfami.4.3.220

### Abstract

**Objective:** To pilot test the feasibility and validity of new, brief, structured, physician-administered diagnostic interviews for six mental disorders in primary care patients identified from a patient-completed screen.

**Design:** Comparison of the new diagnostic interviews with the Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders, Revised Third Edition, version P (SCID-P), administered independently by a mental health professional.

> Psychopharmacol Bull. 1995;31(2):415-20.

## The SDDS-PC: a diagnostic aid for multiple mental disorders in primary care

M Olsson<sup>1</sup>, A C Leon, W E Broadhead, M M Weissman, J E Barrett, R S Blacklow, T T Gilbert, E S Higgins

Affiliations + expand

PMID: 7491399

### Abstract

The Symptom Driven Diagnostic System for Primary Care (SDDS-PC) is a new computerized clinical procedure to assist primary care physicians in diagnosing mental disorders during the course of routine practice. It has three components: (1) a 5-minute patient-administered 16-item screening questionnaire, (2) six 5-minute physician-administered diagnostic interview modules based on DSM-III-R criteria, and (3) a longitudinal tracking form. The SDDS-PC covers five disorders (major depression, panic disorder, alcohol abuse or dependence, generalized anxiety disorder, and obsessive compulsive disorder) as well as suicidal ideation. Patients who screen positive for a disorder receive the corresponding diagnostic interview module. Patients who meet mental disorder criteria on the diagnostic interview module are then followed with the longitudinal tracking form. Minor or subsyndromal conditions are also addressed at the physician's discretion. This article describes the development of SDDS-PC and summarizes results from two studies which involved comparisons between the SDDS-PC and independently administered full-length structured diagnostic interviews.

Comparative Study > Arch Fam Med. 1995 Mar;4(3):211-9. doi: 10.1001/archfami.4.3.211.

## Development and validation of the SDDS-PC screen for multiple mental disorders in primary care

W E Broadhead<sup>1</sup>, A C Leon, M M Weissman, J E Barrett, R S Blacklow, T T Gilbert, M B Keller, M Olsson, E S Higgins

Affiliations + expand

PMID: 7881602 DOI: 10.1001/archfami.4.3.211

### Abstract

**Objective:** To develop, validate, and cross-validate a patient-completed screen for multiple mental disorders in primary care.

**Design:** Comparison of a patient self-report screen with an independent diagnostic assessment by mental health professionals using the Structured Clinical Interview for DSM-III-R diagnoses as criterion standard.

# Health Risk – Environment (Po-Huang Chiang)

Variables	Male				Female			
	Coefficient	S.E.	p-value	VIF	Coefficient	S.E.	p-value	VIF
Area deprivation index	-0.181	0.079	0.022 *	1.267	-0.062	0.050	0.216	1.451
Smoking rates (%)	0.050	0.034	0.146	1.551	0.064	0.039	0.100	2.294
PM <sub>2.5</sub> concentration (µg/m <sup>3</sup> )	0.045	0.012	<0.001 *	1.155	0.036	0.010	0.001 *	2.042
Aborigines (%)	-0.010	0.004	0.020 *	1.307	-0.011	0.003	<0.001 *	1.332
Health care facilities (per km <sup>2</sup> )	0.003	0.007	0.708	1.227	0.010	0.004	0.021 *	1.144
Workers in textile industry (%)	0.006	0.022	0.805	1.364	0.008	0.013	0.566	1.234
Elderly population (% , age ≥ 65)	0.172	0.067	0.011 *	1.289	0.025	0.028	0.381	1.480
Adjusted R-square (OLS)	<b>9.2%</b>				<b>13.2%</b>			
Adjusted R-square (GWR)	<b>16.2%</b>				<b>20%</b>			

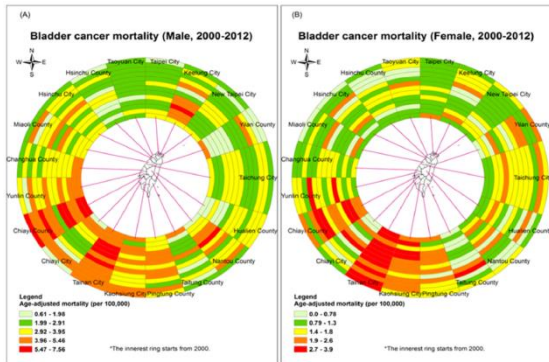


Figure 2. Spatio-temporal distribution of bladder cancer age-adjusted mortality rates with ring map in city or county level during 2000–2012. (A) Male (B) Female.

## Bladder cancer

Yeh HL, Hsu SW, Chang YC, Chan TC, Tsou HC, Chang YC, **Chiang PH\*** (Corresponding author), Spatial Analysis of Ambient PM<sub>2.5</sub> Exposure and Bladder Cancer Mortality in Taiwan. *International Journal of Environmental Research and Public Health*. **2017**, 14, 508; doi:10.3390/ijerph14050508.

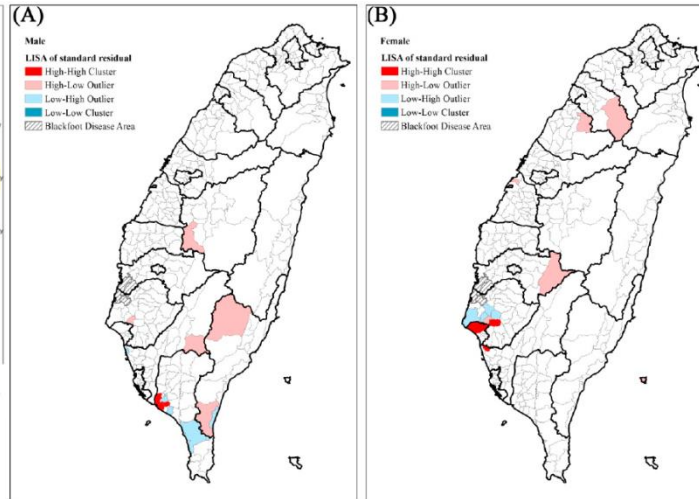


Figure 4. Local Moran's I of the residuals by geographically weighted regression from 2000 to 2012. (A) Male (B) Female.

## Air

- Yeh HL, Tsou HC, Huang LY, Chang YC, **Chiang PH\***. Application of Geographically Weighted Principal Components (GWPCA) – high pollution area. *Taiwan Society for Risk Analysis*. Tainan, Taiwan, January 19, **2018** (Oral Presentation)
- Yeh HL, Hsu SW, Chang YC, Chan TC, Tsou HC, Chang YC, **Chiang PH\***. Spatial Analysis of Ambient PM<sub>2.5</sub> Exposure and Bladder Cancer Mortality in Taiwan. *Asia Conference of Occupational and Environmental Health*. Kaohsiung, April 27-30, **2017**.
- Yeh HL, Tsou HC, **Chiang PH**. Geographically Weighted Principal Components (GWPCA) for spatial heterogeneity analysis of air pollution. *Taiwan Public Health Association*. Taipei, Taiwan, October 15-16, **2016**. (Oral Presentation)
- Chen HH, Shih PTT\*, **Chiang PH**, Yu PH, Tsou HC, Yeh HL. Estimating PM<sub>2.5</sub> Concentration with MODIS for a 2014 Petrochemical Industrial Accident. *The 36th Asian Conference on Remote Sensing (ACRS)*, October 19-23, **2015**. Manila, Philippines. (**Best Presentation Award**)
- **Chiang PH**, Chen CW\*, Hsieh DPH, Chan TC, Chiang HC, Wen CP. Lung cancer risk in females due to exposures to PM<sub>2.5</sub> in Taiwan. *The Open Epidemiology Journal*, June **2014**, 7, 6-16. Invited Article.

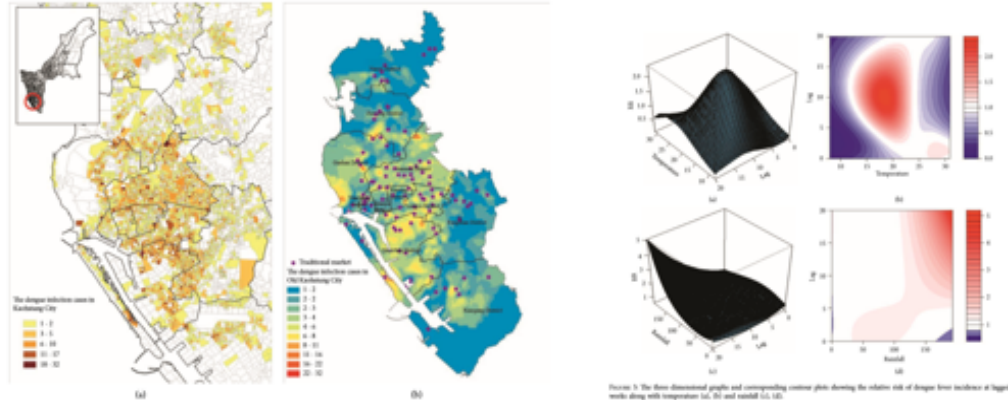
## Soil

- **Chiang PH**, Chan TC, Hsieh DPH\*, A GIS-aided assessment of health hazards of Cadmium in farm soils in central Taiwan, *International Journal of Environmental Research and Public Health*. September, **2011**; 8(9): 3759-3763. doi:10.3390/ijerph8093759.

Disease	Publish	Tools	Result
Chronic Obstructive Pulmonary Disease (COPD)	<ol style="list-style-type: none"> <li>Chan TC, <b>Chiang PH*</b>, Su MD, Liu SY. Health disparities in chronic obstructive pulmonary disease (COPD) medical visits and mortality. PNC 2013 Annual Conference and Joint Meetings. December 10-12, 2013. Kyoto, Japan. (Oral Presentation)</li> <li>Chan TC, <b>Chiang PH</b>, Su MD, Wang HW, Liu MSY*. Geographic Disparity in Chronic Obstructive Pulmonary Disease (COPD) Mortality Rates among the Taiwan Population. PLoS ONE. May 2014. 9(5): e98170. doi:10.1371/journal.pone.0098170. [SCI, IF 2012=3.730; Ranking: 7/56, 12.5% (biology)]</li> <li>Chan TC, <b>Chiang PH</b>, Su MD, Wang HW5, Liu MSY*. Geographic disparity in chronic obstructive pulmonary disease (COPD) mortality rates among the Taiwan population. 台灣地理資訊學會年會暨學術研討會，高雄，2014年6月24日~27日。</li> <li>Chan TC, Wang HW, Tseng TJ, <b>Chiang PH*</b> (Corresponding author). Spatial clustering and local risk factors of chronic obstructive pulmonary disease (COPD). <i>International Journal of Environmental Research and Public Health</i>. (Revised 2015).</li> </ol>	<ul style="list-style-type: none"> <li>➤ Ordinary Least Squares Model (OLS)</li> <li>➤ Spatial Autocorrelation (Global &amp; Local Moran's I)</li> <li>➤ Spatial Interpolation Method</li> <li>➤ Geographically Weighted Regression (GWR)</li> <li>➤ Dasymetric Mapping Methods</li> <li>➤ Agglomerative hierarchical clustering</li> </ul>	研究顯示空氣污染(PM10, SO2, CO)吸菸、社會經濟及山地鄉為重要危險因子
Chronic Kidney Disease (CKD)	<ul style="list-style-type: none"> <li>➤ Chan TC, Fan I, Liu MSY, Su MD, <b>Chiang PH</b>. Addressing Health Disparities in Chronic Kidney Disease. <i>Int. J. Environ. Res. Public Health</i> 2014, 11, 12848-12865; doi:10.3390/ijerph111212848</li> </ul>	<ul style="list-style-type: none"> <li>➤ Ordinary Least Squares Model (OLS)</li> <li>➤ Geographically weighted regression(GWR)</li> <li>➤ Local Moran's I</li> </ul>	研究顯示高教育程度及年長者與慢性腎臟病有正相關，透過地理加權迴歸模型及空間自相關分析發現慢性腎臟病集中於臺南與高雄交界地區
Female Lung Cancer	<ol style="list-style-type: none"> <li><b>Chiang PH</b>, Chen CW, Chiang HC, Yeh HL, Tsou HC, Chang YC, Huang LY. Lung Cancer Risk in Females Due to Exposures to PM2.5 in Taiwan. The 21st Asian Conference on Occupational Health, September 2-4, 2014. Fukuoka, Japan.</li> <li><b>Chiang PH</b>, Chen CW*, Hsieh DPH, Chan TC, Chiang HC, Wen CP. Lung cancer risk in females due to exposures to PM2.5 in Taiwan. <i>The Open Epidemiology Journal</i>, June 2014, 7, 6-16. Invited Article.</li> </ol>	<ul style="list-style-type: none"> <li>➤ Cancer Attribute Death</li> <li>➤ Empirical Bayesian Kriging method</li> <li>➤ Health Impact Assessment</li> </ul>	研究顯示PM2.5濃度每增加10μg/m3，女性肺癌死亡率提高16%(6%-25%)且11%女性肺癌死亡可歸因於PM2.5
Bladder Cancer	<ul style="list-style-type: none"> <li>➤ 鄒惠貞、葉信伶、詹大千、張晏甄、<b>江博煌*</b>，膀胱癌死亡率之地理不平等研究，台灣地理資訊學會年會暨學術研討會，台中，2015年6月29~30日。</li> <li>➤ 鄒惠貞、葉信伶、詹大千、張晏甄、<b>江博煌*</b>，膀胱癌死亡率之地理不平等研究，2015年公衛聯合年會，台北，2015年10月17~18日。</li> </ul>	<ul style="list-style-type: none"> <li>➤ Ordinary Least Squares Model (OLS)</li> <li>➤ Spatial Autocorrelation (Global &amp; Local Moran's I)</li> <li>➤ Geographically Weighted Regression (GWR)</li> </ul>	發現65歲以上老人為男性膀胱癌之重要危險因子；65歲以上老人、抽菸及紡織業為女性膀胱癌之重要危險因子。

# Geographic Epidemiology Research

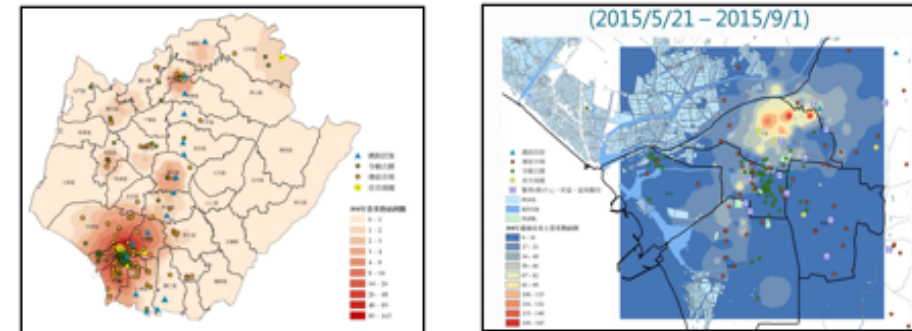
Relationship between the Incidence of Dengue Virus Transmission in **Traditional Market** and Climatic Conditions in Kaohsiung City



- Meteorological analysis results suggested that the relative risk of dengue fever increased when the weekly average temperature was more than 15° Catlagged weeks 5 to 18.
- Elevated relative risk of dengue was observed when the weekly average rainfall was more than 150mm at lagged weeks 12 to 20.
- The spatial analysis revealed that approximately 83% of dengue cases were located in the 1000m buffer zone of traditional market, with statistical significance.

Huang CH, Lin CY, Yang CY, Chan TC, **Chiang PH**, Chen YH. Relationship between the Incidence of Dengue Virus Transmission in Traditional Market and Climatic Conditions in Kaohsiung City. Volume: **2021**|Article ID9916642, <https://doi.org/10.1155/2021/9916642>. *Canadian Journal of Infectious Diseases and Medical Microbiology*

大台南地區登革熱累積病例數與流動人口集中地區之比較



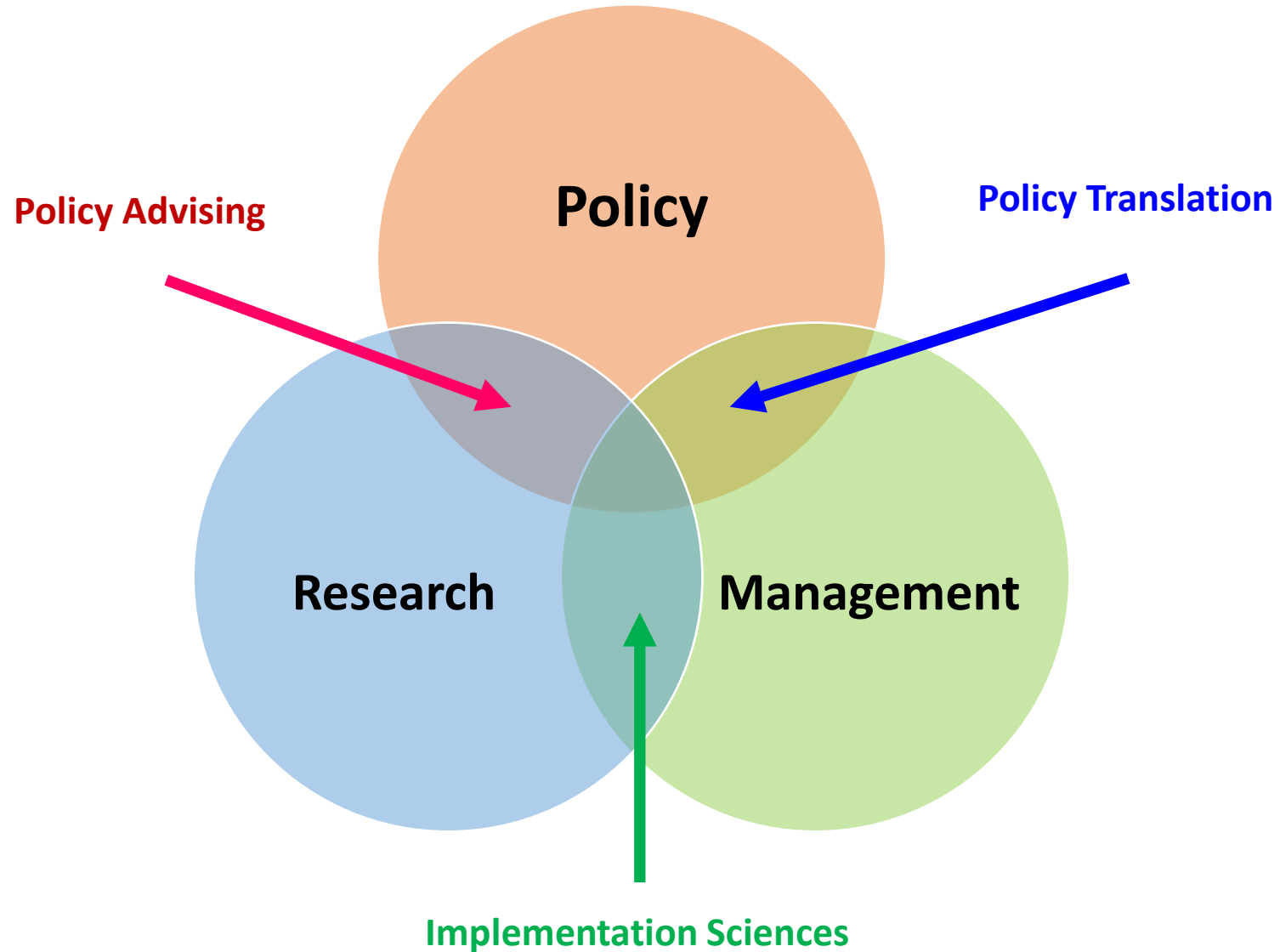
Tsou HC, Yeh HL, **Chiang PH\*** (corresponding author). Spatial trend analysis of dengue fever outbreak *The Journal of Taiwan Association for Medical Informatics*. **2015** Dec 24(4): 39-48.

台南縣病例熱區與傳統市場區域有地理關聯 (在市場周遭1000公尺，成人約10分鐘步行路程範圍內-涵蓋台南縣及市場區域範圍內之部份台南市)，台南縣78%的病例發生在此範圍

- Chen CC, Lin BC, Yap L, **Chiang PH**, Chan TC \*. The Association between Ambient Temperature and Acute Diarrhea Incidence in Hong Kong, Taiwan, and Japan. *Sustainability*. May **2018**, 10, 1417; doi:10.3390/su10051417
- Chan TC, Wang HW, Tseng TJ, **Chiang PH\*** (corresponding author). Spatial clustering and local risk factors of chronic obstructive pulmonary disease (COPD). *International Journal of Environmental Research and Public Health*. **2015** Dec 10;12(12):15716-15727.
- **Chiang PH** (1<sup>st</sup> author), Yang TY, Hsu SW\*. Trends in Ambulatory Care Visits and Expenditures among Persons with Down Syndrome in Taiwan, *Journal of Disability Research (Taiwan)*, December, **2015**, 13(4): 268-283.
- Chan TC, Fan IC, Liu MSY, Su MD, **Chiang PH\*** (corresponding author). Addressing Health Disparities in Chronic Kidney Disease. *International Journal of Environmental Research and Public Health*. 11(12), 12848-12865; doi:10.3390/ijerph111212848. December **2014**
- Tsou HC, Chuang YC, Wu LY, Yeh HL, **Chiang PH\*** (corresponding author). Choosing optimal locations of Automatic External Defibrillators by using GIS spatial analysis – a case study of Taipei City Wanhua District. *The Journal of Taiwan Association for Medical Informatics*. June **2014**, Vol. 23 (2):01-18.
- Chan TC, **Chiang PH**, Su MD, Wang HW, Liu MSY\*. Geographic Disparity in Chronic Obstructive Pulmonary Disease (COPD) Mortality Rates among the Taiwan Population. *PLoS One*. May **2014**. 9(5): e98170. doi:10.1371/journal.pone.0098170.

# NHRI 論壇

# 論壇政策建言及轉譯



# 論壇研議領域

103/9~109

- 新遺傳基因
  - Fabry Disease/兒童發育遲緩/Upper Tract Urothelial Carcinoma(UTUC)/臺灣腦組織資源庫
- 環境與食品安全
  - 氣候變遷與健康/登革熱之防治/加強食品風險評估及預防
- 社會安全網
  - 兒虐之困境與解決之道/兒虐議題之教育推廣/台灣藥物濫用防治策略之行動綱領與方案規劃/精神病人社區照顧需求探討及評估/兒虐的預防及心理治療
- 健康照顧與福利服務
  - 醫療體系在高齡化社會之因應/建構在地老化持續照護模式/健康醫療科技發展政策/醫療與福利服務產業化評估/我國高齡長者健康識能之決定因子與其健康結果/社會福利暨人口政策研究/高齡健康及長照研究中心研議計畫/疫苗之財務規劃
- 預防醫學與健康促進
  - 健康體位生活及文化/運動指引
- 健保體制之檢討與調整
  - 全民健保藥品給付支付制度改革之探討/健保低效益醫療評估研究
- 醫事人力之培育政策
  - 二十一世紀醫事人員的培育/醫療體系轉型與再造

論壇出版品

103-109 論壇共出版21冊

108年出版5冊：

1. 兒虐議題之教育推廣與提升警政人員專業兒保效能
2. 臺灣藥物濫用防治策略：行動綱領與實施方案
3. 低效益醫療評估研究-改善政策之探討
4. 我國高齡長者健康識能之決定因子與其健康結果
5. 精神病人社區照顧需求探討及評估

105年

1. 全球經濟論壇提出全球文化指數報告
2. 解嚴前後之綠島監獄新書
3. 加值食品品類評估及標章設計
4. 21世紀醫事人員應具備專業職能之思考
5. 新媒體應用

106年

1. 全民閱讀與健康
2. 兒童虐待之法律與實務之探討
3. 醫藥關係在臺灣社會的演進與挑戰
4. 兒童發展障礙防治策略
5. 低效益醫療評估研究與政策建議

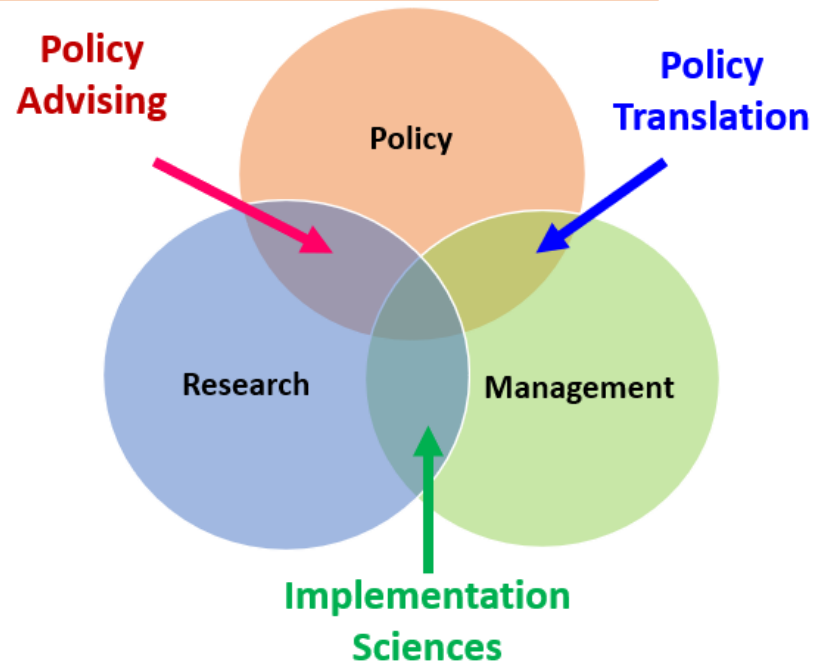
107年

1. 國際通用健康評估之發展：國際化趨勢
2. 低效益醫療評估之國際化趨勢
3. 國際化通用健康評估之發展：國際化趨勢
4. 精神健康與社會工作之發展：國際化趨勢
5. 精神健康與社會工作之發展：國際化趨勢
6. 精神健康與社會工作之發展：國際化趨勢

欲購買上述出版品，可至：  
國家衛生研究院洽詢 (<http://book.nhri.org.tw>) 或 國家書店 (<http://goo.gl/jweQNK>) ;  
或者可前往論壇網頁之出版品書架線上閱覽 (<http://forum.nhri.org.tw/book/>)

Based on the experiences of the NHRI Forum, the establishment of a communication platform, incorporating both information science and learning health systems (**LHS**), would make the policy research process smoother. I realized the important mission of **policy translation** and **implementation**.

- 運用資訊科技於**心理健康**服務之發展
- COVID-19疫情下**醫事人員心理狀態**調查暨國際合作計畫



#### Health Technology Assessment – CDE & NHRI

- 未來**復健人力**發展評估計畫
- 我國全民健康保險運用**抗精神病長效針劑**效益評估及精神醫療未來建議
- 國內外**藥癮替代治療**政策檢視與我國美沙冬治療成本效益分析

- **老人失能**預估模式與智能健康地理媒介平台的研發
- A Learning Health Ecosystem Integrating Clinical and Genomic Information for Children with Developmental Delay/Intellectual Disability (**DDID**)
- **UTUC** Consortium – Unusual high tumor mutational burden and response to immune check point inhibitor in aristolochic acid prevalent urothelial cancer area, and the potential impact of precision cancer treatment strategy



Core Laboratories

- Medical Genomic
- Precision Oncology
- Precision Health
- Big Data Analysis



Universities & Research institutions

International Collaboration

Consortium A

Company IoT

Hospital Medical Agencies

Company Risk

Company Gene

Company Health



醫療風險評估

健康檢查建議

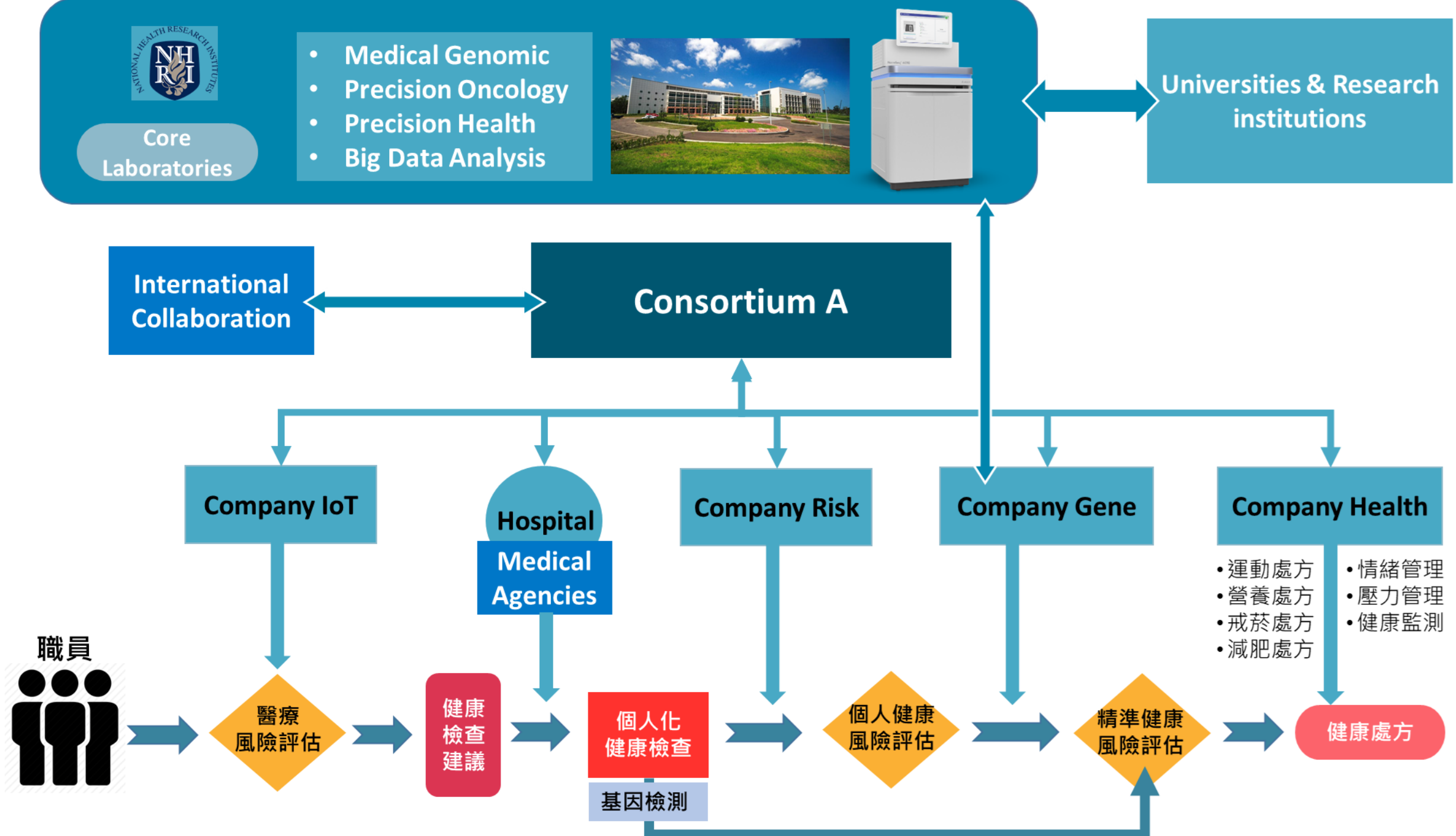
個人化健康檢查  
基因檢測

個人健康風險評估

精準健康風險評估

健康處方

- 運動處方
- 營養處方
- 戒菸處方
- 減肥處方
- 情緒管理
- 壓力管理
- 健康監測



# 高齡健康與長照研究中心研議計畫

## 「高齡健康與長照研究中心研議計畫」諮議特別委員會

計畫主持人：吳成文院士

召集委員：戴東原院長

諮議特別委員(含各面向召集人)

### 面向一

社會福利與長照政策  
(古允文召集人)

### 面向二

健康照護的轉型  
(陳慶餘、黃國晉召集人)

### 面向三

高齡醫學研究與轉譯  
(余幸司、葛應欽召集人)

### 面向四

經濟、財務、效能  
及產業發展  
(石曜堂、謝邦昌召集人)

### 面向五

高齡人口健康與  
長照可近性之社會不平等  
(江東亮、楊志良召集人)

### 面向一 議題委員會

人口研究與社會福利之需求評估  
經濟安全 財務規劃  
長照政策規劃與發展  
角色與責任  
國家、市場 家庭與個人在長照的

### 面向二 議題委員會

轉銜  
社區  
居家

### 面向三 議題委員會

高齡長者重度老化疾病之醫療照護  
高齡長者用藥之合適性與安全性  
高齡長者衰弱 肌少症的預防與治療  
病的影響  
高齡長者身心自主功能對健康與疾  
智慧科技與高齡照顧  
高齡長者失能 失智之世代研究  
高齡醫學人力盤點及人才培育

### 面向四 議題委員會

經濟  
財務  
效能  
產業發展

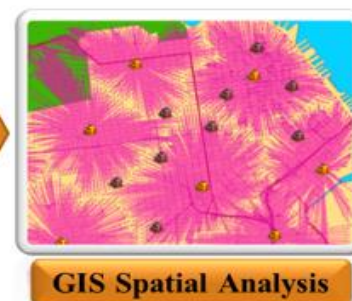
### 面向五 議題委員會

長照不平等  
健康不平等  
原鄉不平等

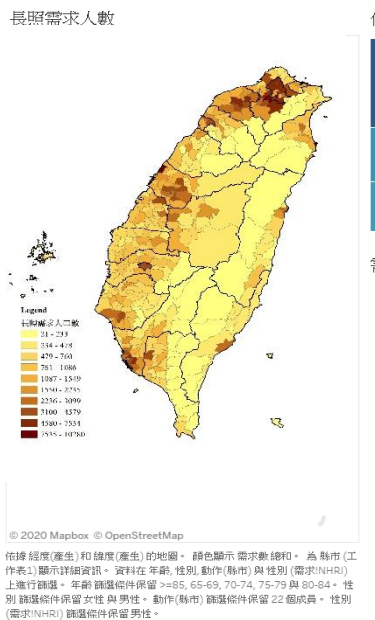
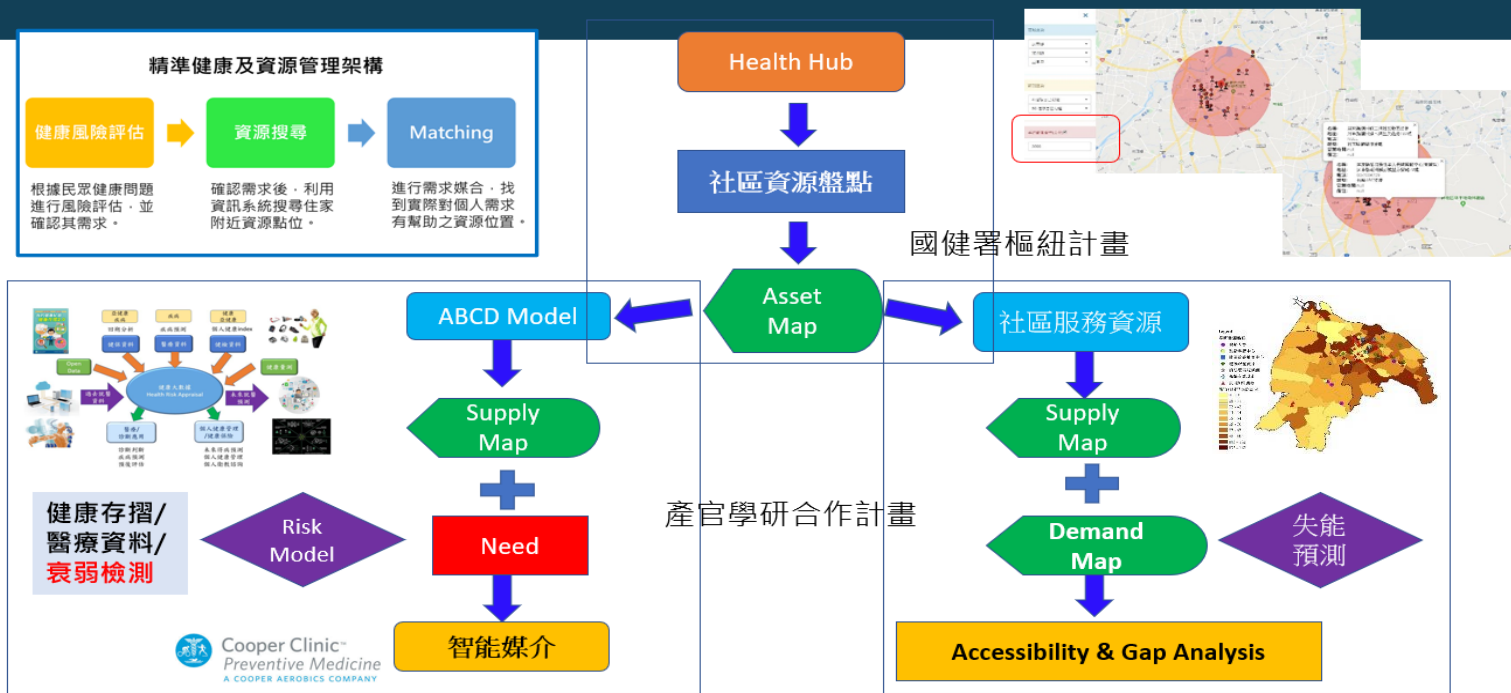
# IT asset based of community development project – Health Hub

## Implementation Focus

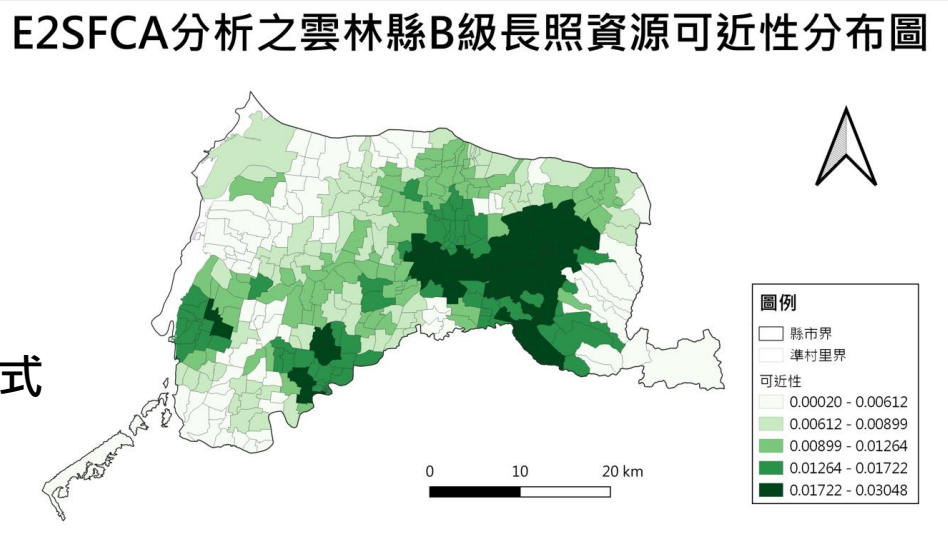
國家級中心設立之任務(解決方式)	重要且急迫之研究或執行重點
1. 人口變遷與社會福利調整的時間軸滾動研究	<ul style="list-style-type: none"> <li>人口與家庭結構之長期研究與監測：以實證為基礎進行高齡社會的治理，包含強化老化基礎研究、進行政策整合研究等</li> <li>訂定各項公平目標：依據人口結構改變，訂定短、中、長期目標，達到監測並能及時調整政策推動</li> </ul>
2. 生活照顧、服務照顧及醫療照顧的整合模式研究	<ul style="list-style-type: none"> <li>以人為中心的福利服務整合：包含建立多專業共同合作團隊、整合服務效能評估與檢核機制的建立等</li> <li>社區健康及生活資源中心：整合醫療、長照及生活照顧資源</li> </ul>
3. 醫療科技及資訊技術的積極研發	<ul style="list-style-type: none"> <li>醫療照護新科技導入：如精準健康管理</li> <li>資訊科技技術的研發，改善長照缺人、缺床、缺資金的問題：如人工智慧(AI)、大數據分析(Big data)</li> </ul>
4. 建立資料分析的國家級整合中心	<ul style="list-style-type: none"> <li>建立中高齡長期追蹤資料庫：助於瞭解不同世代背景之高齡者的世代價值觀與生活經驗</li> <li>以社區健康照護為主的資料資源中心(Health Data Hub)</li> <li>建立全人高齡者功能水平監測系統：有向掌握高齡者健康功能，並達到預防監測之功能</li> </ul>
5. 規劃因地制宜的特色研究	<ul style="list-style-type: none"> <li>建構活躍老化本土化的概念與內涵：並以教育為核心，預防為方向，發展實證為基礎之活躍老化方案</li> <li>善用社區強項資源，發展地方特色方案</li> <li>原鄉長照服務體系之在地化：長照服務應依原鄉文化彈性調整</li> </ul>
6. 在時間軸線上各項財務及經濟安全規劃的整體配合研究	<ul style="list-style-type: none"> <li>以實證為基礎研訂未來長照經濟、財務發展路線：如「給付及支付基準」的修正等</li> </ul>
7. 訂定國家超高齡社會因應措施	<ul style="list-style-type: none"> <li>政策執行需要部門溝通機制：如中央與地方政府</li> <li>高齡與長照服務的彈性建置：因不同地區及發展狀況有不同的需求與限的彈性制度</li> <li>建構「新經濟社會安全網」：包含一般民眾老後的失能經濟盤點，精算財產規劃的相關保護措施</li> </ul>



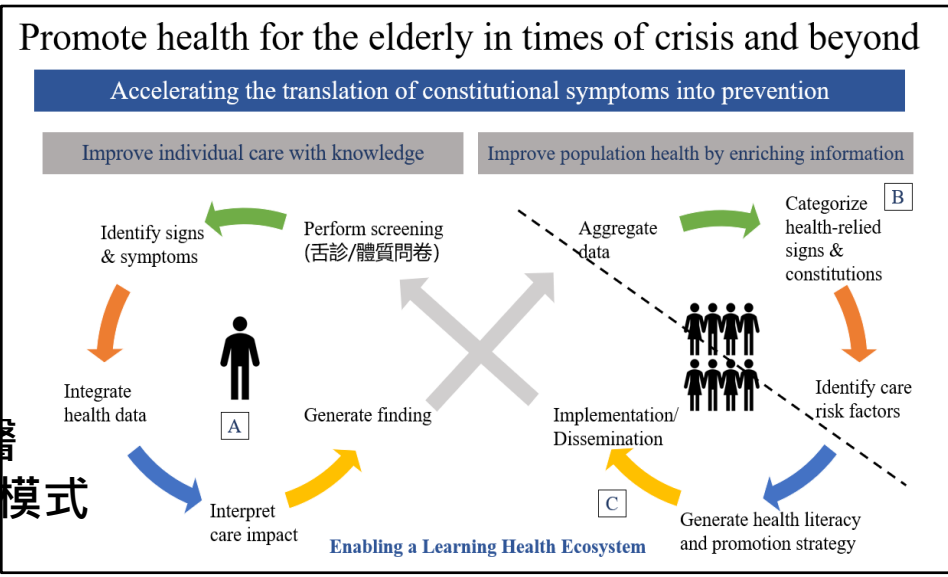
## Health Hub 社區健康資源智慧媒介



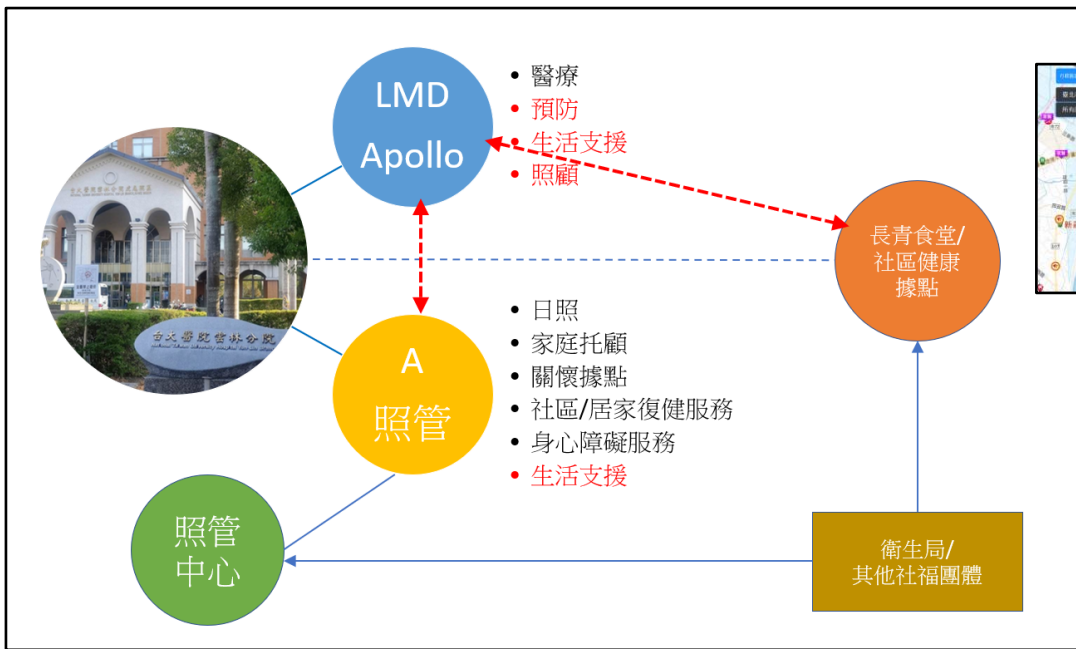
# IT asset based of community development project – Health Hub



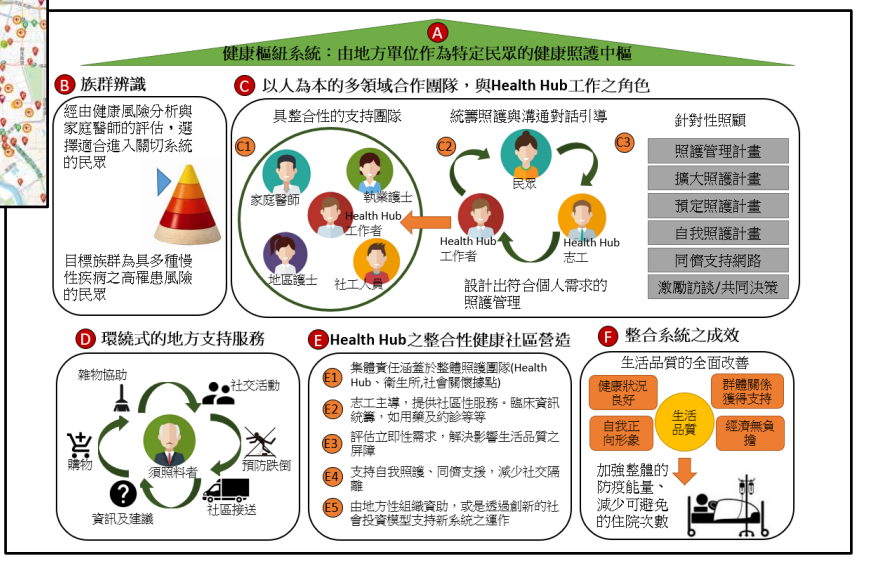
雲林模式



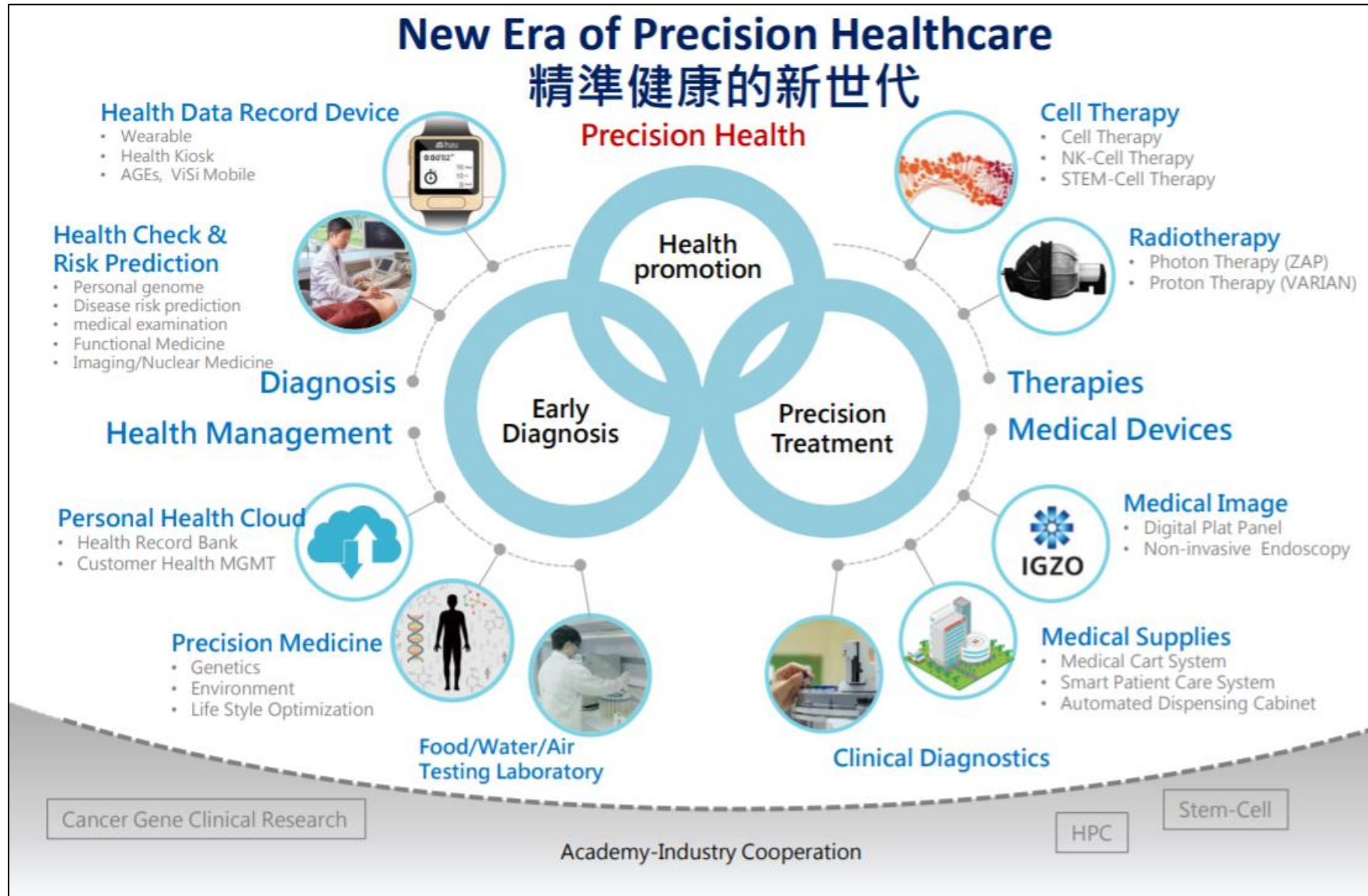
高屏中西醫  
地區健康促進模式



萬華模式

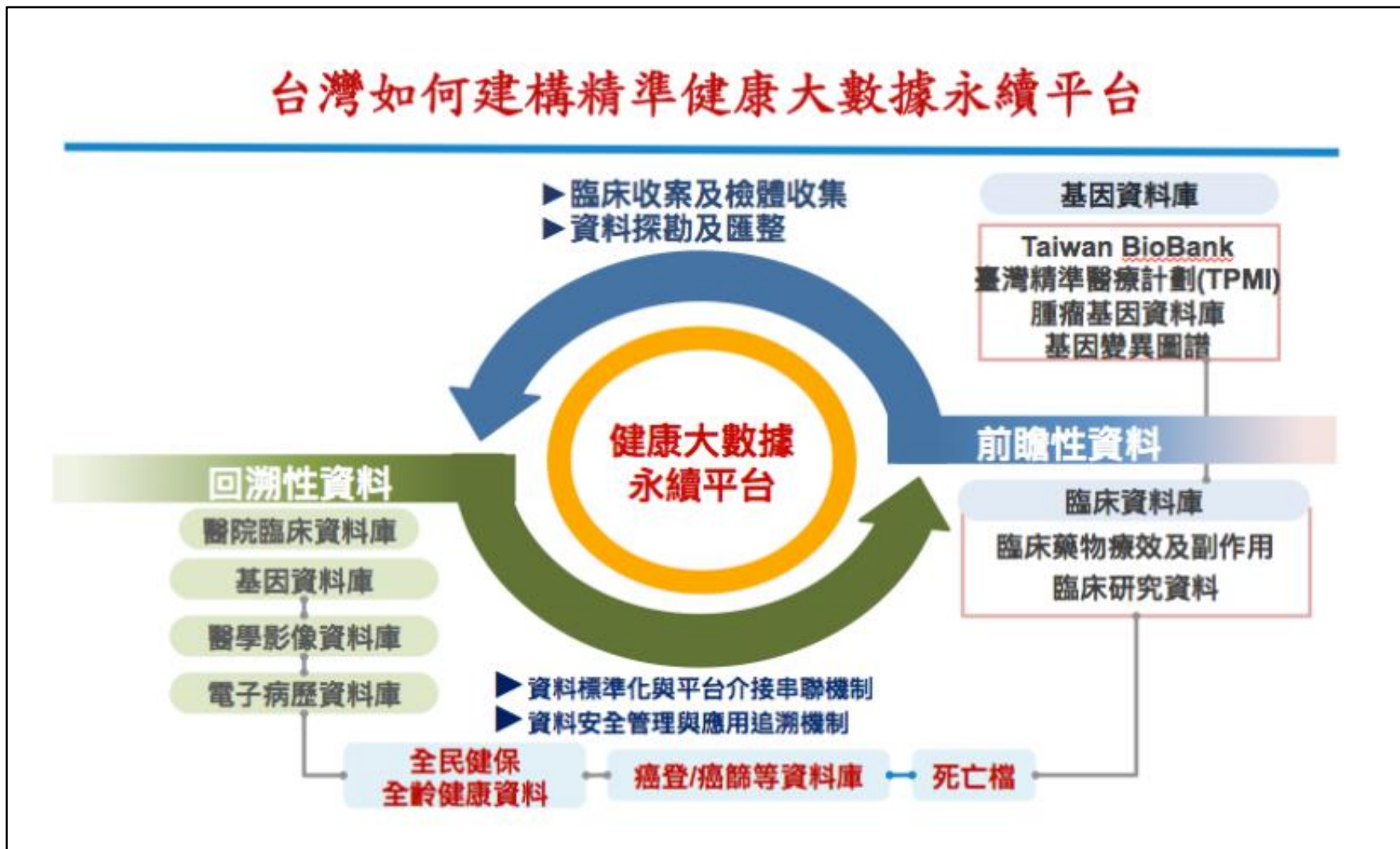


# Individualized Medicine -> Precision Medicine -> Precision Health -> Health for All for all Ages

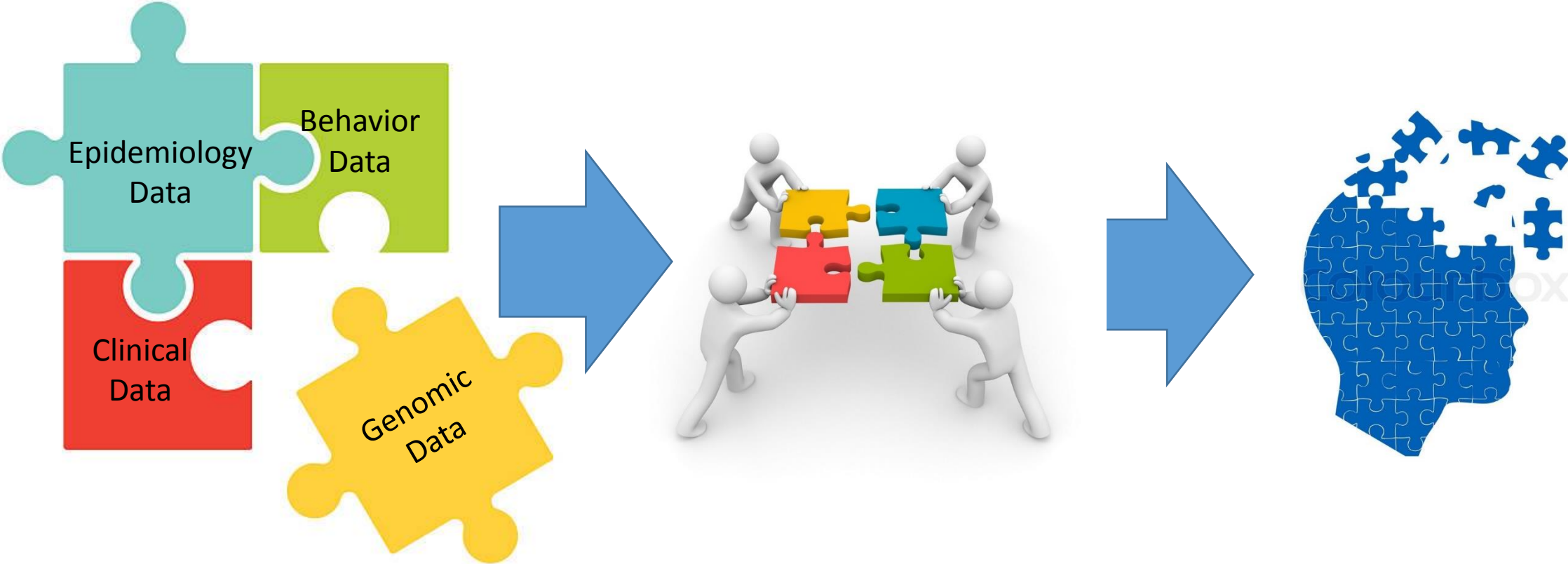


# 2021 BTC 委員總建議

## 台灣如何建構精準健康大數據永續平台

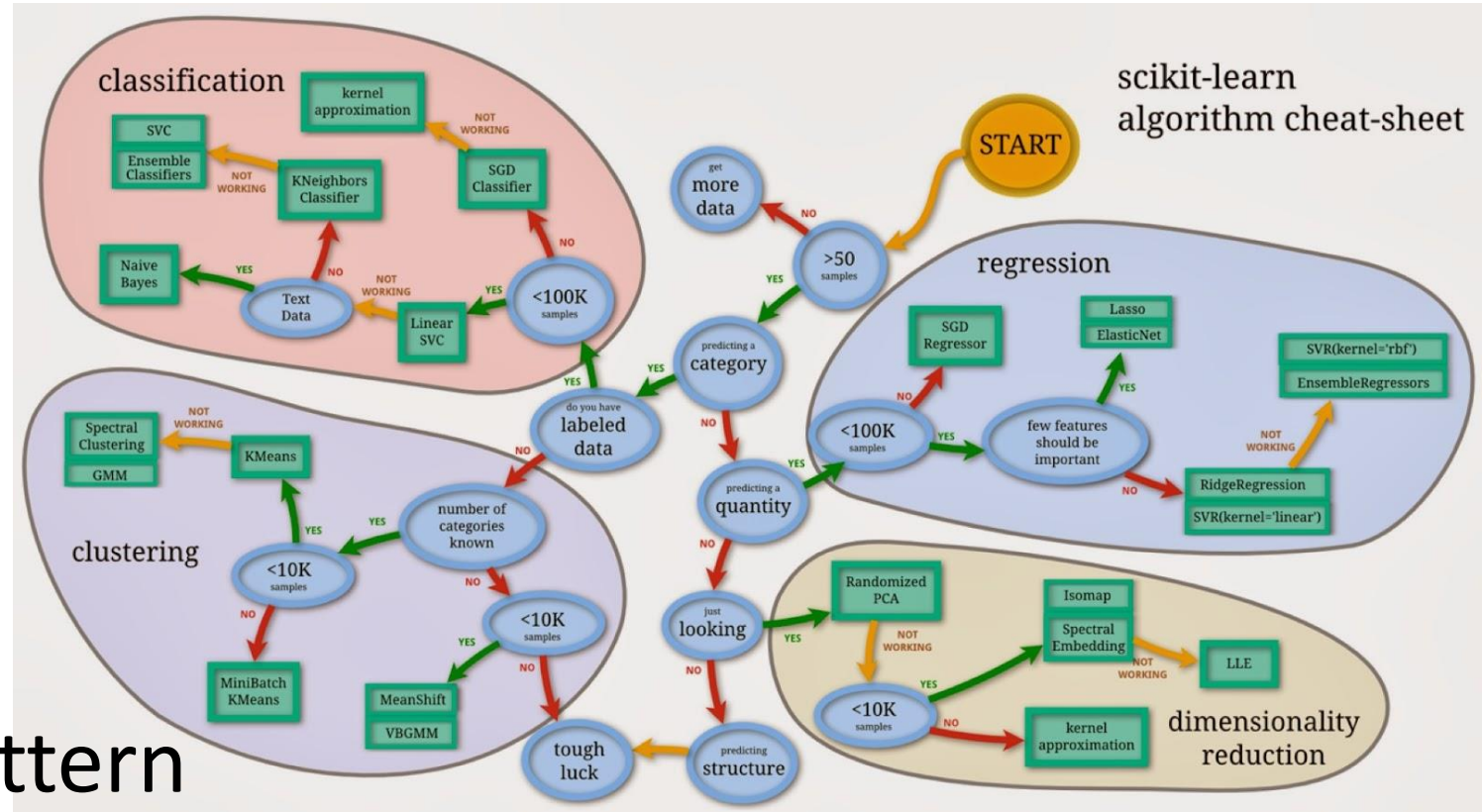


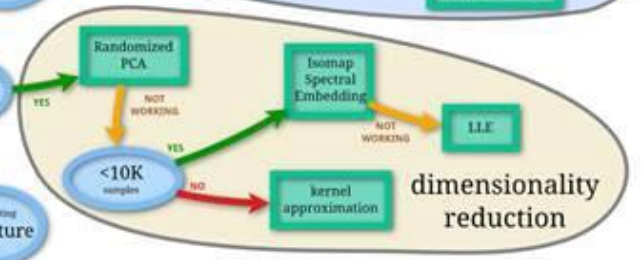
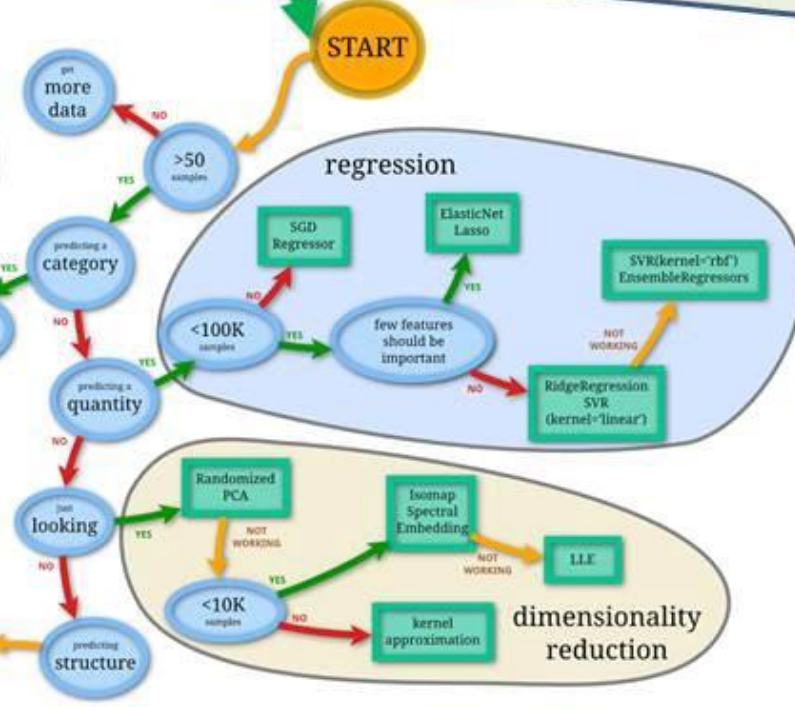
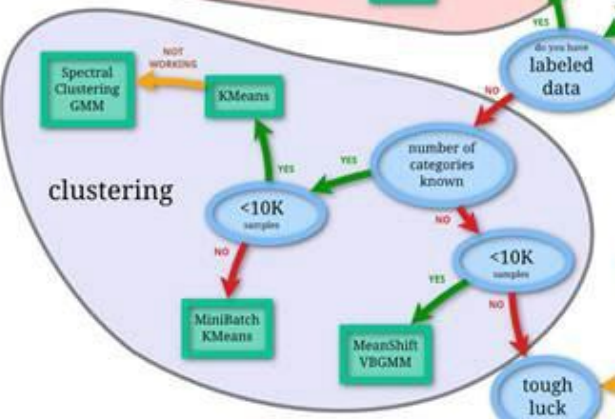
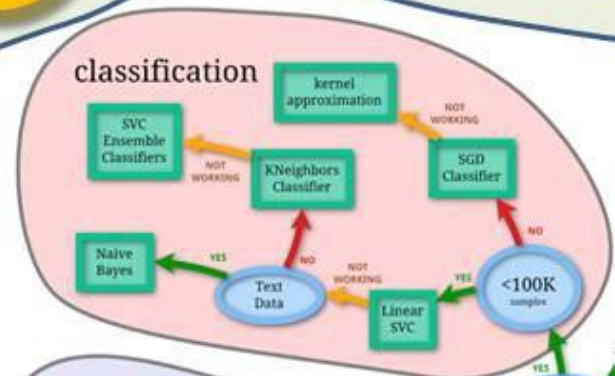
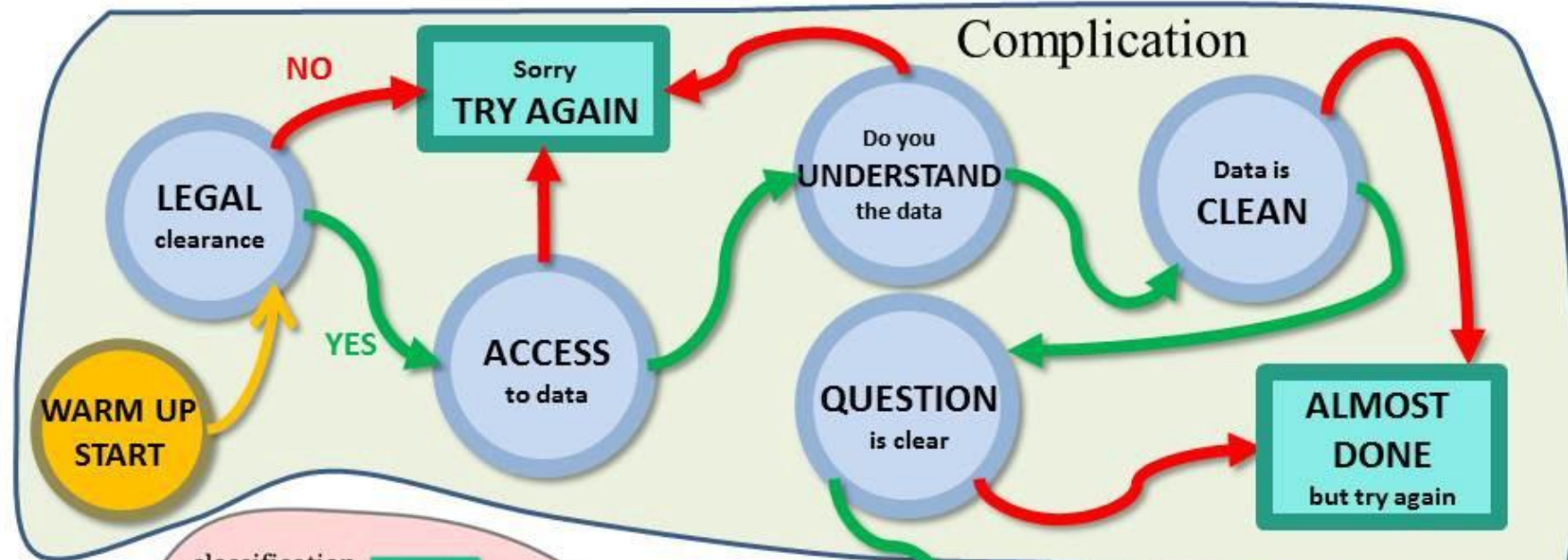
# Data Puzzle



# AI – Typical Machine Learning Tasks

- Concept learning
- Function learning
- Predictive model
- Clustering
- Finding predictive pattern





***THANK YOU FOR LISTENING***



- **健康管理師認證課程 (護理、社工、醫資)**
- **Health Hub (以社區資產為基礎的健康樞紐)**
- 兒童發育之精準健康管理
- 兒童及青少年SDDS-PC (國際合作)

職務 | 地區 | 排序 | 距離

8/16 【台中柏伙】健康管理師  
★ 臺北市北投健康管理醫院  
月薪31,000~36,000元  
台中市西屯區

8/17 健康管理師  
★ 康聯生醫科技股份有限公司  
月薪38,000~42,000元  
台北市中正區  
距捷運善導寺站40公尺

【半導體大廠】聯合招募  
贊助 台積電、應用材料、穩懋半導體等  
超過15家國內、外知名企業  
歡迎社會新鮮人或產業精英一同加入!

8/10 健康管理護理師  
★ 尹書田醫療財團法人書田泌尿科眼科診所  
待遇面議  
台北市大安區

8/16 護理師(健檢/健康管理師)(無夜班/薪資高)  
★ 臺北市北投健康管理醫院  
月薪32,000~42,000元  
台北市北投區

8/19 健康管理中心-事務員  
★ 臺北醫學大學附設醫院  
月薪28,000~30,000元  
台北市信義區

8/19 【南科】護理健康管理師  
★ 直得科技股份有限公司  
月薪30,000~35,000元

職務 | 地區 | 排序 | 距離

8/17 【臺南六順】健康管理師  
★ 六順診所  
月薪28,000~30,000元  
台南市學甲區

8/16 健檢護理師(永越健康管理中心)  
★ 教學醫院\_西園醫療社團法人西園醫院  
月薪32,000~48,000元  
台北市萬華區

8/13 初級健康管理師(櫃檯)-台中  
★ 拉菲爾人本診所  
月薪27,000~35,000元  
台中市市區

8/15 健康管理師  
★ 奧森馥能管理顧問股份有限公司  
月薪26,000~40,000元  
台中市南區

月薪36K起+免經驗#服務專員  
贊助 亞洲最佳企業雇主-永慶房屋  
不捐業績X工作8小時X離家近X獎金  
雙北重金招募→視面試預約中

5/13 健康管理專員  
★ 光麗生醫股份有限公司  
月薪30,000~45,000元  
新北市汐止區

8/20 【大台北】門市健康管理顧問  
★ 尚禾亞康養國際集團\_尚禾亞國際貿易有限公司  
月薪30,000~60,000元  
台北市中山區  
距捷運忠孝新生站480公尺

健康管理者(1782筆)

地區 ▾ 職類 ▾ 最相關 ▾

健康管理師  
康聯生醫科技股份有限公司  
月薪3.8萬~4.2萬元 | 1年以上 | 台北市中正區  
距捷運善導寺站40公尺

健康管理師  
清泉醫院  
月薪2.6萬~3.8萬元 | 經歷不拘 | 台中市大雅區

健康管理師  
輝雄診所  
月薪3萬~4.5萬元 | 5年以上 | 台北市中山區  
距捷運行天宮站370公尺

初級健康管理師(櫃檯)-台中  
拉菲爾人本診所  
月薪2.7萬~3.5萬元 | 經歷不拘 | 台中市市區

全家便利商店→兼差"薪"選擇!  
不限學經歷,時薪175~205元  
下班賺更多 | 時段由你決定,即刻加入

【南科】護理健康管理師  
直得科技股份有限公司  
月薪3萬~3.5萬元 | 經歷不拘 | 台南市新市區

健康管理師(台北)  
美兆診所  
月薪3萬~4.5萬元 | 經歷不拘 | 台北市中正區  
距捷運台北車站250公尺

健康管理者(1782筆)

地區 ▾ 職類 ▾ 最相關 ▾ 更多 ▾

健檢中心-健康管理師  
安慎診所  
月薪3.2萬~3.7萬元 | 1年以上 | 新竹市

健檢中心/健康管理師  
聯新國際醫院(原名稱:堰新醫院)  
月薪2.6萬~3.6萬元 | 2年以上 | 桃園市平鎮區

新光人壽-健康管理師  
新光金融控股股份有限公司(新光金控/新光人壽/新...  
月薪3.4萬元 | 1年以上 | 台北市中正區  
距捷運台北車站270公尺

健康管理師\_汐止\_10032  
緯創資通股份有限公司  
月薪3萬~6萬元 | 5年以上 | 新北市汐止區

AB0102健康管理師\_大安區  
杏一醫療用品股份有限公司  
月薪3萬~3.6萬元 | 經歷不拘 | 台北市大安區

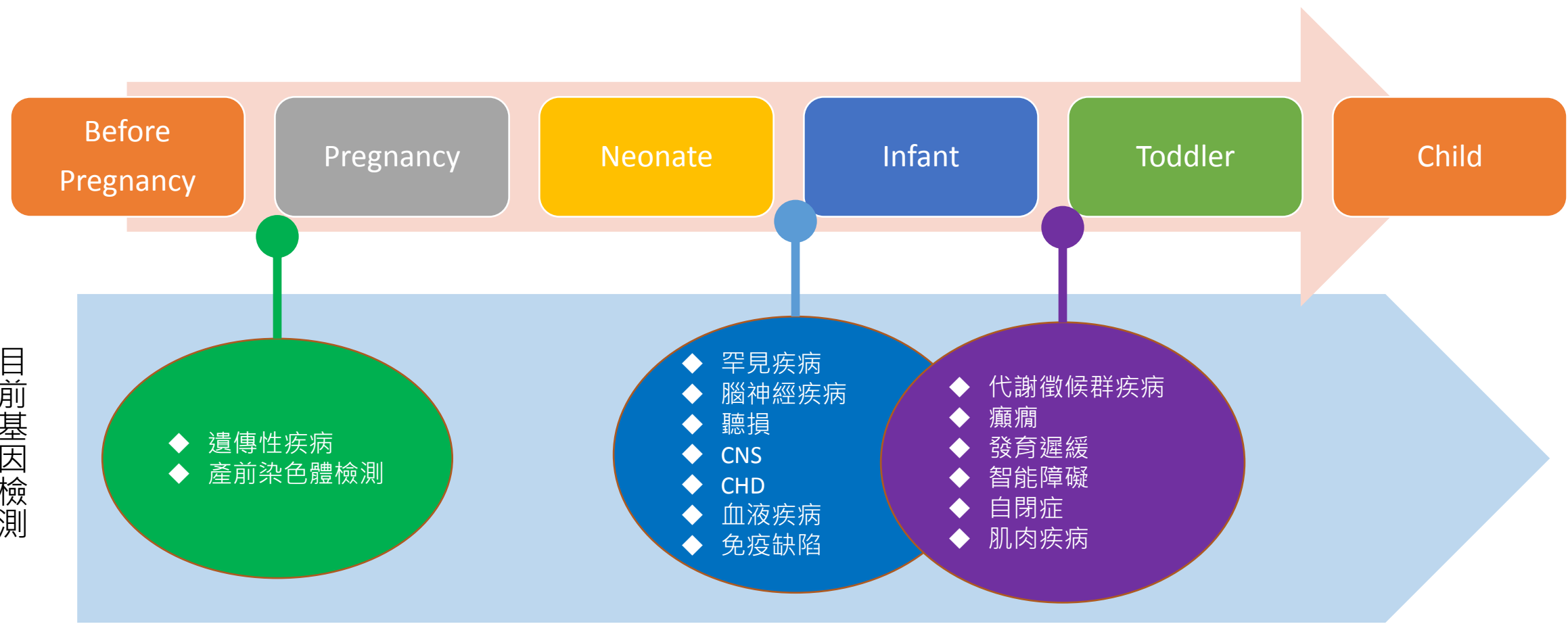
AB0102健康管理師\_松山區  
杏一醫療用品股份有限公司  
月薪3萬~3.6萬元 | 經歷不拘 | 台北市松山區

AB0102健康管理師\_文山區  
杏一醫療用品股份有限公司  
月薪3萬~3.6萬元 | 經歷不拘 | 台北市文山區

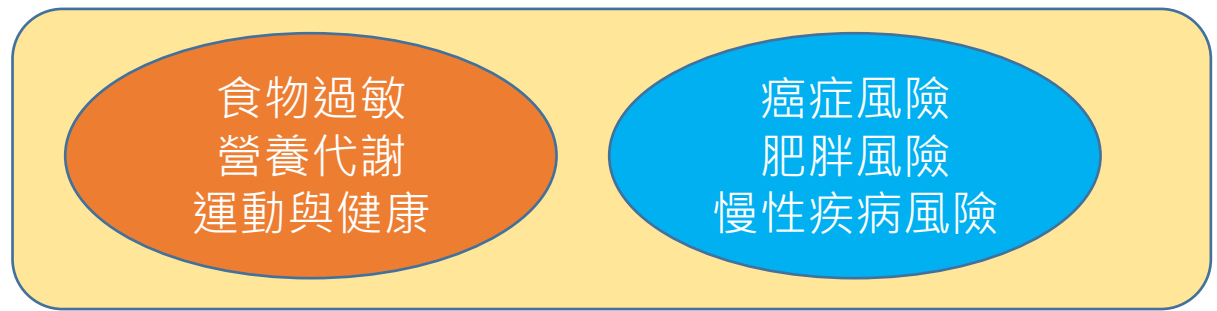
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- Health Hub (以社區資產為基礎的健康樞紐)

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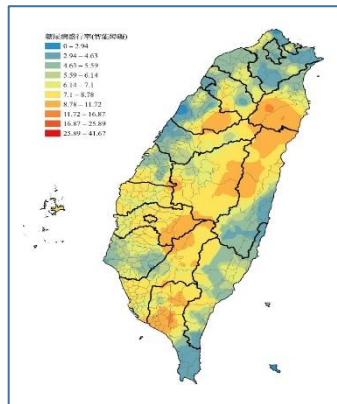
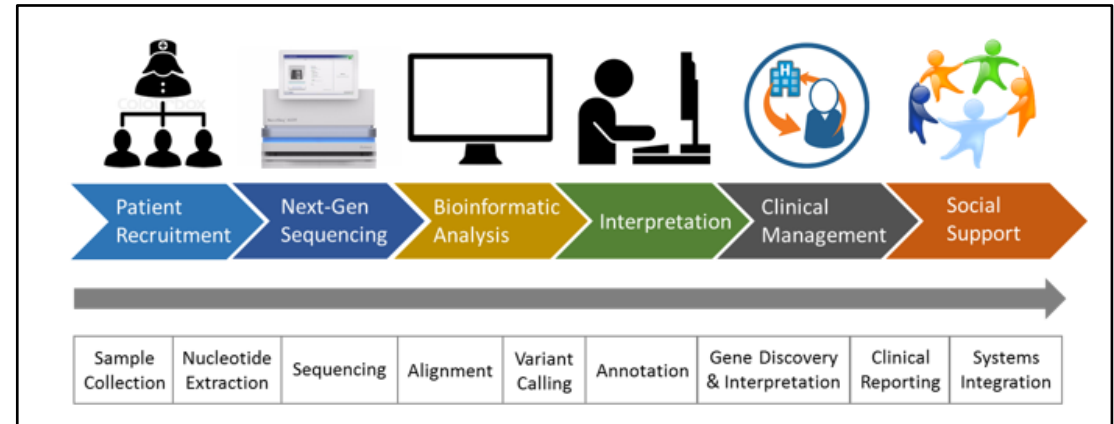
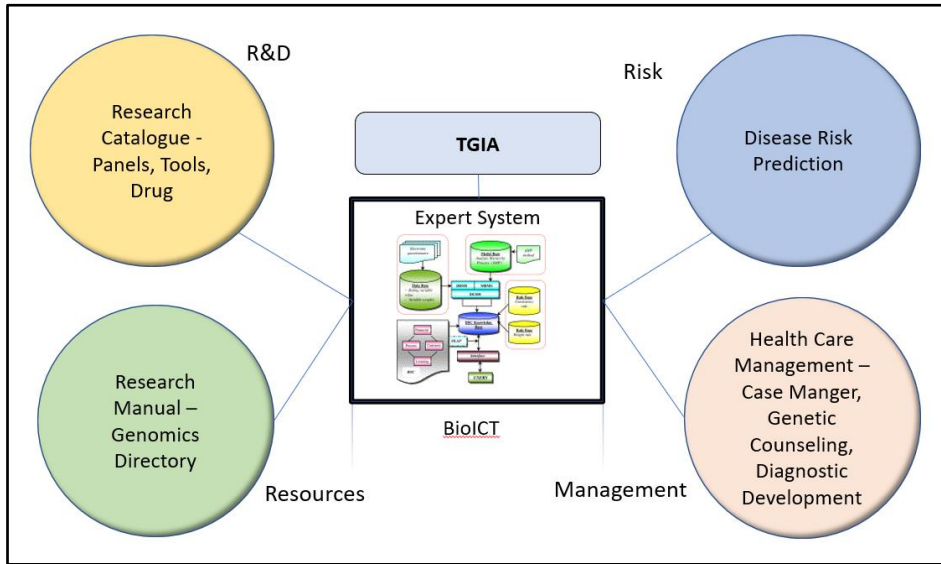
目前基因檢測



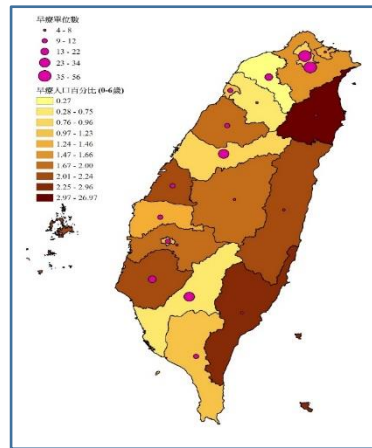
其他健康風險



# A Learning Health System Integrating Clinical and Genomic Information to Enable Early Detection and Early Intervention for Children with Developmental Delay/Intellectual Disability



◆ 智能障礙組糖尿病鄉鎮盛行率



◆ 早療單位與早療人口分布圖

